

School of Computer Science & Applications ACADEMIC HAND BOOK



Ordinance & AcademicRegulations Bachelor of Computer Application (BCA)



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1. **PREAMBLE**

As the technological enhancement and availability of technology to every person of world a huge demand of computer skilled professional is ample. In this world of opportunities, impact of higher education is so inevitable for getting desired guidance to secure, right kind of employment. It is compulsory to pursue higher related- education in the best institutes. In this direction major reforms are to opt Learning Outcomes-based Curriculum Framework (LOCF), specially, in the undergraduate education (UG) program, that ensure student centric, interactive and outcome-oriented goals, objectives and skill enhancement to acquire. LOCF along with National Education Policy (NEP) in this regard ensure uniform education fabric of standard and content delivery education all over the nation. This syllabus development is a step to ensure development of the undergraduates for both, academia and employability. Latest technical trends, industry standards, market needs, and interests of students, future expectations the need has been taken into consideration while developing the syllabus.

The LOCFinculcation is to build up a comprehensive course structure with detailed syllabus. This is an effort to develop a student centric framework where they are expected to have a concrete understanding of fundamentals of computer science along with the latest trends and techniques like Artificial Intelligence, Internet of Things (IoT), Machine Learning (ML) with advanced skill sets that include Mobile Application environment, Object Oriented Programming (OOPs) among many courses. Each course aims to present learning targets and objectives, and thus provide learning and teaching strategies, assessment and resources. The students shall be equipped with the latest trends in computer science, after completion of the programme

With this an education temple of nation should ensure an environment, which should be bias free, irrespective of cast, religion, races, sex difference and easily available to youths of the nation. The human value, ethics and environmental teaching is also introduced with this.

2. DEFINITIONSANDNOMENCLATURE

IntheseRegulations, unless the context otherwise requires:

- 1. "Programme" means Degree Programme like Bachelor of Computer Application (BCA). Hence further BCA and BCA (Cloud and Cyber Security) will call BCA in this document.
- 2. "GPA" means Grade Point Average.
- 3. "Course" means a theory or practical subjects that are normally studied in a semester.
- 4. "VC,Vice-ChancellorofIIMT-University" meanstheHeadoftheUniversity.
- 5. "Registrar"istheHeadofallAcademic andGeneralAdministrationoftheUniversity.
- 6. "Dean" means the authority of the school who is responsible for all academic activities of various programmes and implementation of relevant rules of these Regulations pertaining to the AcademicProgrammes.
- 7. "COE, Controller of Examinations" means the authority of the University who is responsible for allactivities relate dotheUniversityExaminations,publicationofresults,awardofgradesheetsanddegrees.



- 8. "Dean Student Welfare" is responsible for all student related activities including student discipline, extra and co–curricular activities, attendance and meetings with class representatives, Student Council and parent–teacher meeting.
- 9. "HoD" means the Head of the Department concerned.
- 10. "University" means IIMT-University, Meerut.
- 11. "TCH" means Total Contact Hours-refers to the teaching-learning periods.
- 12. "DEC"meansDepartmentExamCommittee.
- 13. "BoS"meansBoardofStudies.
- 14. "ACM" means Academic Council Meeting the highest authoritative body for approval for allAcademicPolicies.
- 15. "Class Coordinator" is a faculty of the class who takes care of the attendance, academic performance, and the general conduct of the students of that class.
- 16. "IA" is Internal Assessment which is assessed for every student for every course during these every.
- 17. "ESE" is End Semester Examination conducted by the University at the End of the Semester for allthecoursesofthatsemester.
- 18. "UGC" means University Grants Commission.
- 19. "MHRD" means Ministry of Human Resource Development, Govt. of India.
- 20. "AICTE" means All India Council of Technical Education.
- 21. "HEI" means Higher EducationInstitutions.
- 22. "PRN" means Permanent Registration Number.
- 23. "CGPA" means Cumulative GPA.
- 24. "SGPA" means Semester GPA.
- 25. "NC" means Non-Credit.

3. VISION AND MISSION OF THE SCHOOL

VISION

To achieve heights in computer education domain by creating appropriate environment for students, faculties and staff with availability of latest technological infrastructure.

MISSION

- 1. To dissipate appropriate all types of practical and theoretical computer science knowledge to our young students.
- 2. Inculcate professional efficiency in the students for brighter career opportunity as per industry latest requirement.
- 3. To provide learning environment for students with our reputed academics partner in the field of computer science.
- 4. To prepare our student as an IT professional with full of ethics and human values.

4. **PROGRAM EDUCATIONAL OBJECTIVES (PEO)**

- **PEO1:** Thegraduates' programs are designed to produce skill graduates who will be competent professionals in academics, industry and organizations of government and private sector.
- **PEO2:** The pass out graduates will be able to handle the fast-changing world requirements and will become effective professionals.



PEO3: The successful Graduates will be a good team leader and will be able to lead the team to find optimal solutions and achieve expertise in their field or become entrepreneurs and play the leading roles in all types of organizations.

5. **PROGRAM OUTCOMES (PO'S)**

- **PO1**: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **PO2:** Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO3:** Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **PO4:** Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **PO5:** Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools prediction and modeling to complex engineering activities with an understanding of the limitations.
- **PO6:** The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- **PO7:** Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and the need for sustainable development.
- **PO8:** Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **PO9:** Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **PO10:** Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and receive clear instructions.
- **PO11:** Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in team, to manage projects and in multidisciplinary environments.
- **PO12:** Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

6. **PROGRAM SPECIFIC OUTCOMES (PSO'S)**

PSO1: The graduates are proficient in fundamental principles and methods of Computer Science, Mathematical and Scientific reasoning and are able to:



- Apply fundamental concepts of integration, differentiation, vector calculus, probability & statistics, and discrete mathematics.
- Design, create & evaluate algorithms appropriate to specific problems.

PSO2: The graduates have understanding for:

- Demonstrate capability for computers, computer network and server environments and there troubleshooting.
- Capacity to handle cloud computing environment and solutions.
- Well defined knowledge for solving problems of security and threats in information knowledge domain.

7. ADMISSION

Hence further BCA and BCA (Cloud and Cyber Security) will be called BCA in this document. The admission policy and procedure shall be decided from time to time by the University based on the guidelines issued by the UGC/ Ministry of Education, Government of India. Seats are also made available for Non-Resident Indians and foreign nationals, who satisfy the admission eligibility norms of the University as per the UGC Norms.

8. ELIGIBILITYIN ALL YEARS AS PER NEP (ENTRY)

- 8.1 Candidate should have passed "10+2" exam (recognized board) in any stream with at least 40% in aggregate.
- 8.2 Admission will be based on academic record.
- 8.3 The Academic Council shall have power to amend or repeal the eligibility criteria laid down at clause 8.1& 8.2, if required.

9. CURRICULUM

The curriculum for Bachelor of Computer ApplicationProgramme is designed to have minimum and maximum credits as per the scheme of 120-160 credits that are distributed across six semesters of study for the award of degree.

10. MEDIUM OF INSTRUCTION

The medium of instruction is ENGLISH for all courses, examinations, seminar presentations and projectreports.

11. CHOICE BASED CREDIT SYSTEM (CBCS)/ LOCF/ OBE

- **11.1** The three-year curriculum has been divided into six semesters. Semester Ist to VIth shall include lectures, tutorials, practical, seminars and project work as defined in the scheme of instruction and examination issued by the University from time to time.
- **11.2** The curriculum will be also including such other curricular, co-curricular and extracurricular activities as may be prescribed by the University from time to time. Credit System BCA programme will have a curriculum in which every course will be assigned certain credits reflecting its weight and contact periods per week, as given below:



Lecture period (L) per week
 Tutorial period (T) per week
 Practical period (P) per week

= 1 Credit = 1 Credit = 0.5 Credit

In addition to theory and laboratory courses there may be other courses such as seminar, project etc., which will be assigned credits as per their contribution in the programme without regard to contact periods.

11.3 Minimum Credit Requirements

The minimum credit required for award of a BCA degree is 120. This is normally divided into theory courses, tutorials, laboratory courses, seminars and projects in duration of six semesters. The credits are distributed semester wise as shown in the structure and syllabus manual of the programme. Courses generally progress in sequences, building competencies and their positioning indicates certain academic maturity on the part of the learners. Learners are expected to follow the semester wise schedule of courses given in the syllabus manual of the programme.

11.4 Course Categories

Under CBCS, the degree programme will consist of the following categories of courses as per following table:

S. No.	Category	
1.	Core Course (Theory)-CC	
2.	Core Course (Practical)-CC(P)	
3.	Discipline Specific Elective (Theory)- DSE	As per Format 1 & 2 of
4.	Generic Elective (Theory)-GE	CBCS
5.	Ability Enhancement Compulsory Courses-AECC	
6.	Skill Enhancement Courses-SEC	
7.	Research Project (RP)	

Table 11.4 - Distribution of Credits (Evaluation Scheme)

11.5 Curriculum Structure

The curriculum for BCA will contain a listing of all courses, with each course having a course category, course number, course title, number of contact periods per week, number of credits assigned, and the marks assigned to various components of evaluation.

11.6 Approval of the Curriculum

The curriculum for BCA programme will be prepared by the department concerned and will be approved by the Board of Studies of the department. The Academic Council for final approval and then the curriculum will be implemented. Same procedure shall be



used for any modification in the curriculum.

12. REGISTRATION FOR A COURSE IN A SEMESTER

A student will be eligible for registration of courses only if he/she satisfies the regulation (progression), and has cleared all dues to the University, Hostel and Library up to the end of the previous semester if student is not debarred from enrolment on disciplinary grounds.

The university follows a flexible Choice Based Credit System and slot-based table. Accordingly, the students shall be given the option for selecting their courses, credits, teachers, slots and create their timetable. The student is given the option of selecting the number of credits to undergo in a semester, subject to the curriculum requirements.

Except for the first-year courses, registration for a semester will be done during a specified week before the start of the semester as per the academic calendar.

Late registration /enrolment will be permitted by the Dean of the School for genuine cases, on recommendation by the Head of the respective department, with a late fee as decided from time to time.

The student shall make the choice of course in consultation with the Class Coordinator and as stipulated from time to time.

Students shall have to pay additional fee as prescribed, for registering in certain elective courses under Generic Electives courses offered by certain specific departments and for higher level Foreign Languages, as decided from time to time.

13. ATTENDENCE

The faculty handling a course must finalize the attendance, three calendar days before the last instructional day of the course and submit to the HoD through the class teacher.

13.1 Condonation of Medical Cases

- a. A student with less than 75% attendance (Total Contact Hours -"TCH") in any course, will not be permitted to appear for the end-semester examination in that course, irrespective of the reason for the shortfall of the attendance. The student is however permitted to avail Academic Leave up to 10% for attending academic related activities like, Industrial Visits, Seminars, Conferences, Competitions etc., with the prior approval of the HoD. After the event, the student should submit the relevant documents for proof to the HoD for approval of the Academic Leave.
- b. The remaining 25% allowance in attendance is given to account for activities under NCC / NSS / Cultural / Sports/ Minor Medical exigencies etc.
- c. Students under "CO (Carry Over)" category in any course shall attend, the immediately following Summer / Winter course. The detailed schedule of the Summer / Winter courses offered in every semester will be announced during the end of that semester. The students who have obtained "CO (Carry Over)" has to select their appropriate slots and courses, optimally to attend the courses.



13.2 Additional Condonation

Additional Condonation may be considered in rare and genuine cases which includes, approved leave for attending select NCC / Sports Camps, cases requiring prolonged medical treatment and critical illness involving hospitalization. For such select NCC / Sports Camps prior permission for leave shall be obtained by the respective Dean / Director of sports from the designated authority, before deputing the students.

For medical cases, submission of complete medical history and records with prior information from the parent / guardian to Dean (Students Welfare) DSW is mandatory. The assessment of such cases will be done by the attendance sub – committee on the merit of the case and put-up recommendations to the Vice – Chancellor. Such condonation is permitted only twice for a student in the entire duration of the programme.

The Vice-Chancellor, based on the recommendation of the attendance sub-committee may then give condonation of attendance, only if the Vice-Chancellor deems it fit and deserving. But in any case, the condonation cannot exceed 10%.

14. ASSESMENT PROCEDURE

- 14.1 Internal Assessment (IA) 25 Marks & External Assessment (EA) 75 Marks
- 14.2 Practical Assessment (as per format 1 and 2)
- **15. RESEARCH PROJECT/SEMESTER PROJECT ASSESMENT CRITERIA** The general guidelines for assessment of Project are given in Table 15.1

S. No	Review / Examination scheme	Broad Guidelines	Weightage
1	First Review	Concept	10%
2	Second Review	Design	10%
3	Third Review	Experiment/Analysis	20%
4	Final Review/ESM	Project report and Viva – Voce, Results and Conclusion	60%

Table15.1: Assessment pattern for Research Project / Semester Project

16. INTERNSHIP – RESEARCH/INDUTRIAL INTERNSHIP

A student has to compulsorily attend summer internship at the end of 4th semester for a minimum period of 30 days. In lieu of Summer-Winter internship, the student is permitted to register for undertaking project work under a faculty of the University and carry out the project for minimum period of 30 days. In both the cases, the internship report in the prescribed format duly certified by the faculty in-charge shall be submitted



to the HOD. The evaluation will be done through presentation and viva. The course will have a weight age as defined in the respective curriculum.

For the final year project and viva-voce end semester examination, the student shall submit a project report in the prescribed format issued by the University. The reviews will be conducted by a committee constituted by the HOD. The end semester assessment will be based on the project report and a viva on the project conducted by a committee constituted by controller of examination. This may include an external expert.

17. FOR NON-CGPA COURSES/AUDIT COURSES

The Assessment will be done based on the respective assessment as per rubrics issued by the HOD.

A student securing less than the minimum specified internal assessment marks in any course will not be permitted to appear for the end-semester examination in that course and will be graded under "CO (Carry Over)" category for that course. This will be denoted in the grade sheet as "CO (Carry Over)", till the course is successfully completed in the subsequent semester(s).

18. CREDIT WEIGHTAGE

Credits are the weightage, assigned to the courses based on the following general pattern: One Hour 1 credits Two Hour Practical 0.5 credits

19. MAXIMUM DURATION OF THE PROGRAMME/ PROMOTION POLICY

A student may complete the programme at a slower pace than the regular pace, but in any case, in not more than **N+2 years**.

A student completing the degree programmes in the extended period will not be eligible for university ranking.

20. MAXIMUM GAPS BETWEEN SEMESTER/YEAR

A student may be permitted by the Vice-Chancellor to withdraw from the entire programme for amaximum of two semesters for reasons of ill health, start – up venture or other valid reasons asrecommendedbyacommitteeconsistingofHeadofDepartment,DeanofSchool,andDean(St udentWelfare).

21. CREDIT SYSTEM & GRADING CGPA/SGPA

Introduction

IIMT University implemented the UGC guidelines to implement of the choice-based credit system with a view to offer student's choice of courses within a programme with a flexibility to complete the programme by earning credits at a pace decided by the students themselves. The system allowed students to choose inter-disciplinary, intra-disciplinary courses according to their learning needs, interest and aptitude. It was considered as a cafeteria approach and was expected to provide mobility to students.



21.1 Credit System

As per the current credit system practiced in institutions needs comprehensive reforms as they offer very little flexibility, choice and are less learner centric. Degrees offered today are more self-contained focusing on a specialization area and depend a lot on knowledge available with the faculty from the department only. Though the most requisite credit system does exist, wherein students are given a wide choice and flexibility, these exist as small islands in the vast ocean of thousands of educational institutes in India. In such institutions, the curriculum is frequently designed which is learner centric and offering a wide specialization area for students to pick and choose courses from.

The institutions shall make attempts wherein the design of the credit system and the teaching and evaluation modes shall be the responsibility of individual course teachers. The students should have the freedom to opt for courses from other specializations and not just from their core specialization. For this there has to be stronger collaborations between departments of the University and outside.

21.2 Grading system

Most institutions follow the absolute grading system which is a simple procedure wherein the marks obtained by students correspond to a specific grade and grade point. It reflects the individual performance in a particular subject without any reference to the group/class. The absolute grading system has limitations and may be susceptible to some inconsistencies.

The relative grading system on the other hand provides relative performance of a student to a group/class wherein the student is ranked in a group/class on basis of relative level of achievement. In this system decisions are made in advance by the faculty members as to what proportion of students would be awarded a particular grade on the basis of their relative performance and which is done by assigning grades on basis of a normal curve. This facilitates comparative performance and eliminates negative effect of pass or fail.

Relative grading system may be used if the number of students registered for the course is at least 30. For a class of smaller size, an absolute grading scheme may be used. The statistical method may be used with adjustments to calculate the mean (M), median (Md) and standard deviation (SD) of the total marks (TM) obtained by the students registered for the course. If the mean and median coincide, the mean may be used for further computations, otherwise the median may be used. If suppose the mean is used, then the letter grades may be awarded based on the ranges specified in table below: A grading system as shown in given table-

Letter Grade	Range
A+	TM>M+1.75SD
А	M+1.25 SD \leq TM $<$ M+1.75SD
B+	M+0.75 SD \leq TM $<$ M+1.25SD
В	$M+0.25 \text{ SD} \le TM \le M+0.75 \text{ SD}$

Table 21.2: Grading system



C+	$M-0.25 \text{ SD} \le TM \le M-0.25 \text{ SD}$
С	$M-0.75 \text{ SD} \le TM \le M-0.25 \text{ SD}$
D+	$M-1.25 \text{ SD} \le TM \le M-0.75 \text{ SD}$
D	$M-1.75 \text{ SD} \le TM \le M-1.25 \text{ SD}$
E+	$M-2.0 \text{ SD} \le TM \le M-1.75 \text{ SD}$
E	$M-2.25 \text{ SD} \le TM \le M-2.0 \text{ SD}$
F	M-2.25 SD > TM
	Carry Over (Summer / Winter) due to Attendance deficiency (between 40%
CO	and 75%) and/or
	I. Lack of minimum IA marks as specified in clause 10.0 Table 3.
RA	Repeat the course due to (i) Lack of minimum attendance (below 40%) in
КА	regular course.
	DETAINED "RC" or "RA" or both in all registered theory courses of a
	semester. The student is detained and has to repeat the entire semester. Clause
	12.3

Letter grades may be improved based on the following scheme: Use the table above to determine grade boundaries. Look for natural gaps in the neighborhood of grade boundaries. Choose the largest gap in the neighborhood and make this as the grade boundary.

An 'E', 'E+' and 'F' grade may not be a purely relative grade. These may be assigned on the following basis:

- A minimum, say 30/100, may be set as pass marks for the course. A fail grade may then be awarded only if the Total Marks for the course are less than 30. Otherwise, the students may be awarded the Just Pass Grade D.
- A failure grade may be awarded to students whose marks are below the prescribed minimum even if the table above leads to a pass grade. Similarly, a lower limit may be set for the A grade also, for instance greater than or equal to 86. Students not achieving the prescribed minimum may be awarded a lower letter grade even if the table above indicates otherwise. A pass grade may be made mandatory for both internal as well as external examinations in the case of a separate internal and external assessment,
- a. Internal and External marks may be summed up with appropriate weightage to compute a total out of 100 marks. The letter grade may be assigned on this computed total.
- b. Internal and external marks may be graded separately and then the assigned grade points may be used, with appropriate weightage, to compute a final grade point and letter grade.

Grading in the case of Re-evaluations, Retests and Remedial Examinations may be based on the following guidelines:

- a. The ranges of marks once computed for awarding letter grades the first time, called the First Distribution (FD), will not be modified.
- b. If a re-evaluation leads to a change in marks, then FD will be used to award an appropriate letter grade.
- c. A retest may be permitted, if
 - i. A student gets a letter grade of E+ or E. In this case, irrespective of the



marks obtained, at most D grade may be awarded.

ii. A student is unable to complete course requirements because of certified illness or tragedy. In this case FD will be used to award an appropriate letter grade.

The use of relative grading system may be recommended in autonomous institutions, institutes of national importance and institutions with high ranking. The results of the relative grading system may be shared by such institutions later with other interested institutions to implement the same.

21.3 GPA and CGPA

GPA is the ratio of the sum of the product of the number of credits Ci of course "i "and the grade points Pi earned for that course taken over all courses "i" registered and successfully completed by the student to the sum of Ci for all "i". That is,

$$GPA = \frac{\sum_{i}^{\sum C_{i} P_{i}}}{\sum_{i}^{\sum C_{i}}}$$

CGPA will be calculated in a similar manner, in any semester, considering all the courses enrolled from the first semester onwards.

21.2 The Grade card will not include the computation of GPA and CGPA for courses with letter grade CO, RC and U until those grades are converted to the regular grades.

21.3 A course successfully completed cannot be repeated.

Grade Sheet

Letter grade

Based on the performance, each student is awarded a final letter grade at the end of the semester in each course. The letter grades and corresponding grade points are given in **Table 8**.

A student is considered to have completed a course successfully and earned credits if he/she secures a letter grade other than F, CO, RA in that course.

After results are declared, grade sheet will be issued to each student which will contain the following details:

- a. Program and discipline for which the student has enrolled.
- b. Semester of registration.
- c. The course code, name of the course, category of course and the credits for each course registered in that semester
- d. The letter grade obtained in each course
- e. Semester Grade Point Average (GPA)
- f. The total number of credits earned by the student up to the end of that semester in each of the course categories.
- g. The Cumulative Grade Point Average (CGPA) of all the courses taken from the first semester.



h. Credits earned under Non CGPA courses.

22. CLAS/DIVISION

- 22.1 Classification is based on CGPA and is as follows: $CGPA \ge 8.0$: First Class with distinction $6.5 \le CGPA < 8.0$: First Class $5.0 \le CGPA < 6.5$: Second Class
- 22.2 (i) Further, the award of 'First class with distinction' is subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses in his/her first appearance with effect from II semester, within the minimum duration of the programme.
 - ii) The award of 'First Class is further subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses within 3 years for Bachelor of Computer Application.
 - (iii) The period of authorized break of the programme (vide clause 11.0) will not be (counted for the purpose of the above classification.

23. TRANFER OF CREDITS/ACEDIMIC CREDIT BANK

- 23.1 "Credit-transfer" means the mechanism by which the eligible HEIs registered with ABC are able to receive or provide prescribed 'credits' to individual registered ABC account in adherence to the UGC credit norms for the 'course/s' registered by the desirous students in any eligible higher education institution within India
- 23.2. Within the broad framework of these regulations, the Academic Council, based on the recommendation of the Credit Transfer Committee so constituted may permit students to transfer part of the credit earned in other approved Universities of repute & status in the India or abroad.
- 23.3 The Academic Council may also approve admission of students who have completed a portion of course work in another approved Institute of repute under Multiple entry & Exit system, based on the recommendation of the credit transfer committee on a case-to-case basis.
- 23.4 Students who have completed coursework, at least first year, at some university other than the university to which transfer is to be sought, may request for transfer of admission to this university. A student may be granted admission only through an admission process that will follow the same policy as for fresh admissions. However, a uniform credit system must be followed by all universities to effect transfer of credits.
- 23.5 Credit Transfer request can be submitted only after the student has been admitted in the concerned program and the following conditions are met:

University Grants Commission initiated the concept of National Academic Credit Bank (NAC-Bank) which will be a digital / virtual / online entity to be established and



managed by UGC. The main objective of the NAC-Bank would be to facilitate student mobility across the education system wherein the credits can be accumulated and be used at alter point of time for the requirements of partial fulfillment of a degree program.

- i. The course work has been completed at a UGC approved and accredited University through fulltime formal learning mode.
- ii. The university accreditation grade/ ranking is not lower than that of the university to which the transfer is sought.
- iii. The courses prescribe to the common minimum syllabus under UGC CBCS system.
- iv. The letter grade obtained in the courses is "B" or better.
- v. The number of credits to be transferred does not exceed the prescribed limit.
- vi. The program in question must have a similar credit system, in particular, modular or semester and the same numeric and letter grading system along with common meaning of the term "credit" in numerical terms.

The aspect of shelf life of courses needs to be considered while accepting credits as obsolescence of knowledge of certain field in terms of its current relevance needs to be investigated. The time elapsed between successful completion of certain courses of the program and the admission to which program transfer is sought needs to be considered. The maximum number of credit points that may be considered under a credit transfer needs to be specified. Contextual variables such as teaching-learning approach adopted, learning facilities offered, use of evaluation modes may also be considered while preparing the credit transfer policy.

Moderation

Moderation of assessment is an organized procedure which ensures use of valid assessment material and consistent application of criteria, to provide fair academic judgment and reliable outcome in the form of marks or grades. It assures appropriate designing and implementation of assessment activities along with generation of valid and reliable results.

Integration of moderation process with assessment system is imperative for the development of academic quality in higher educational institutions as:

- It addresses any difference in individual judgments of different evaluators.
- It ensures that all achievements in the form of marks and grades across courses reflect achievement of same level of standard.
- It is also carried out to develop a common understanding of the standards and criteria and to recognize performance which demonstrates that standard or fulfils those criteria.

Moderation may be conducted in case there are large number of fail grades or high grades, or when large numbers of students who have received the same grade or clustering of students on letter grades, or when there are discrepancies between grades allocated to individual students in different courses, or to find out the difficulty level of the question paper or whether the assessments modes used cover the entire syllabus or not.

Applicability



Moderation will be made applicable to both external and internal modes of assessment. All programs and courses will indicate, as part of their statements on assessment, arrangements for the moderation of assessed work. This can be done through formulation of a moderation policy and implemented across all programs and courses of instruction and delivery. The time frame for the moderation will be linked with the time frame for assessment.

In the event moderation is triggered, an evaluation will begin with a discussion on the following (though not exhaustive) lines:

- a. What are the rubrics used for each of the different types of assessment in the course? Is a standardized/ prescribed rubric used or has the instructor developed his/ her own rubric. If the instructor is using a personally framed rubric, or if there is no identified rubric, then how does the assessment map to learning outcomes?
- b. The difficulty level of the questions included in the assessments, i.e., is the difficulty level on the extremes, very easy or very hard.
- c. The manner of awarding marks, i.e., has the correction been at the extremes, liberal or tough.

Each department will establish a committee and designate roles and responsibilities at different levels for smooth working of the moderation process. In order to maintain neutrality, it will be ensured that moderator should not be the assessor. Staff members will be trained professionally in assessment techniques and moderation procedures. All assessment material produced by learner including examination sheets, assignments, project reports, research reports etc. will be examined.

Institutions will be encouraged to make the moderation process online. In this system, assessment plans, moderation plans, assessment tools, samples of which may be submitted online. Moderation reports will be generated online so that progress can be tracked and submitted to the COE after the approval of Dean and HOD. The moderation will not be restricted to just assessment but also include moderation of content and assessment design.

24. CHANGE OF DISCIPILINE

"Academic Flexibility" is the provision for innovative and interchangeable curricular structures to enable creative combinations of Courses/Programmes in Disciplines of study leading to Degree/Diploma/PG Diploma/Certificate of Study offering multiple entry and multiple exit facilities in tune with National Education Policy-2020, while removing the rigid curricular boundaries and creating new possibilities of life-long learning.

25. USE OF TECNOLOGICAL INTERVENTIONS

With the proliferation of different types of access devices, especially mobile access devices, technology has the potential to augment traditional classroom practices and revolutionize learning and evaluation methods. Technology, in fact can be an important driver to enable lifelong learning. Learning and engagement of students is facilitated by use of technology through several modes such as synchronous learning, semi-synchronous learning, blended learning, collaborative learning, flipped classroom etc. MOOC's, especially provided through SWAYAM, are a window of opportunity for lifelong learning and are offered through technology-based platforms. Learning



management systems (LMS) may be used by institutions to integrate the entire teaching, learning and evaluation process. The Learning Management System may be used by institutions to deliver academic content in blended form and to assess learning through thesis, assignments etc. Open-source learning management systems such as *Moodle*, *Edmodo* may be used for posting content in the form of videos, audios, e-learning modules, live class sessions etc. Use of plagiarism detection software will be highly recommended to check originality of the content.

In the conduct of examinations, universities face tremendous challenges such as need for trained manpower, distribution of question paper without delays and errors, delays in evaluation of answer scripts, lack of infrastructure to conduct examinations at a large scale, non-availability of faculty members for assessment, security issues faced during paper setting and paper distribution, tampering of certificates and answer scripts etc.

For a typical examination department of an institution will be an autonomous body right from registration of student to convocation through an integrated system. In fact, steps must be taken to implement a complete examination management system that considers the complete life cycle of examination process. The use of technology will reduce dependency on human intervention and be error free. The following functions will be automated:

- i. Registration of students and generating unique PRN,
- ii. Filling up of examination form,
- iii. Generation of seat numbers and admit cards/hall tickets,
- iv. Preparation of list of paper setter,
- v. Use of question bank system to draw question sets, question paper generation,
- vi. Online distribution of question papers on the day of examination with system of encryption,
- vii. Barcode system for answer books (this will eliminate issues related to errors, avoid malpractices etc.),
- viii. Digitization of answer scripts and onscreen evaluation of answer sheets,
- ix. Tracking of student's performance,
- x. Marks submission through online software,
- xi. Viewing of result through online system,
- xii. Online verification and revaluation system,
- xiii. Digitization of certificates and marksheets(to avoid tampering and easy retrieval),
- xiv. Certificate authentication system,
- xv. Submission of various other applications through online system.The above will lead to conduct of functions of the examination system in an efficient and transparent manner and timely availability of information to students.

26. STUDENT DESCIPILINE

Every student is required to observe utmost discipline and decorum both inside and outside thecampus and not to indulge in any activity which may affect adversely the prestige reputation of theUniversity and School.



27. STUDENT WELFARE

Any act of indiscipline of a student reported to the Dean (Students Welfare) and Head of theDepartment will be referred to a Discipline Committee constituted for the purpose. The Committeewill enquire into the charges and decide on a suitable punishment if the charges are substantiated. The committee will also authorize the Dean (Students Welfare) to recommend to the Vice-Chancellorfor the implementation of the decision. The student concerned may appeal to the Vice-Chancellor, whose decision will be the final.

28. RAGGING

Ragging in any form is a criminal and non-bailable offence in our country. The current State

andCentrallegisolationsprovidestringentpunishmentsincludingimprisonment.Oncetheinvo lvementofastudent(s) is established in ragging, offending fellow students/staff, harassment of any nature to thefellow students/staff etc. the student(s) will be liable to be dismissed from the University, as per thelaid down procedures of the UGC / Govt. /Institute. Every senior student at the University, along withtheir parent, shall give an undertaking every year in this regard and the same should be submitted at the timeofRegistration.

29. POWER TO MODIFY

Notwithstandingallthathasbeenstatedabove,theAcademicCouncilisvestedwithpowerstomo difyany or all the above regulations from time to time, if required, subject to the approval by the Board ofStudiesand finalapprovalbyVice-Chancellor.

30. EXIT POINT

Exit point will be governed as per format 1 and format 2.

31. NC/CREDIT COURSE

For non-credit courses 'Satisfactory' or 'Unsatisfactory' shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.



Evaluation Scheme

Bachelors in Computer Application (BCA)

Academic Hand Book (School of Computer Sciences & Application)



		Bachelors	in Computer Appli Semester - I	cation (BCA)							
ä				Evaluation Scheme								
S.	Subject Code	Subject Name	Course Type		Period	S	Internal	External	Total	Creadita		
No.	_			L	Т	Р	Marks	Marks	Marks	Credits		
1	BCA-NEP-101	Problem Solving using C	C1	4	0	0	25	75	100	4		
2	BCA-NEP-102	Fundamentals of Computer and IT	C2	4	0	0	25	75	100	4		
3	BCA-NEP-104	BCA-NEP-104 1. Mathematics-I 2. Discrete Mathematics		4	0	0	25	75	100	4		
4	NHU-111	English Communication	AECC	3	0	0	15	35	50	3		
5	BCA-NEP-105P	Problem Solving using C	CORE LAB 1	0	0	4	25	25	50	2		
6	BCA-NEP-106P	Fundamentals of Computer and IT Lab	CORE LAB 2	0	0	4	25	25	50	2		
		Grand Total		15	0	8	140	310	450	19		
		Core Course 2, DSE – Discipline Specific Ele	ective, AECC – Abil	ity Enha	ncemen	t Comp	ulsory Course, C	E – Generic Ele	ctive, SEC-	Skill		
	incement Course, RP	5										
L-Lect	ure, T- tutorials, P- P	ractical (Labs), NC- Non-Credit Course										
		KE NCC (GENCC-101) AS A GENERAL F	ELECTIVE/OPTION	AL CO	JRSE A	AND CE	RTIFICATE W	ILL BE PROVID	DED AFTER) L		
	COMPLETION OF N	NCC COURSE.										



			Semester - II	Evaluation Scheme							
S. No.	Subject Code	Subject Name	Course Type	Periods			Internal	External	Total	Credits	
190.				L	Т	Р	Marks	Marks	Marks	Creatis	
1	BCA-NEP-201	Data Structure and Algorithms using C	C1	4	0	0	25	75	100	4	
2	BCA-NEP-202	Database Management System	C2	4	0	0	25	75	100	4	
3	BCA-NEP-204	 Mathematics-II Optimization Techniques 	DSE	4	0	0	25	75	100	4	
4	*Code will be decided by parent department	GE-I(To be opted by the students as per the given electives in the list attached)	GE (Mandatory)	4	0	0	25	75	100	4	
5	NHU-112	Environmental & Ecology	AECC	3	0	0	15	25	50	3	
6	BCA-NEP-205P	Data Structure and Algorithms using C	CORE LAB 1	0	0	4	25	25	50	2	
7	BCA-NEP-206P	Database Management System Lab	CORE LAB 2	0	0	4	25	25	50	2	
8	BCA-NEP-207P	MOOCS/NPTEL	SEC	4	0	0	50	0	50	4	
		Grand Total		23	0	8	215	375	600	27	
Enhan	cement Course, RP -	Core Course 2, DSE – Discipline Specific El Research Project ractical (Labs), NC- Non-Credit Course	ective, AECC – Abil	ity Enh	anceme	nt Comj	oulsory Course,	GE – Generic El	ective, SEC	- Skill	



		Bachelors	in Computer Appli Semester - III	cation (BCA)						
G				Evaluation Scheme							
S. No.	Subject Code	Subject Name	Course Type		Period	5	Internal	External	Total Marks	Credits	
140.				L	Т	P	Marks	Marks		Creans	
1	BCA-NEP-301	OOPS using JAVA	C1	4	0	0	25	75	100	4	
2	BCA-NEP-302	Operating System	C2	4	0	0	25	75	100	4	
3	BCA-NEP-304	 Computer System Architecture Data Analytics 	DSE	4	0	0	25	75	100	4	
4	BCA-NEP-303	Communication Skill & Personality Development	AECC	3	0	0	15	35	50	3	
5	BCA-NEP-305P	OOPS using JAVA Lab	CORE LAB 1	0	0	4	25	25	50	2	
6	BCA-NEP-306P	Operating System Lab	CORE LAB 2	0	0	4	25	25	50	2	
		Grand Total		15	0	8	140	310	450	19	
C1 - Core	e Course 1, C2 - Cor	e Course 2, DSE – Discipline Specific E	lective, AECC - Ab	ility En	hancem	ent Cor	npulsory Cours	e, GE – Generic	Elective, S	EC- Skill	
Enhancen	nent Course, RP – Rea	search Project									
L-Lecture	e, T- tutorials, P- Prac	ctical (Labs), NC- Non-Credit Course									
NOTE: S	STUDENT CAN TA	KE NCC (GENCC-101) AS A GENERA	AL ELECTIVE/OPT	IONAL	, COUI	RSE AN	ID CERTIFICA	TE WILL BE	PROVIDED) AFTER	
COMPLE	ETION OF NCC COU	JRSE.									



a							Evaluati	on Scheme		
S. No.	Subject Code	Subject Name	Course Type		Period	5	Internal	External	Total	Credits
110.				L	Т	Р	Marks	Marks	Marks	Creans
1	BCA-NEP-401	Software Engineering	C1	4	0	0	25	75	100	4
2	BCA-NEP-402	Python Programming	C2	4	0	0	25	75	100	4
3	BCA-NEP-404	 Data Mining Numerical Analysis 	DSE	4	0	0	25	75	100	4
4	*Code will be decided by parent department	led by parent per the given electives in the list		4	0	0	25	75	100	4
5	UVE-401	Human Values and Professional Ethics	AECC	3	0	0	15	35	50	3
6	BCA-NEP-405P	Software Engineering Lab	CORE LAB 1	0	0	4	25	25	50	2
7	BCA-NEP-406P	Python Programming Lab	CORE LAB 2	0	0	4	25	25	50	2
8	BCA-NEP-407P	MOOCS/NPTEL	SEC	4	0	0	50	0	50	4
		Grand Total		23	0	8	215	385	600	27



~				Evaluation Scheme							
S. No.	Subject Code	Subject Name	Course Type		Period	s	Internal	External	Total	Credits	
110.				L	Т	Р	Marks	Marks	Marks	Crean	
1	BCA-NEP-501	Design and Analysis of Algorithms	C1	4	0	0	25	75	100	4	
2	BCA-NEP-502	Web Technologies	C2	4	0	0	25	75	100	4	
3	BCA-NEP-503	 Data Communication Network ERP Big Data 	DSE	4	0	0	25	75	100	4	
4	RP-1 AUDIT	Research Project–I [@]	AUDIT	0	0	0	50	0	50	NC	
5	BCA-NEP-IP-I	Internship	Industrial Internship (Mandatory)	0	0	10	50	50	100	5	
6	BCA-NEP-504P	Design and Analysis of Algorithms Lab	CORE LAB 1	0	0	4	25	25	50	2	
7	BCA-NEP-505P	Web Technologies Lab	CORE LAB 2	0	0	4	25	25	50	2	
		Grand Total		12	0	18	225	325	500	21	
Enha	incement Course, RP	Core Course 2, DSE – Discipline Specific E – Research Project Practical (Labs), NC- Non-Credit Course	Elective, AECC – Ab	ility En	hancen	nent Cor	npulsory Course	e, GE – Generic	Elective, SE	C- Skill	



C				Evaluation Scheme							
S. No.	Subject Code	Subject Name	Course Type		Period		Internal	External	Total	Credit	
				L	Т	Р	Marks	Marks	Marks	+	
1	BCA-NEP-601	Cyber Security	C1	4	0	0	25	75	100	4	
2	BCA-NEP-602	Artificial Intelligence	C2	4	0	0	25	75	100	4	
3	BCA-NEP-603	 Mobile Computing E-Commerce Real Time System 	DSE	4	0	0	25	75	100	4	
4	BCA-NEP-IP-II	Industrial Project	Industrial Project	0	0	10	100	0	100	5	
5	BCA-NEP-605P	Cyber Security Lab	CORE LAB 1	0	0	4	25	25	50	2	
6	BCA-NEP-606P	AI Lab	CORE LAB 2	0	0	4	25	25	50	2	
7	*Code will be decided by parent department	GE-III (To be opted by the students as per the given electives in the list attached)	GE (Mandatory)	4	0	0	25	75	100	4	
8	BCA-NEP-607P	MOOCS/NPTEL	SEC	4	0	0	50	0	50	4	
9	BCA-NEP-607	Research Project-II [@]	AUDIT	0	0	0	50	0	50	NC	
		Grand Total		20	0	18	350	350	700	29	
Enha	ancement Course, RP	ore Course 2, DSE – Discipline Specific E – Research Project ractical (Labs), NC- Non-Credit Course	lective, AECC – Abil	ity Enh	anceme	ent Comj	pulsory Course,	GE – Generic E	lective, SEC	- Skill	



Format-1

Academic Hand Book (School of Computer Sciences & Application)



Format-1

IIMTU-NEP IMPLEMENTATION CBCS: Statement of Credit Distribution

College/School: SCH Programme: BCA Duration: 3 YEARS Annual/Semester : St			JTER SCINECE AND A	PPLICATIONS			Credit Range: 12 (Suggested by Cl		
Minimum Credit Score Required For Certificate (40)	First Year	Semester	Core Course/ Foundation Course	Ability Enhancement Compulsory Course (AECC)	Skill Enhancement Course (SEC)	Discipline Specific Elective (DSE)	Generic Elective (GE) (From other Faculty)	Research Project (RP) /Industrial Internship /Industrial Project	Prerequisite
CERTIFICATE	First Year Credit 46	Ι	Problem Solving using C (Th. 4 Cr. + P 2Cr.) Fundamentals of Computers and IT (Th. 4 Cr. + P 2Cr.)	English communication (Th. 3 Cr.)		1.Mathematics I 2. Discrete Mathematics (Th. 4 Cr.)			
		П	Data Structure Algorithms using C (Th. 4 Cr. + P 2Cr.) DBMS (Th. 4 Cr. + P 2Cr.)	Environment & Ecology (Th. 3 Cr.)	MOOCS/NPTEL 4 Cr.	 Mathematics II Optimization Techniques (Th. 4 Cr.) 	GE-I (Mandatory) (Th. 4 Cr.)		Problem Solving using C Mathematics I

Note: - Students can take NCC (GENCC-101) as a general elective/optional course and certificate will be provided after competition of NCC Course.



College/School: SCHOOL OF COMPUTER SCINECE AND APPLICATIONSProgramme: BCA Duration: 3 YEARS Annual/Semester - SEMESTER

Credit Range: 120 - 160 (Suggested by CBCS Committee) Provision to change the stream onwards

Minimum Credit			Core Course/	Ability	Skill	Discipline Specific	Generic	Research	Prerequisite
Score Required for	Year	<u>ц</u>	Foundation Course	Enhancement	Enhancement	Elective	Elective	Project	
Diploma (80)		Semester		Compulsory	Course (SEC)	(DSE)	(GE)	(RP) /Industrial	
	Second	eme		Course (AECC)			(From other Faculty)	Internship	
	Sec	Š					T acuity)	/Industrial	
	•1							Project	
			OOPS using JAVA	Communication		1. Computer			
			(Th. 4 Cr. + P 2 Cr.)	Skill &		System			
	ļį	***	OPERATING	Personality		Architecture			
-	Credit	III	SYSTEM (The 4 Creek D 2 Creek)	Development		2. Data Analytics			
MA	ar C		(Th. 4 Cr. + P 2Cr.)	(Th. 3 Cr.)		(Th. 4 Cr.)			
DIPLOMA	Year 46		Software Engineering	Human Values	MOOCS/NPTEL	1. Data Mining	GE-II		
dic	pu		(Th. 4 Cr. + P 2Cr.)	and Professional	4 Cr.	2. Numerical	(Mandatory)		
	Second		, , , , , , , , , , , , , , , , , , ,	Ethics		Analysis	(Th. 4 Cr.)		
	Š	IV	Python Programming	(Th. 3 Cr.)					
			(Th. 4 Cr. + P 2Cr.)			(Th. 4 Cr.)			

Note: - Students can take NCC (GENCC-101) as a general elective/optional course and certificate will be provided after competition of NCC Course.



Col	lege/School: SCHOOL OF COMPUTER SCINECE AND	Credit Range: 120 - 160
AP	PLICATIONSProgramme: BCA	(Suggested by CBCS Committee)
Dur	ation: 3 YEARS	Provision to change the Core Papers (Main Subject)
Anr	ual/Semester - SEMESTER	

Minimum Credit Score Required for Degree (120)	Third Year	Semester	Core Course/ Foundation Course	Ability Enhancement Compulsory Course (AECC)	Skill Enhancement Course (SEC)	Discipline Specific Elective (DSE)	Generic Elective (GE) (From other Faculty)	Research Project (RP) /Industrial Internship /Industrial Project	Prerequisite
Ξ	Year Credit 50	v	Design and Analysis of Algorithms (Th. 4 Cr. + P 2Cr.) Web Technologies (Th. 4 Cr. + P 2Cr.)			 Data Communication Network ERP BIG Data (Th. 4Cr.) 		RP-1 (AUDIT) Non-Credit (Research Project-I) Internship (Mandatory) (5 Cr.)	Data Structure Algorithms using C
DEGREE	Third Year 50	VI	Cyber Security (Th. 4 Cr. + P 2Cr.) Artificial Intelligence (Th. 4 Cr. + P 2Cr.)		MOOCS/NPTEL 4 Cr.	 Mobile Computing E-Commerce Real Time System (Th. 4 Cr.) 	GE-III (Mandatory) (Th. 4 Cr.)	RP-II (AUDIT) Non-Credit (Research Project-II) Industrial Project (5 Cr.)	



Format-2

Academic Hand Book (School of Computer Sciences & Application)



		picificitatio		~						
Program	Year	Semester (15 weeks)	Paper	Credit	Periods per Week	Periods (Hours) per Semester	Paper Title	Unit (Periods per semester	Prerequisite	Elective (For other faculty)
			i) C1 (Th. 4 Cr. +	4	4	45	Problem Solving using C	5		
		$\widehat{\mathbf{:}}$	P 2 Cr.)	2	4	10	Problem Solving using C lab	5		
		-I (19 Cr.)	ii) AECC-I	3	3	40	English Communication			
		(19	iii) DSE-I	4	4	45	1. Mathematics-I	5		
		- I -					2. Discrete Mathematics			
SE	-		ii) C2(Th.4 Cr.+P 2	4	4	45	Fundamentals of Computers &	5		
IRS	Cr.)	HL	Cr)	2	4	10	ITFundamentals of Computers & IT			
00	6 C	SEMESTER					Lab			
Ŭ	(46	N.								
ΓE	٨R	SE	Note:- Students can take	NCC (GENCC-	101) as a Ge	eneral Elective/Optional course and certif	icate will be	provided a	after
CA.	YEAR		competition of NCC Cou				*		•	
CERTIFICATE COURSE		4	i) C3 (Th. 4 Cr. +	4	4	45	Data Structure Algorithms using C	5		
LI	SS	(27	P 2 Cr.)	2	4	10	Data Structure Algorithms using C			
ER'	FIRST	Π	ii) AECC-II	3	3	40	LabEnvironment & Ecology	5		
CF	-		iii) SEC-I & II	4	8	40	MOOCS (NPTEL)	5		
		TER Cr.)	iv) DSE-II	4	4	45	1. Mathematics-II			
		LS					2. Optimization Techniques	5		
		ИE	v) GE-I	4	4	45	#To be selected from other School	5		
		SEMESTER Cr.)	ii) C4 (Th.4Cr.+	4	4	45	Database Management System	5		
		S	P 2 Cr.)	2	4	10	Database Management System Lab			

IIMTU-NEP Implementation: BCA

Programme Outcome:

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering

Programme Specific Outcome:

PSO1: The graduates are proficient in fundamental principles and methods of Computer Science, Mathematical and Scientific reasoning and are able to:

• Apply fundamental concepts of integration, differentiation, vector calculus, probability & statistics, and discrete mathematics.

• Design, create & evaluate algorithms appropriate to specific problems.

Format-2



sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools prediction and modeling to complex engineering activities with an understanding of the limitations.

PSO2: The graduates have understanding for:

• Demonstrate capability for computers, computer network and server environments and there troubleshooting.

• Capacity to handle cloud computing environment and solutions.

• Well defined knowledge for solving problems of security and threats in information knowledge domain.

Trogram C	ucom	c and i rogra	in specific Outcome – a		Слигс	1	r	-		
Programme	Year	Semester (15 weeks)	Paper	Credit	Periods per Week	Periods (Hours) per Semester	Paper Title	Unit (Periods per semester)	Prerequisite	Elective (For other faculty)
			i) C5 (Th. 4 Cr. +	4	4	45	OOPS using Java	5		
SE	(46	(19	P 2 Cr.)	2	4	10	OOPS using Java Lab			
R	R () []	ii) AECC-III	3	3	40	Communication Skill &	5		
COURSE	[N]	F					Personality Development			
C	YEA (.)	TER Cr.)	iii) DSE-III	4	4	45	1. Computer System Architecture	5		
MA	Ū Ū	C					2. Data Analytics			
OM	SECOND	ES	i) C6 (Th. 4 Cr. +	4	4	45	Operating System	5		
LI I	Ŭ,	M	P 2 Cr.)	2	4	10	Operating System Lab			
DIPL	SI	SE	Note:- Students can ta	ke NCC	C (GENC	C-101) as a	General Elective/Optional course and	certificate w	ill be provi	ded after
						com	petition of NCC Course.			

*Program Outcome and Program Specific Outcome - See Annexure - 1



	i) C7 (Th. 4 Cr. +	1	1	45	Software Engineering	5	
	P 2 Cr.)	2	4	10	Software Engineering Lab	5	
<u>(</u>)	,	$\frac{2}{2}$	+ 2		Human values and Professional	5	
	ii) AECC-IV	3	3	40		5	
	iii) SEC-III & IV	4	4	40	Ethics	5	
LER	iv) DSE-IV	4	4	45	MOOCS (NPTEL)	5	
	-				1. Data Mining		
	v) GE-II	4	4	45	2. Numerical Analysis	5	
					#To be opted from other School		
E	ii) C8 (Th. 4 Cr. +	4	4	45	Python Programming	5	
	P 2 Cr.)	2	4	10	Python Programming Lab		

Programme Outcome:

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools prediction and modeling to complex engineering activities with an understanding of the limitations.

Programme Specific Outcome:

PSO1: The graduates are proficient in fundamental principles and methods of Computer Science, Mathematical and Scientific reasoning and are able to:

• Apply fundamental concepts of integration, differentiation, vector calculus, probability & statistics, and discrete mathematics.

• Design, create & evaluate algorithms appropriate to specific problems. PSO2: The graduates have understanding for:

• Demonstrate capability for computers, computer network and server environments and there troubleshooting.

• Capacity to handle cloud computing environment and solutions.

• Well defined knowledge for solving problems of security and threats in information knowledge domain.



Programme	Year	Semester (15 weeks)	Paper	Credit	Periods per Week	Periods (Hours) per Semester	Paper Title	Unit (Periods per semester)	Prerequisite	Elective (For other faculty)
			i) C9 (Th. 4 Cr. +	4	4	45	Design and Analysis of Algorithm	5		
			P 2 Cr.)	2	4	10	Design and Analysis of Algorithm			
			ii) DSE-V	4	4	45	Lab	5		
		-V (21 Cr.)					1. Data Communication Network			
		<u>5</u>					2. ERP			
							3. BIG Data			
		R	ii) C10 (Th. 4 Cr. +P	4	4	45	Web Technologies	5		
Ъ	(:		2 Cr.)	2	4	10	Web Technologies Lab			
IRSI	(50 Cr.)	SEMESTER	iii) Research Project	NC	_	10	Luciana a lucia			
DEGREE COURSE		SEI	iv) Internship (Mandatory)	5	5	10	Internship			
E	YEAR		i) C11 (Th. 4 Cr. +	4	4	45	Cyber Security	5		
RF		$\overline{}$	P 2 Cr.)	2	4	10	Cyber Security Lab			
Ð	THIRD	Cr	ii) SEC-V & VI	4	4	40	MOOCS (NPTEL)	5		
DI	H	53	iii) DSE-VI	4	4	45	1.Mobile Computing			
		-VI (29 Cr.)					 2. E-Commence 3. Real Time System 	5		
			iv) GE-III	4	4	45	#To be opted from other School	5		
		LE	ii) C12 (Th. 4 Cr. +	4	4	45	Artificial Intelligence	5		
		IES	P 2Cr.)	2	4	10	Artificial Intelligence Lab			
		SEMESTER	iii) Research Project iv) Industrial Project	NC 5	5	10	Industrial Project			
			(Mandatory)							



Format-3

Academic Hand Book (School of Computer Sciences & Application)



Format-3

IIMTU-NEPIMPLEMENTATION Year-I / Semester-I

Program	me: Certificate	Year: I	
Class: B	CA	Semester: I	
Credits	Subject: English com	munication	
Theory:			
Course		nunication	
NHU-1	8		
Course	Objectives:		
CO1: 1	t aims to improve English com	munication skills i.e., Listening, speaking, reading,	& writing.
CO2: 7	Γο develop potential skills to de	eal confidently in English with diverse situations in	the external
	vorld.		
CO3: 7	Fo work in a collaborative man	ner & communicate effectively in English.	
		vities related to English Communication which wi	ll enable the
		problems, and demonstrate a positive work ethics.	
	of Paper: AECC	1	
	1m Passing Marks/Credits: 4	0% Marks	
L: 3	0		
T: 0			
P: 0 (Ir	Hours/Week)		
	- 1 Hr. = 1 Credit		
Unit		Contents	No. of
C III C			Lectures
			Allotted
Ι	English Communication skill	ls:	8
	listening skills,		
	speaking skills,		
	reading skills,		
	writing skills.		
	Starting and sustaining a con	versation.	
	6 6	Essential of effective Communication, Barriers to	
	Communication, Role of Cor		
II	· · · · · · · · · · · · · · · · · · ·	skills, Group discussion, Communication in	8
		Committees Parts of Speech- Noun, Pronoun,	Ũ
		Conjunction, Preposition, Interjection, Articles,	
	Common errors in English		
III		es, Use of visual aids, Creating a Dynamic	8
		ad interaction, Telephonic conversation & Basic	Ŭ
	Etiquette.	Le moraction, receptionic conversation & Dusie	
	-	: Meaning, Types and Importance. Listening:	
	Difference between Listening		
IV		onyms, Words often Confused, Idioms, Phrases,	8
1 1	Phrasal Verbs	onyms, words oren confused, futoris, i fildses,	0
V		s, Minutes, Job Application letter, CV, Business	8
v		of Effective Business Correspondence, Types and	0
	Structure of Business Letter.	or Effective Dusiness Correspondence, Types and	
	Suuciule of Dusiness Letter.		



Text Books:

- English Grammar and Composition by Wren & Martin
- Effective Communication and Soft Skills by Nitin Bhatnagar
- The ACE of Soft Skills: Attitude, Communication and Etiquette for Success by Gopalaswamy Ramesh and Mahadevan Ramesh

Reference

- English Grammar in Use by Raymond Murphy
- English Grammar Composition and Usage by J.C. Nesfield

Evaluation/Assessment Methodology

		Max. Marks 50
1)	Class tasks/ Sessional Examination	15
2)	Presentations /Seminar/Attendance	
3)	Assignments/TA	
4)	Research Project Report	Nil
	Seminar On Research Project Report	
5)	ESE	35
	Total:	50
Prere	quisites for the course: NIL	
Cours	e Learning Outcome	
CO1: '	To get knowledge about communication skills.	
CO2: '	To understand about use of grammar.	
CO3: '	To understand about presentation.	
CO4: '	To get information about how to face interview and public.	
CO5· '	To get knowledge about telephonic conversation & etiquette	

CO5: To get knowledge about telephonic conversation & etiquette.



0	mme: Certif	ïcate	Year: I	
Class: BCA			Semester: I	
Credit		Subject: Mathem	natics-I	
	Theory:4Cr			
	Course Code: Title: Mathematics-I			
	BCA-NEP-104			
	e Objectives:			
	CO1: Compute the rank and inverse of a matrix and solve system of linear equations.			
CO2:				
			nd type of Discontinuities.	
CO3:			Chain Rule, Derivatives of Composite Functions, L	ogarithmic
GO 4		on, Successive Dif		
CO4:			e Rolle's Theorem, Mean Value Theorem, Leibnitz	Theorem,
005		rentiation, Euler's		
CO5:		0 0	imit of Sum, Riemann Sum, Fundamental Theorem of	r Calculus,
NI-4		•	of Integration Substitution.	
	e of Paper: E			
	um Passing	Marks/Credits: 4	0% Marks	
L:4				
T:0				
	Hours/Week			
•	-1 Hr. $= 1$ (_redit Credit(4Hrs./Week=	(Creadite)	
Practic	al- Z His = I			
				No. of
Unit			Contents	No. of Lectures
				Lectures
Unit			Contents	Lectures Allotted
	Determina	nts: Definition, M	Contents linors, Cofactors, Properties of Determinants,	Lectures
Unit	Determina Matrices:	nts: Definition, M Definition, Typ	Contents linors, Cofactors, Properties of Determinants, es of Matrices, Addition, Subtraction, Scalar	Lectures Allotted
Unit	Determina Matrices : Multiplicat	nts: Definition, M Definition, Typ ion and Multiplica	Contents linors, Cofactors, Properties of Determinants, es of Matrices, Addition, Subtraction, Scalar ation of Matrices, Adjoint, Inverse, Cramer's Rule,	Lectures Allotted
Unit	Determina Matrices : Multiplicat	nts: Definition, M Definition, Typ ion and Multiplica	Contents linors, Cofactors, Properties of Determinants, es of Matrices, Addition, Subtraction, Scalar	Lectures Allotted
Unit	Determina Matrices: Multiplicat Rank of M proof)	nts: Definition, M Definition, Typ ion and Multiplica atrix, Eigen Vecto	Contents linors, Cofactors, Properties of Determinants, es of Matrices, Addition, Subtraction, Scalar ation of Matrices, Adjoint, Inverse, Cramer's Rule, ors of a Matrix, Cayley-Hamilton Theorem (without	Lectures Allotted
Unit	Determina Matrices: Multiplicat Rank of M proof) Limits &	nts: Definition, M Definition, Typ ion and Multiplica atrix, Eigen Vecto Continuity: Limi	Contents linors, Cofactors, Properties of Determinants, es of Matrices, Addition, Subtraction, Scalar ation of Matrices, Adjoint, Inverse, Cramer's Rule,	Lectures Allotted 8
Unit	Determina Matrices: Multiplicat Rank of M proof) Limits & Limits of V	nts: Definition, M Definition, Typ ion and Multiplica atrix, Eigen Vecto Continuity: Limi /arious Types of F	Contents linors, Cofactors, Properties of Determinants, es of Matrices, Addition, Subtraction, Scalar ation of Matrices, Adjoint, Inverse, Cramer's Rule, ors of a Matrix, Cayley-Hamilton Theorem (without it at a Point, Properties of Limit, Computation of	Lectures Allotted 8
Unit	Determina Matrices: Multiplicat Rank of M proof) Limits & Limits of V Interval, In	nts: Definition, M Definition, Typ ion and Multiplica atrix, Eigen Vecto Continuity : Limi /arious Types of F termediate Value 7	Contents linors, Cofactors, Properties of Determinants, es of Matrices, Addition, Subtraction, Scalar ation of Matrices, Adjoint, Inverse, Cramer's Rule, ors of a Matrix, Cayley-Hamilton Theorem (without it at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an	Lectures Allotted 8
Unit I II	Determina Matrices: Multiplicat Rank of M proof) Limits & Limits of V Interval, In Differentia	nts: Definition, M Definition, Typ ion and Multiplica atrix, Eigen Vecto Continuity: Limi /arious Types of F termediate Value 7 ation: Derivative,	Contents linors, Cofactors, Properties of Determinants, es of Matrices, Addition, Subtraction, Scalar ation of Matrices, Adjoint, Inverse, Cramer's Rule, ors of a Matrix, Cayley-Hamilton Theorem (without it at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an Theorem, Type of Discontinuities.	Lectures Allotted 8
Unit I II	Determina Matrices: Multiplicat Rank of M proof) Limits & Limits of V Interval, In Differentia quotients,	nts: Definition, M Definition, Typ ion and Multiplica atrix, Eigen Vecto Continuity: Limi /arious Types of F termediate Value 7 ation: Derivative,	Contents Linors, Cofactors, Properties of Determinants, es of Matrices, Addition, Subtraction, Scalar ation of Matrices, Adjoint, Inverse, Cramer's Rule, ors of a Matrix, Cayley-Hamilton Theorem (without it at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an Theorem, Type of Discontinuities. , Derivatives of Sum, Differences, Product & erivatives of Composite Functions, Logarithmic	Lectures Allotted 8
Unit I II	Determina Matrices: Multiplicat Rank of M proof) Limits & Limits of V Interval, In Differentia quotients, Differentia	nts: Definition, M Definition, Typ ion and Multiplica atrix, Eigen Vecto Continuity: Limi /arious Types of F termediate Value 7 ntion: Derivative, Chain Rule, De tion, Successive D	Contents Linors, Cofactors, Properties of Determinants, es of Matrices, Addition, Subtraction, Scalar ation of Matrices, Adjoint, Inverse, Cramer's Rule, ors of a Matrix, Cayley-Hamilton Theorem (without it at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an Theorem, Type of Discontinuities. , Derivatives of Sum, Differences, Product & erivatives of Composite Functions, Logarithmic	Lectures Allotted 8
Unit I II III	Determina Matrices: Multiplicat Rank of M proof) Limits & Limits of V Interval, In Differentia quotients, Differentia Applicatio	nts: Definition, M Definition, Typ ion and Multiplica atrix, Eigen Vecto Continuity: Limi /arious Types of F termediate Value 7 ttion: Derivative, Chain Rule, De tion, Successive D n of Differentia	Contents linors, Cofactors, Properties of Determinants, es of Matrices, Addition, Subtraction, Scalar ation of Matrices, Adjoint, Inverse, Cramer's Rule, ors of a Matrix, Cayley-Hamilton Theorem (without it at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an Theorem, Type of Discontinuities. , Derivatives of Sum, Differences, Product & erivatives of Composite Functions, Logarithmic ifferentiation.	Lectures Allotted 8 8 8 8
Unit I II III	Determina Matrices: Multiplicat Rank of M proof) Limits & Limits of V Interval, In Differentia quotients, Differentia Applicatio Expansion Hospitals I	nts: Definition, M Definition, Typ ion and Multiplica atrix, Eigen Vecto Continuity: Limi /arious Types of F termediate Value 7 tion: Derivative, Chain Rule, De tion, Successive D n of Differentia of Functions (M Rule, Maxima &	Contents linors, Cofactors, Properties of Determinants, es of Matrices, Addition, Subtraction, Scalar ation of Matrices, Adjoint, Inverse, Cramer's Rule, ors of a Matrix, Cayley-Hamilton Theorem (without it at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an Theorem, Type of Discontinuities. , Derivatives of Sum, Differences, Product & erivatives of Composite Functions, Logarithmic ifferentiation. ation: Rolle's Theorem, Mean Value Theorem,	Lectures Allotted 8 8 8 8
Unit I II III	Determina Matrices: Multiplicat Rank of M proof) Limits & Limits of V Interval, In Differentia quotients, Differentia Applicatio Expansion Hospitals I Euler's The	nts: Definition, M Definition, Typ ion and Multiplica atrix, Eigen Vecto Continuity: Limi /arious Types of F termediate Value 7 tion: Derivative, Chain Rule, De tion, Successive D n of Differentia of Functions (M Rule, Maxima & T	Contents linors, Cofactors, Properties of Determinants, es of Matrices, Addition, Subtraction, Scalar ation of Matrices, Adjoint, Inverse, Cramer's Rule, ors of a Matrix, Cayley-Hamilton Theorem (without It at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an Theorem, Type of Discontinuities. , Derivatives of Sum, Differences, Product & erivatives of Composite Functions, Logarithmic ifferentiation. ation: Rolle's Theorem, Mean Value Theorem, Iaclaurin's & Taylor's), Indeterminate Forms, L' Minima, Leibnitz Theorem, Partial Differentiation,	Lectures Allotted 8 8 8 8
Unit I II III	Determina Matrices: Multiplicat Rank of M proof) Limits & Limits of V Interval, In Differentia quotients, Differentia Applicatio Expansion Hospitals I Euler's The Integration	nts: Definition, M Definition, Typ ion and Multiplica atrix, Eigen Vecto Continuity: Limi /arious Types of F termediate Value 7 tion: Derivative, Chain Rule, Derivative, Chain Rule, Derivative, Chain Rule, Derivative, Chain Rule, Derivative, Chain Rule, Derivative, tion, Successive D n of Differentia of Functions (M Rule, Maxima & Teorem. n: Integral as Limi	Contents Linors, Cofactors, Properties of Determinants, es of Matrices, Addition, Subtraction, Scalar ation of Matrices, Adjoint, Inverse, Cramer's Rule, brs of a Matrix, Cayley-Hamilton Theorem (without at at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an Theorem, Type of Discontinuities. , Derivatives of Sum, Differences, Product & erivatives of Composite Functions, Logarithmic ifferentiation. Ation: Rolle's Theorem, Mean Value Theorem, Iaclaurin's & Taylor's), Indeterminate Forms, L' Minima, Leibnitz Theorem, Partial Differentiation, it of Sum, Riemann Sum, Fundamental Theorem of	Lectures Allotted 8 8 8
Unit I II III	Determina Matrices: Multiplicat Rank of M proof) Limits & Limits of V Interval, In Differentia quotients, Differentia Applicatio Expansion Hospitals I Euler's The Integration Calculus,	nts: Definition, M Definition, Typ ion and Multiplica atrix, Eigen Vecto Continuity: Limi /arious Types of F termediate Value 7 ntion: Derivative, Chain Rule, Det tion, Successive D n of Differentia of Functions (M Rule, Maxima & corem. n: Integral as Limi Indefinite Integral	Contents linors, Cofactors, Properties of Determinants, es of Matrices, Addition, Subtraction, Scalar ation of Matrices, Adjoint, Inverse, Cramer's Rule, ors of a Matrix, Cayley-Hamilton Theorem (without it at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an Theorem, Type of Discontinuities. , Derivatives of Sum, Differences, Product & erivatives of Composite Functions, Logarithmic ifferentiation. ation: Rolle's Theorem, Mean Value Theorem, Iaclaurin's & Taylor's), Indeterminate Forms, L' Minima, Leibnitz Theorem, Partial Differentiation, it of Sum, Riemann Sum, Fundamental Theorem of s, Methods of Integration Substitution, By Parts,	Lectures Allotted 8 8 8 8
Unit I II III	Determina Matrices: Multiplicat Rank of M proof) Limits & Limits of V Interval, In Differentia quotients, Differentia Applicatio Expansion Hospitals I Euler's The Integration Calculus, I Partial Frace	nts: Definition, M Definition, Typ ion and Multiplica atrix, Eigen Vecto Continuity: Limi /arious Types of F termediate Value 7 tion: Derivative, Chain Rule, De tion, Successive D n of Differentia of Functions (M Rule, Maxima & corem. n: Integral as Limi Indefinite Integral ctions, Integration	Contents linors, Cofactors, Properties of Determinants, es of Matrices, Addition, Subtraction, Scalar ation of Matrices, Adjoint, Inverse, Cramer's Rule, ors of a Matrix, Cayley-Hamilton Theorem (without It at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an Theorem, Type of Discontinuities. , Derivatives of Sum, Differences, Product & erivatives of Composite Functions, Logarithmic ifferentiation. ation: Rolle's Theorem, Mean Value Theorem, laclaurin's & Taylor's), Indeterminate Forms, L' Minima, Leibnitz Theorem, Partial Differentiation, it of Sum, Riemann Sum, Fundamental Theorem of s, Methods of Integration Substitution, By Parts, of Algebraic and Transcendental Functions, Definite	Lectures Allotted 8 8 8 8
Unit I II III V V	Determina Matrices: Multiplicat Rank of M proof) Limits & Limits of V Interval, In Differentia quotients, Differentia Application Expansion Hospitals I Euler's The Integration Calculus, I Partial Frac Integral, Si	nts: Definition, M Definition, Typ ion and Multiplica atrix, Eigen Vecto Continuity: Limi /arious Types of F termediate Value 7 ntion: Derivative, Chain Rule, Det tion, Successive D n of Differentia of Functions (M Rule, Maxima & corem. n: Integral as Limi Indefinite Integral	Contents linors, Cofactors, Properties of Determinants, es of Matrices, Addition, Subtraction, Scalar ation of Matrices, Adjoint, Inverse, Cramer's Rule, ors of a Matrix, Cayley-Hamilton Theorem (without It at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an Theorem, Type of Discontinuities. , Derivatives of Sum, Differences, Product & erivatives of Composite Functions, Logarithmic ifferentiation. ation: Rolle's Theorem, Mean Value Theorem, laclaurin's & Taylor's), Indeterminate Forms, L' Minima, Leibnitz Theorem, Partial Differentiation, it of Sum, Riemann Sum, Fundamental Theorem of s, Methods of Integration Substitution, By Parts, of Algebraic and Transcendental Functions, Definite	Lectures Allotted 8 8 8 8
Unit I II III IV V	Determina Matrices: Multiplicat Rank of M proof) Limits & Limits of V Interval, In Differentia quotients, Differentia Applicatio Expansion Hospitals I Euler's The Integration Calculus, I Partial Frac Integral, Si ooks:	nts: Definition, M Definition, Typ ion and Multiplica atrix, Eigen Vecto Continuity: Limi /arious Types of F termediate Value T tion: Derivative, Chain Rule, De tion, Successive D n of Differentia of Functions (M Rule, Maxima & corem. n: Integral as Limi Indefinite Integral ctions, Integration mple Problems of	Contents linors, Cofactors, Properties of Determinants, es of Matrices, Addition, Subtraction, Scalar ation of Matrices, Adjoint, Inverse, Cramer's Rule, ors of a Matrix, Cayley-Hamilton Theorem (without It at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an Theorem, Type of Discontinuities. , Derivatives of Sum, Differences, Product & erivatives of Composite Functions, Logarithmic ifferentiation. ation: Rolle's Theorem, Mean Value Theorem, laclaurin's & Taylor's), Indeterminate Forms, L' Minima, Leibnitz Theorem, Partial Differentiation, it of Sum, Riemann Sum, Fundamental Theorem of s, Methods of Integration Substitution, By Parts, of Algebraic and Transcendental Functions, Definite	Lectures Allotted 8 8 8 8



Fundaming southanning southanning	reasoning cries Section 21 & 120	
2. H.K. Dass, "Advanced Engineering Mathematics", S. Chand & Company		
Reference		
1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & So	ns.	
2. B. S. Grewal, "Elementary Engineering Mathematics", Khanna Publishers		
Evaluation/Assessment Methodology		
1) Class tasks/ Sessional Examination	15	
2) Presentations /Seminar		
3) Assignments		
4) Research Project Report	10	
Seminar On Research Project Report		
5) ESE	75	
Total: 100		
Prerequisites for the course: NIL		
Course Learning Outcomes:		
CO1: Compute the rank and inverse of a matrix and solve system of linear en	quations.	
CO2: Computation of Limits of Various Types of Functions, Continuity	over an Interval, to find	
Intermediate Value Theorem and type of Discontinuities.		
CO3: Understand the Derivatives, Chain Rule, Derivatives of Composite	Functions, Logarithmic	
Differentiation, Successive Differentiation.	_	
CO4: Use of different theorems like Rolle's Theorem, Mean Value Theorem	orem, Leibnitz Theorem,	
Partial Differentiation, Euler's Theorem.		
CO5: Understanding of Integral as Limit of Sum, Riemann Sum, Fundamen	tal Theorem of Calculus,	
Indefinite Integrals, Methods of Integration Substitution.		



Prog	Programme: Certificate Year: I			
Class: BCA			Semester: I	
Cred		Subject: Discrete Ma		
	Theory:4Cr			
	Course Code: Title: Discrete Mathematics			
	-NEP-104			
Cour	rse Objectiv	'es:		
CO1	0		f Algebraic Structures like Groups, Rings and Fiel	ds.
	Formula	te and solve recurrence	es and recursive functions.	
CO2	: Apply tl	ne concept of combinat	orics to solve basic problems in discrete mathemat	tics.
CO3	: Use ma	thematical and logical	notation to define and formally reason about ba	sic discrete
		es such as Sets, Relatio		
CO4		_	s using logical connectives and quantifiers to check	
CO5	5		th truth tables and propositional and predicate logic	с.
	<u> </u>	Discipline Specific E		
	imum Passi	ng Marks/Credits: 40	% Marks	
L:4				
T:0		1 \		
	In Hours/W			
	ory-1 Hr.=1C			
		1Credit (4Hrs./Week=		No. of
Unit			Contents	No. of Lectures
				Allotted
Ι	Set Theo	rv: Introduction. Siz	ze of sets and Cardinals, Venn diagrams,	8
		•		-
	Combination of sets, Multi sets, ordered pairs and Set Identities.			
			-	
		Definition, Types of	functions, Operations on functions, recursively	
	Functions defined fur	Definition, Types of actions.	-	
	Functions defined fur Relation:	Definition, Types of actions.	functions, Operations on functions, recursively on relations, Composite relations, Properties of	
II	Functions defined fur Relation: relations, E	E Definition, Types of actions. Definition, Operations Equality of relations, Pa	functions, Operations on functions, recursively on relations, Composite relations, Properties of	8
II	Functions defined fun Relation: relations, E Posets, H Combination	Definition, Types of actions. Definition, Operations Equality of relations, Pa asse Diagram and on of Partial ordered	functions, Operations on functions, recursively on relations, Composite relations, Properties of artial order relation. Lattices: Introduction, Partial ordered sets, sets, Hasse diagram, Introduction on flattices,	8
II	Functions defined fun Relation: relations, E Posets, H Combination Properties	Definition, Types of actions. Definition, Operations Equality of relations, Pa asse Diagram and on of Partial ordered of lattices– Bounded, C	functions, Operations on functions, recursively on relations, Composite relations, Properties of artial order relation. Lattices: Introduction, Partial ordered sets, sets, Hasse diagram, Introduction on flattices, Complemented, Modular and Complete lattice.	8
П	Functions defined fur Relation: relations, E Posets, H Combination Properties Boolean	Definition, Types of actions. Definition, Operations Equality of relations, Pa asse Diagram and on of Partial ordered of lattices– Bounded, C Algebra: Introduction	functions, Operations on functions, recursively on relations, Composite relations, Properties of artial order relation. Lattices: Introduction, Partial ordered sets, sets, Hasse diagram, Introduction on flattices, Complemented, Modular and Complete lattice. , Axioms and Theorems of Boolean algebra,	8
II	Functions defined fun Relation: relations, E Posets, H Combination Properties Boolean A Boolean fu	Definition, Types of actions. Definition, Operations Equality of relations, Pa asse Diagram and on of Partial ordered of lattices– Bounded, C Algebra: Introduction	functions, Operations on functions, recursively on relations, Composite relations, Properties of artial order relation. Lattices: Introduction, Partial ordered sets, sets, Hasse diagram, Introduction on flattices, Complemented, Modular and Complete lattice.	8
	Functions defined fun Relation: relations, E Posets, H Combination Properties Boolean A Boolean fun gates.	Definition, Types of actions. Definition, Operations Equality of relations, Pa asse Diagram and on of Partial ordered of lattices– Bounded, C Algebra: Introduction anctions. Simplification	functions, Operations on functions, recursively on relations, Composite relations, Properties of artial order relation. Lattices: Introduction, Partial ordered sets, sets, Hasse diagram, Introduction on flattices, Complemented, Modular and Complete lattice. , Axioms and Theorems of Boolean algebra, n of Boolean functions, Karnaugh maps, Logic	
II	Functions defined fur Relation: relations, E Posets, H Combination Properties Boolean A Boolean fur gates. Predicate	Definition, Types of actions. Definition, Operations Equality of relations, Pa asse Diagram and on of Partial ordered of lattices– Bounded, C Algebra: Introduction unctions. Simplification Logic: Theory of Pred	functions, Operations on functions, recursively on relations, Composite relations, Properties of artial order relation. Lattices: Introduction, Partial ordered sets, sets, Hasse diagram, Introduction on flattices, Complemented, Modular and Complete lattice. , Axioms and Theorems of Boolean algebra, n of Boolean functions, Karnaugh maps, Logic licates, First order predicate, Predicate formulas,	8
	Functions defined fun Relation: relations, E Posets, H Combination Properties Boolean fun gates. Predicate Quantifiers	E Definition, Types of actions. Definition, Operations Equality of relations, Pa asse Diagram and on of Partial ordered of lattices– Bounded, C Algebra: Introduction, unctions. Simplification Logic: Theory of Pred s, Inference theory of p	functions, Operations on functions, recursively on relations, Composite relations, Properties of artial order relation. Lattices: Introduction, Partial ordered sets, sets, Hasse diagram, Introduction on flattices, Complemented, Modular and Complete lattice. , Axioms and Theorems of Boolean algebra, n of Boolean functions, Karnaugh maps, Logic licates, First order predicate, Predicate formulas, redicate logic.	
	Functions defined fur Relation: relations, E Posets, H Combination Properties Boolean fu gates. Predicate Quantifiers Proposition	Definition, Types of actions. Definition, Operations Equality of relations, Pa asse Diagram and on of Partial ordered of lattices– Bounded, C Algebra: Introduction unctions. Simplification Logic: Theory of Pred a, Inference theory of p nal: Propositions, Tru	functions, Operations on functions, recursively on relations, Composite relations, Properties of artial order relation. Lattices: Introduction, Partial ordered sets, sets, Hasse diagram, Introduction on flattices, Complemented, Modular and Complete lattice. , Axioms and Theorems of Boolean algebra, n of Boolean functions, Karnaugh maps, Logic licates, First order predicate, Predicate formulas, redicate logic. th tables, Tautology, Contradiction, Algebra of	
III	Functions defined fur Relation: relations, E Posets, H Combination Properties Boolean fut gates. Predicate Quantifiers Proposition	Definition, Types of actions. Definition, Operations Equality of relations, Pa asse Diagram and on of Partial ordered of lattices– Bounded, C Algebra: Introduction, anctions. Simplification Logic: Theory of Pred a, Inference theory of p nal: Propositions, Tru as, Theory of Inference	functions, Operations on functions, recursively on relations, Composite relations, Properties of artial order relation. Lattices: Introduction, Partial ordered sets, sets, Hasse diagram, Introduction on flattices, Complemented, Modular and Complete lattice. , Axioms and Theorems of Boolean algebra, n of Boolean functions, Karnaugh maps, Logic licates, First order predicate, Predicate formulas, redicate logic. th tables, Tautology, Contradiction, Algebra of and Natural Detection.	8
	Functions defined fur Relation: relations, E Posets, H Combination Properties Boolean fu gates. Predicate Quantifiers Proposition Algebraic	Definition, Types of actions. Definition, Operations Equality of relations, Pa asse Diagram and on of Partial ordered of lattices– Bounded, C Algebra: Introduction unctions. Simplification Logic: Theory of Pred a, Inference theory of p nal: Propositions, Truns, Theory of Inference Structures: Introduction	functions, Operations on functions, recursively on relations, Composite relations, Properties of artial order relation. Lattices: Introduction, Partial ordered sets, sets, Hasse diagram, Introduction on flattices, Complemented, Modular and Complete lattice. , Axioms and Theorems of Boolean algebra, n of Boolean functions, Karnaugh maps, Logic licates, First order predicate, Predicate formulas, redicate logic. th tables, Tautology, Contradiction, Algebra of and Natural Detection.	
III	Functions defined fur Relation: relations, E Posets, H Combination Properties Boolean fur gates. Predicate Quantifiers Proposition Algebraic of algebrai	Definition, Types of actions. Definition, Operations Equality of relations, Pa asse Diagram and on of Partial ordered of lattices– Bounded, C Algebra: Introduction unctions. Simplification Logic: Theory of Pred a, Inference theory of p nal: Propositions, Tru as, Theory of Inference Structures: Introduction c structures: Semi grou	functions, Operations on functions, recursively on relations, Composite relations, Properties of artial order relation. Lattices: Introduction, Partial ordered sets, sets, Hasse diagram, Introduction on flattices, Complemented, Modular and Complete lattice. , Axioms and Theorems of Boolean algebra, n of Boolean functions, Karnaugh maps, Logic licates, First order predicate, Predicate formulas, redicate logic. th tables, Tautology, Contradiction, Algebra of and Natural Detection. ion to algebraic Structures and properties. Types up, Monoid, Group, Abelian group and Properties	8
III	Functions defined fur Relation: relations, E Posets, H Combination Properties Boolean fur gates. Predicate Quantifiers Proposition Algebraic of algebrai of group.	Definition, Types of actions. Definition, Operations Equality of relations, Pa asse Diagram and on of Partial ordered of lattices– Bounded, C Algebra: Introduction unctions. Simplification Logic: Theory of Pred a, Inference theory of p nal: Propositions, Tru as, Theory of Inference Structures: Introduction c structures: Semi grou Subgroup, Cyclic grou	functions, Operations on functions, recursively on relations, Composite relations, Properties of artial order relation. Lattices: Introduction, Partial ordered sets, sets, Hasse diagram, Introduction on flattices, Complemented, Modular and Complete lattice. , Axioms and Theorems of Boolean algebra, n of Boolean functions, Karnaugh maps, Logic licates, First order predicate, Predicate formulas, redicate logic. th tables, Tautology, Contradiction, Algebra of and Natural Detection.	8
III	Functions defined fur Relation: relations, H Posets, H Combination Properties Boolean A Boolean fu gates. Predicate Quantifiers Proposition Algebraic of algebrai of group. S and Isomore	Definition, Types of actions. Definition, Operations Equality of relations, Pa asse Diagram and on of Partial ordered of lattices– Bounded, C Algebra: Introduction, unctions. Simplification Logic: Theory of Pred a, Inference theory of p nal: Propositions, Tru as, Theory of Inference Structures: Introduction c structures: Semi grou Subgroup, Cyclic grou phism of groups.	functions, Operations on functions, recursively on relations, Composite relations, Properties of artial order relation. Lattices: Introduction, Partial ordered sets, sets, Hasse diagram, Introduction on flattices, Complemented, Modular and Complete lattice. , Axioms and Theorems of Boolean algebra, n of Boolean functions, Karnaugh maps, Logic licates, First order predicate, Predicate formulas, redicate logic. th tables, Tautology, Contradiction, Algebra of and Natural Detection. ion to algebraic Structures and properties. Types up, Monoid, Group, Abelian group and Properties	8



	Transforming Education System, Tra	nsforming Lives	Section 2f & 12B	
V	Natural Numbers: Introduction, Piano's axioms, Mathematical Induction	on, Strong	8	
	Induction and Induction with Nonzero Base cases.			
	Recurrence Relation & Generating functions: Introduction and properties of			
	Generating Functions. Simple Recurrence relation with constant coeffic	cients and		
	Linear recurrence relation without constant coefficients. Methods of			
	recurrences.			
	Combinatorics: Introduction, Counting techniques and Pigeonhole	principle,		
	Polya's Counting theorem.			
Text I	Book:			
1. Ke	nneth H. Rosen, "Discrete Mathematics and Its Applications", Mc Graw H	Hill, 2006.		
2. B.	Kolman, R.C. Bus by and S. Cross", Discrete Mathematics Structures", Pr	rentice Hal	1, 2004.	
Refer	ence Book:			
1. R.I	P. Girimaldi, "Discrete and Combinatorial Mathematics", Addison Wesley	, 2004.		
2. Y.	N. Singh, "Discrete Mathematical Structures", Wiley-India, First edition,2	2010.		
	Evaluation/Assessment Methodology			
		Max. N	Iarks 100	
1) (Class tasks/ Sessional Examination		15	
2) F	Presentations /Seminar			
3) A	Assignments			
4) F	Research Project Report		10	
S	Seminar On Research Project Report			
5) E	ESE		75	
	Total:	1	100	
Prere	quisites for the course: NIL			
Cour	se Learning Outcomes:			
CO1:				
CO2:	1 1 1			
CO3:				
CO4:				
CO5:	Able to analyze preposition and predicate logics.			



Program	nme·UG	Year: 1	ſ		
8		Semes			
Credits		Subject:Fundamental of C			
Theory: 0					
Practical: 2					
Course Code: Title:Fundamental of Computer and IT LAB					
BCA-NEP-106P					
Course	Objectives				
CO1: Ur	CO1: Understand Computer Fundamentals – hardware and Software				
		omputer networks			
	•	utomation tools			
		rch engines			
	of Paper: (
	m Passing	Marks/Credits:50% Marks	S		
L:0					
T:0					
	ours/Week				
	1 Hr. = 1 (
		Credit(4Hrs./Week=4Credits)			Nuc
Unit	Contents				No. of Lectures
					Allotted
Ι	Identify th	e internal and external hardv	vare/peripheral components		2
I		e internal and external hardy	<u> </u>		2
III			ring letter using word process	sor	2
IV	-		d on boundary conditions for		2
1,		s using Spread sheet.		in number	_
V		U 1	ansition and animations, in	sertion of	2
	-	nages and internet contents)	,		
VI			g of email with attachments.		2
VII	Demonstr	ate how to create email-id an	d uploading and downloading	g files.	2
VIII			management commands (cre		2
		ete and rename folders and fi		· 17/	
	·		essment Methodology		
				Ma	x. Marks:50
1) Class	s tasks/ Ses	sional Examination		25	
2) Prese	entations /S	eminar			
	gnments				
	arch Projec	t Report/Seminar On Researc	ch Project Report		
5) ESE				25	
~			Total:	50	
	U	utcomes:Student will be abl	e to:		
		asic computer terminology	•		
	CO2: Formulate opinions about the impact of computers on society				
CO3: Po	CO3: Possess the knowledge of basic hardware peripherals				



0	amme: Certificate	Year: I	
Class:	BCA	Semester: I	
Credit	Credits Subject: Mathematics-I		
Theory			
Cours	Course Code: Title: Mathematics-I		
BCA-N	BCA-NEP-104		
Cours	e Objectives:		
CO1:	Compute the rank and i	nverse of a matrix and solve system of linear equations.	
CO2:	Computation of Limits	of Various Types of Functions, Continuity over an Interva	l, to find
		orem and type of Discontinuities.	
CO3:		tives, Chain Rule, Derivatives of Composite Functions, Log	garithmic
	Differentiation, Success	-	
CO4:	Use of different theore	ms like Rolle's Theorem, Mean Value Theorem, Leibnitz	Theorem,
	Partial Differentiation,		,
CO5:	,	gral as Limit of Sum, Riemann Sum, Fundamental The	eorem of
		egrals, Methods of Integration Substitution.	
Nature	e of Paper: DSE		
Minim	um Passing Marks/Cre	edits: 40% Marks	
L:4			
T:0			
	Hours/Week)		
	r - 1 Hr. = 1 Credit		
•	al- 2 Hrs.=1Credit(4Hrs.	/Week=4Credits)	
Unit		Contents	No. of
			Lectures
			Allotted
Ι	Determinants: Definit	tion, Minors, Cofactors, Properties of Determinants,	8
		, Types of Matrices, Addition, Subtraction, Scalar	
		Iltiplication of Matrices, Adjoint, Inverse, Cramer's Rule,	
	_	Vectors of a Matrix, Cayley-Hamilton Theorem (without	
	proof)		
II		: Limit at a Point, Properties of Limit, Computation of	8
		es of Functions, Continuity at a Point, Continuity Over an	
		Value Theorem, Type of Discontinuities.	
III		vative, Derivatives of Sum, Differences, Product &	8
		le, Derivatives of Composite Functions, Logarithmic	
	Differentiation, Succes	1 0	
IV		erentiation: Rolle's Theorem, Mean Value Theorem,	8
		ons (Maclaurin's & Taylor's), Indeterminate Forms, L'	
	-	na & Minima, Leibnitz Theorem, Partial Differentiation,	
	Euler's Theorem.	, · · · · · · · · · · · · · · · · · · ·	
V		as Limit of Sum, Riemann Sum, Fundamental Theorem of	8
Ť	2 2	ntegrals, Methods of Integration Substitution, By Parts,	v
		regration of Algebraic and Transcendental Functions,	
		ble Problems of Line Integral.	
	1 Dominio micgrai, omi	ne i roorenno or Enne muegran.	



Transforming Education Syste	m, Transforming Lives Section 21 & 128		
Text Books:			
1. Babu Ram, "Engineering Mathematics", Pearson Education			
2. H.K. Dass, "Advanced Engineering Mathematics", S. Chand & Company			
Reference			
1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & S	ons.		
2. B. S. Grewal, "Elementary Engineering Mathematics", Khanna Publisher	rs		
Evaluation/Assessment Methodology			
1) Class tasks/ Sessional Examination	15		
2) Presentations /Seminar			
3) Assignments			
4) Research Project Report	10		
Seminar On Research Project Report			
5) ESE	75		
Total: 100			
Prerequisites for the course: NIL			
Course Learning Outcomes:			
CO1: Compute the rank and inverse of a matrix and solve system of linear	equations.		
CO2: Computation of Limits of Various Types of Functions, Continuity	over an Interval, to find		
Intermediate Value Theorem and type of Discontinuities.			
CO3: Understand the Derivatives, Chain Rule, Derivatives of Composite	Functions, Logarithmic		
Differentiation, Successive Differentiation.	_		
CO4: Use of different theorems like Rolle's Theorem, Mean Value Theorem	orem, Leibnitz Theorem,		
Partial Differentiation, Euler's Theorem.			
CO5: Understanding of Integral as Limit of Sum, Riemann Sum, Fu	indamental Theorem of		
Calculus, Indefinite Integrals, Methods of Integration Substitution.			



Progra	mme: Certificate	Year: I			
Class:BCA		Semester: I			
Credit	· · · · · · · · · · · · · · · · · · ·	als of Computers and IT			
Theory	•				
Course		of Computers and IT			
	BCA-NEP-102				
Course	Objectives:				
CO1:	Demonstrate the use of mathem	natical software and solve simple mathematical prob	olems.		
CO2:	Explain the needs of hardware	and software required for a computation task.			
CO3:	State typical provisions of cyb	er law that govern the proper usage of Internet an	d computing		
	resources.				
CO4:		portant application software and their use to p	perform any		
	engineering activity.				
		ng system commands and shell script.			
	of Paper: Core				
	um Passing Marks/Credits: 4	0% Marks			
L:4					
T:0	Hours (Wash)				
	Hours/Week)				
•	- 1 Hr. = 1 Credit al- 2 Hrs.=1Credit(4Hrs./Week=	-4Cradita)			
Unit	1- 2 msrcredit(4ms./ week-	Contents	No. of		
Unit		Contents	Lectures		
			Allotted		
Ι	Introduction to Computer	s: Introduction, Characteristics of Computers,	8		
_	-	r, Generations, Types of Computers and Their	-		
	U 1	ing Languages, Types of Memory, RAM, ROM,			
	Secondary Storage Devices	(FD, CD, HD, Pen drive), Input and Output			
	Devices.				
II	Number Systems: Introduc	tion to Binary, Octal, Decimal, Hexadecimal	8		
	Number Systems, Conversio	n, Simple Addition, Subtraction, Multiplication			
	and division.				
	-	s: Definition, Characteristics, Advantages and			
	Disadvantages, Symbols of Fl				
			0		
III	Operating System and Service	es: Types of Operating System, Features of Operating	8		
111	Operating System and Service System, Functions and Service	es of Operating System. DOS - History, Files and	8		
	Operating System and Service System, Functions and Service Directories, Internal and Exter	es of Operating System. DOS – History, Files and rnal Commands, Batch Files. Windows - History,	8		
	Operating System and Service System, Functions and Service Directories, Internal and Exter Icons, Files and Folders, Contro	es of Operating System. DOS – History, Files and rnal Commands, Batch Files. Windows - History, l Panel, Task Bar, Desktop.	-		
III IV	Operating System and Service System, Functions and Service Directories, Internal and Exter Icons, Files and Folders, Contro Office Tools: Basic Concepts	es of Operating System. DOS – History, Files and rnal Commands, Batch Files. Windows - History, l Panel, Task Bar, Desktop. , Uses.	8		
	Operating System and Service System, Functions and Service Directories, Internal and Exter Icons, Files and Folders, Contro Office Tools: Basic Concepts Word: Menu Bar, Menus, Su	es of Operating System. DOS – History, Files and rnal Commands, Batch Files. Windows - History, l Panel, Task Bar, Desktop. , Uses. ubmenus, Tool Bar, Tools, Customizing Toolbar,	-		
	Operating System and Service System, Functions and Service Directories, Internal and Exter Icons, Files and Folders, Contro Office Tools: Basic Concepts Word: Menu Bar, Menus, Su Hiding Toolbar, Creating and	es of Operating System. DOS – History, Files and rnal Commands, Batch Files. Windows - History, l Panel, Task Bar, Desktop. , Uses. ubmenus, Tool Bar, Tools, Customizing Toolbar, d Saving Documents, Working with an Existing	-		
	Operating System and Service System, Functions and Service Directories, Internal and Exter Icons, Files and Folders, Contro Office Tools: Basic Concepts Word: Menu Bar, Menus, Su Hiding Toolbar, Creating and Document, Auto Text, Aut	es of Operating System. DOS – History, Files and rnal Commands, Batch Files. Windows - History, <u>I Panel, Task Bar, Desktop.</u> , Uses. ubmenus, Tool Bar, Tools, Customizing Toolbar, d Saving Documents, Working with an Existing o Complete and Auto Correct; Formatting a	-		
	Operating System and Service System, Functions and Service Directories, Internal and Exter Icons, Files and Folders, Contro Office Tools: Basic Concepts Word: Menu Bar, Menus, Su Hiding Toolbar, Creating and Document, Auto Text, Aut Document, Word Art, Usi	es of Operating System. DOS – History, Files and rnal Commands, Batch Files. Windows - History, l Panel, Task Bar, Desktop. , Uses. ubmenus, Tool Bar, Tools, Customizing Toolbar, d Saving Documents, Working with an Existing o Complete and Auto Correct; Formatting a ng Tables and Columns-Table Creation and			
	Operating System and Service System, Functions and Service Directories, Internal and Exter Icons, Files and Folders, Contro Office Tools: Basic Concepts Word: Menu Bar, Menus, Su Hiding Toolbar, Creating and Document, Auto Text, Aut Document, Word Art, Usi Modification Giving Stress	es of Operating System. DOS – History, Files and rnal Commands, Batch Files. Windows - History, l Panel, Task Bar, Desktop. , Uses. ubmenus, Tool Bar, Tools, Customizing Toolbar, d Saving Documents, Working with an Existing o Complete and Auto Correct; Formatting a ng Tables and Columns-Table Creation and to Auto-Fit, Auto-Format; Object Linking and			
	Operating System and Service System, Functions and Service Directories, Internal and Exter Icons, Files and Folders, Contro Office Tools: Basic Concepts Word: Menu Bar, Menus, Su Hiding Toolbar, Creating and Document, Auto Text, Aut Document, Word Art, Usi Modification Giving Stress Embedding, Inserting and S	es of Operating System. DOS – History, Files and rnal Commands, Batch Files. Windows - History, <u>I Panel, Task Bar, Desktop.</u> , Uses. ubmenus, Tool Bar, Tools, Customizing Toolbar, d Saving Documents, Working with an Existing o Complete and Auto Correct; Formatting a ng Tables and Columns-Table Creation and to Auto-Fit, Auto-Format; Object Linking and izing Graphics, Hyperlink, Envelopes & Label	-		
	Operating System and Service System, Functions and Service Directories, Internal and Exter Icons, Files and Folders, Contro Office Tools: Basic Concepts Word: Menu Bar, Menus, Su Hiding Toolbar, Creating and Document, Auto Text, Aut Document, Word Art, Usi Modification Giving Stress Embedding, Inserting and S	es of Operating System. DOS – History, Files and rnal Commands, Batch Files. Windows - History, l Panel, Task Bar, Desktop. , Uses. ubmenus, Tool Bar, Tools, Customizing Toolbar, d Saving Documents, Working with an Existing o Complete and Auto Correct; Formatting a ng Tables and Columns-Table Creation and to Auto-Fit, Auto-Format; Object Linking and	-		



	Transforming Education System	n, Transforming Lives	Section 2f & 12B		
	Excel: Creating a Simple Spreadsheet, Editing a Spreadsheet, Working with				
	Functions and Formula, Formatting Worksheets, Creating Charts, Inserting and				
	Formatting Data in a Worksheet, Working with an Existing Data List, Auto Fill,				
	Fill Series and Auto- complete Options, Formatting Cells; Sorting & Filtering				
	Data, Conditional Formatting, Interlinking Worksheets and Files, Setting Filters				
	and Performing Calculations on Filtered Data etc.				
V	Power Point: Creating and Viewing Presentations, Editing a P	resentation.	8		
	Editing Master Slides, Inserting, Sorting, Hiding and Deleting Slide		_		
	Pictures, Creating Tables, Slide Layouts, Adding Transition and	-			
	Effect, Hyper Linking Slides & Files.				
	Internet and its Applications: Introduction, Usage, Browser,	Websites.			
	Protocol, Domain Name, IP address, E-Mail, TELNET, FTP, World				
	Portal, Blogging, E-Learning and wiki, Social Networking	······································			
Text B					
	Sinha, "Fundamental of Computers", BPB Publications.				
	nen W. Sagman & Gail Taylor, "MS-Office 2000For Windows", Peacl	npit Press.			
Refere		1			
1. V.Ra	jaraman, "Fundamental of Computers", Prentice-Hall of India.				
	Evaluation/Assessment Methodology				
		Max. M	arks- 100		
1) Cla	ss tasks/ Sessional Examination	1	15		
2) Pres	sentations /Seminar				
3) Ass	ignments				
	earch Project Report]	10		
	ninar On Research Project Report				
5) ES	5 1	-	75		
,	Total: 100				
Prerequ	isites for the course:NIL				
	Learning Outcomes:				
CO 1:	Demonstrate the use of mathematical software and solve simple mat	hematical pro	oblems.		
CO 2:	Explain the needs of hardware and software required for a computation				
CO 3:	State typical provisions of cyber law that govern the proper usage of	of Internet an	d computing		
	resources.				
CO 4:	Explain the working of important application software and th	eir use to	perform any		
	engineering activity.		- •		

CO 5: Demonstrate the use of Operating system commands and shell script.



Progra	m:UG	Year: I	
Class:	BCA	Semester: I	
Credits:		Subject: Problem-Solving using C Lab	
Practica			
Course		Title: Problem-Solving using C Lab	
	NEP-105P		
	Objectives:		
CO 1:	CO 1: Students will be able to learn the basics of programming language and Fundamental concep		
~ ~ ~	of C Langu	e	
CO2:		vill be able to learn and understand Concepts of basic progra	mming with
CO 2		l and Iterative Control statements.	
CO3:		vill be familiar with the concept of Arrays, Pointers, Functions,	categories of
CO4:	· · · · ·	nd recursion.	mplata String
C04.	Operations	ill be able to develop a Program with Structure; learn Union and Con	inplete String
CO5:	1	ill be familiar with File handling programs to perform read-write oper	rations
-	of Paper: C		
	A	Marks/Credits: 50% Marks	
L:0			
T:0			
P:4 (In	Hours/Week)	
	-1 Hr. $= 1$ C		
Practica	al- 2 Hrs.=1C	credit(4Hrs./Week=4Credits)	
Unit	Contents		No. of
			Lectures
			Allotted
Ι	1 1	gram to display "hello world" in C.	02
	-	gram to find the largest and smallest among three entered numbers	02
II		play whether the identified largest/smallest number is even or odd.	
III		gram to check whether the entered year is a leap year or not (a year	
	-	t is divisible by 4 and divisible by 100 or 400.)	
IV		ogram to read a string and check for palindrome without using	02
		ed functions (a string is a palindrome if its half is mirror by itself.	
V	· ·	gram to find the biggest among three numbers using a pointer.	02
VI		ucture named company which has a name, address, phone, and as	02
		riables. Read the name of the company, its address, phone, and no	
X 7 T T		ee. Finally display these members' values.	
VII		ass and display the details from the function.	02
VIII	Write a pros	gram to show programming examples with unions and structures.	02



Reference / Text Books:			
The C Programming Language" by Brian W. Kernighan and Dennis M. Ritchie.			
 C Programming: A Modern Approach" by K. N. King. 			
Evaluation/Assessment Methodology			
	Max. Marks:50		
1) Class tasks/ Sessional Examination	25		
2) Presentations /Seminar			
3) Assignments			
4) Research Project Report			
Seminar On Research Project Report			
5) ESE	25		
Total:	50		
Course Learning Outcomes:			
CO1: Students will be able to develop programs based on fundamenta	l concepts of programming in		
С.			
CO2: Students will be able to solve problems based on Conditional and	Iterative Control Statements.		
CO3: Students will be able to learn Complete Programming Concept	s of Arrays, Pointers and get		
familiar with modular programming Concepts of C using Function	ns.		
CO4: Students will be able to learn conceptual programming with	th String, Structure, and its		
differentiation with Union.			
CO5: Students will be able to perform File handling programs with read	d and write concepts		



Program	me Cer	tificate	Year: I		
Programme: Certificate Class: BCA		tineate	Semester: I		
		Subject: Problem Solving using			
-	Theory:4Cr				
	Practical:2Cr				
	Course Code: Title: Problem Solving using C BCA-NEP-101				
Course C	•				
CO 1:			programming language and Fundame	ental	
GO A	-	s of C Language.			
CO 2:			derstand Concepts of basic progra	mming with	
GO A		onal and Iterative Control statemen			
CO 3:			Arrays, Pointers, Functions, categorie	es of function	
GO 1	and recu				
CO 4:		1 0	with Structure; learn Union and Cor	nplete String	
<u> </u>	Operatio				
CO 5:			g programs to perform read write oper	rations.	
Nature o					
	n Passin	g Marks/Credits: 40% Marks			
L:0					
T:0					
P: 4(In H					
Theory -					
Practical-					
(4Hrs./W		,			
Unit	Conte			N T 0	
		ents		No. of	
		nts		Lectures	
-				Lectures Allotted	
Ι	Intro	luction to 'C' Language: Hi	story, C Character Set, Tokens,	Lectures	
Ι	Intro Keyw	luction to 'C' Language: Hi ords, Constants, Identifiers, Va	riables, Data Types, Comments,	Lectures Allotted	
Ι	Intro Keyw Struct	luction to 'C' Language: Hi ords, Constants, Identifiers, Va ures of 'C' Program, Introduc	tion to Pre-processor Directives:	Lectures Allotted	
I	Intro Keyw Struct #inclu	luction to 'C' Language: Hi ords, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), De	riables, Data Types, Comments, tion to Pre-processor Directives: eclaration, Assignment, Operators,	Lectures Allotted	
	Introd Keyw Struct #inclu Expre	luction to 'C' Language: Hi ords, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), De ssions, Statements, Arithmetic Exp	tion to Pre-processor Directives: eclaration, Assignment, Operators, pressions.	Lectures Allotted 10	
I	Intro Keyw Struct #inclu Expre Bran	Auction to 'C' Language: Hi ords, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), De ssions, Statements, Arithmetic Exp ching and Looping: Two Way S	riables, Data Types, Comments, tion to Pre-processor Directives: eclaration, Assignment, Operators, pressions. Selection (if, if-else, Nested if-else,	Lectures Allotted	
	Intro Keyw Struct #inclu Expre Branc cascad	luction to 'C' Language: Hi ords, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), De ssions, Statements, Arithmetic Exp ching and Looping: Two Way S led if-else), Switch Statement, T	riables, Data Types, Comments, tion to Pre-processor Directives: eclaration, Assignment, Operators, pressions. Selection (if, if-else, Nested if-else, Fernary Operator, goto Statement,	Lectures Allotted 10	
	Intro Keyw Struct #inclu Expre Branc cascad Loops	Juction to 'C' Language: Hi ords, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), De ssions, Statements, Arithmetic Exp ching and Looping: Two Way S led if-else), Switch Statement, T (for, while, do-while) in C, brea	riables, Data Types, Comments, tion to Pre-processor Directives: eclaration, Assignment, Operators, pressions. Selection (if, if-else, Nested if-else,	Lectures Allotted 10	
II	Intro Keyw Struct #inclu Expre Branc cascad Loops Loops	Auction to 'C' Language: Hi ords, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), Do ssions, Statements, Arithmetic Exp ching and Looping: Two Way S led if-else), Switch Statement, T (for, while, do-while) in C, brea	riables, Data Types, Comments, tion to Pre-processor Directives: eclaration, Assignment, Operators, pressions. Selection (if, if-else, Nested if-else, Ternary Operator, goto Statement, k and continue Statements, Nested	Lectures Allotted 10	
	Introd Keyw Struct #inclu Expre Brand cascad Loops Loops Array	luction to 'C' Language: Hi ords, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), De ssions, Statements, Arithmetic Exp ching and Looping: Two Way S led if-else), Switch Statement, T (for, while, do-while) in C, brea s: Types of Arrays, Array Declara	tion to Pre-processor Directives: eclaration, Assignment, Operators, pressions. Selection (if, if-else, Nested if-else, Fernary Operator, goto Statement, ik and continue Statements, Nested tion, Array Initialization, Accessing	Lectures Allotted 10	
II	Intro Keyw Struct #inclu Expre Branc cascad Loops Loops Array Data f	Auction to 'C' Language: Hi ords, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), Do ssions, Statements, Arithmetic Exp ching and Looping: Two Way S led if-else), Switch Statement, T (for, while, do-while) in C, brea	tion to Pre-processor Directives: eclaration, Assignment, Operators, pressions. Selection (if, if-else, Nested if-else, Fernary Operator, goto Statement, ik and continue Statements, Nested tion, Array Initialization, Accessing ctions, Multi-Dimensional Arrays.	Lectures Allotted 10	
II	Intro Keyw Struct #inclu Expre Branc cascad Loops Loops Loops Data f Point	Auction to 'C' Language: Hi ords, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), De ssions, Statements, Arithmetic Exp ching and Looping: Two Way S led if-else), Switch Statement, T (for, while, do-while) in C, brea rs: Types of Arrays, Array Declara rom Array, Using Arrays with Fun ers: Basics, Pointer and Function, A	tion to Pre-processor Directives: eclaration, Assignment, Operators, pressions. Selection (if, if-else, Nested if-else, Ternary Operator, goto Statement, k and continue Statements, Nested tion, Array Initialization, Accessing ctions, Multi-Dimensional Arrays. Array of Pointers.	Lectures Allotted 10	
II	Introd Keyw Struct #inclu Expre Brand cascad Loops Loops Array Data f Point Stora	Juction to 'C' Language: Hi ords, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), De ssions, Statements, Arithmetic Exp ching and Looping: Two Way S led if-else), Switch Statement, T (for, while, do-while) in C, brea	riables, Data Types, Comments, tion to Pre-processor Directives: eclaration, Assignment, Operators, pressions. Selection (if, if-else, Nested if-else, Fernary Operator, goto Statement, ik and continue Statements, Nested tion, Array Initialization, Accessing ctions, Multi-Dimensional Arrays. Array of Pointers. tatic & Register.	Lectures Allotted 10	
II	Intro Keyw Struct #inclu Expre Branc cascad Loops Loops Array Data f Point Stora Funct	Auction to 'C' Language: Hi ords, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), Do ssions, Statements, Arithmetic Exp ching and Looping: Two Way S led if-else), Switch Statement, T (for, while, do-while) in C, brea	tion to Pre-processor Directives: eclaration, Assignment, Operators, pressions. Selection (if, if-else, Nested if-else, Fernary Operator, goto Statement, ik and continue Statements, Nested tion, Array Initialization, Accessing ctions, Multi-Dimensional Arrays. Array of Pointers. tatic & Register. declaring a Function, defining a	Lectures Allotted 10	
II	Intro Keyw Struct #inclu Expre Branc cascad Loops Loops Array Data f Point Stora Funct	Auction to 'C' Language: Hi ords, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), De ssions, Statements, Arithmetic Exp ching and Looping: Two Way S led if-else), Switch Statement, T (for, while, do-while) in C, brea s: Types of Arrays, Array Declara rom Array, Using Arrays with Fun ers: Basics, Pointer and Function, A ge Classes: Automatic, External, S ions: Advantages of Functions, on, calling a Function, Argument	riables, Data Types, Comments, tion to Pre-processor Directives: eclaration, Assignment, Operators, pressions. Selection (if, if-else, Nested if-else, Ternary Operator, goto Statement, k and continue Statements, Nested tion, Array Initialization, Accessing ctions, Multi-Dimensional Arrays. Array of Pointers. tatic & Register. declaring a Function, defining a t Passing – Call by Value, Call by	Lectures Allotted 10	
II	Introd Keyw Struct #inclu Expre Brand cascad Loops Loops Array Data f Point Stora Funct Refere	luction to 'C' Language: Hi ords, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), De ssions, Statements, Arithmetic Exp ching and Looping: Two Way S led if-else), Switch Statement, T (for, while, do-while) in C, brea	riables, Data Types, Comments, tion to Pre-processor Directives: eclaration, Assignment, Operators, pressions. Selection (if, if-else, Nested if-else, Fernary Operator, goto Statement, ik and continue Statements, Nested tion, Array Initialization, Accessing ctions, Multi-Dimensional Arrays. Array of Pointers. tatic & Register. declaring a Function, defining a t Passing – Call by Value, Call by n.	Lectures Allotted 10 10 9	
II	Introd Keyw Struct #inclu Expre Brand cascad Loops Loops Array Data f Point Stora Funct Refere	luction to 'C' Language: Hi ords, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), De ssions, Statements, Arithmetic Exp ching and Looping: Two Way S led if-else), Switch Statement, T (for, while, do-while) in C, brea	riables, Data Types, Comments, tion to Pre-processor Directives: eclaration, Assignment, Operators, pressions. Selection (if, if-else, Nested if-else, Ternary Operator, goto Statement, k and continue Statements, Nested tion, Array Initialization, Accessing ctions, Multi-Dimensional Arrays. Array of Pointers. tatic & Register. declaring a Function, defining a t Passing – Call by Value, Call by	Lectures Allotted 10	
II	Intro Keyw Struct #inclu Expre Branc cascad Loops Loops Array Data f Point Stora Funct Refere String	Juction to 'C' Language: Hi ords, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), Do ssions, Statements, Arithmetic Exp ching and Looping: Two Way S led if-else), Switch Statement, T (for, while, do-while) in C, brea	riables, Data Types, Comments, tion to Pre-processor Directives: eclaration, Assignment, Operators, pressions. Selection (if, if-else, Nested if-else, Fernary Operator, goto Statement, ik and continue Statements, Nested tion, Array Initialization, Accessing ctions, Multi-Dimensional Arrays. Array of Pointers. tatic & Register. declaring a Function, defining a t Passing – Call by Value, Call by n.	Lectures Allotted 10 10 9	



	Transforming Education		Section 2f & 12B			
	Structure and Union: Basic of Structures, Structures and Functions, Array					
	of Structures, Pointer to Structure, Union.					
V	File Handling: Introduction, File Types- Text, Binary, The File Pointer,					
	Opening a File, Closing a File, Reading and Writing a File, File Handling					
	Functions: fgetc(), fputc(), fputs(), fgets(), fprintf(), fscanf(), fwrite(),					
	fread(), fseek(), ftell(), feof() etc.					
Text Bo	oks:					
	laguruswamy, "Programming in ANSI C", Tata Mc.Graw-Hill e	ducation.				
2. Yash	wantKanetkar, "Let us C", BPB Publications					
Reference	e					
	jaraman, "Computer Basics and C Programming", PHI Learning	5				
2. Asho	k N. Kamthane, "Programming in C", Pearson Education.					
Evaluati	on/Assessment Methodology					
		May	x. Marks 100			
1) Class	tasks/ Sessional Examination	15				
2) Prese	ntations /Seminar					
3) Assig	nments					
· ·	arch Project Report	10				
Semi	nar On Research Project Report					
5) ESE		75				
	Total:	100				
	ites for the course: NIL					
	Learning Outcomes:					
	Students will be able to develop programs based on fundamenta C.	l concepts of pro	gramming in			
CO2:	Students will be able to solve problems based on Condit	tional and Itera	tive Control			
CO3:	Statements.					
	Students will be able to learn Complete Programming Concept	s of Arrays, Poi	nters and get			
004	familiar with modular programming Concepts of C using Function		-			
	Students will be able to learn conceptual programming wi	th String, Struc	cture and its			
	Students will be able to learn conceptual programming wid differentiation with Union.	th String, Struc	cture and its			



0	mme:Cer	tificate	Year: I		
Class:BCA		~ • • • • • •	Semester: II		
Credits Subject:Optimization Te		Subject:Optimizatio	n Techniques		
Theory:4Cr					
	Course Code: Title:Optimization Techniques				
	BCA-NEP-204 Course Objectives:				
	CO1: Enumerate the fundamental knowledge of Linear Programming and Dynamic				
	Programming problems.				
			ing optimization techniques based upon the funda	imentals of	
	•	e ,	mization and Maximization of objective function).	nd availant	
	models.	ieni ionnulation by u	ising linear, dynamic programming, game theory an	na queung	
		hastic models for d	liscrete and continuous variables to control inve	entory and	
			odels for the production decision making.	cintory and	
			models for quantitative analysis of managerial p	roblems in	
	industry.	ion of muticinatical	models for quantative analysis of managema p.	roolems m	
	of Paper:	: DSE			
	^	ng Marks/Credits:40	% Marks		
L:4					
T:0					
	Iours/Wee	ek)			
	- 1 Hr. =	· · · · · · · · · · · · · · · · · · ·			
Unit			Contents	No. of	
Unit			Contents	No. of Lectures	
Unit			Contents		
Unit	LINEA	R PROGRAMMIN	Contents G (L.P): Revised Simplex Method, Duel simplex	Lectures	
		R PROGRAMMIN , Sensitivity Analysis		Lectures Allotted	
	Method		G (L.P): Revised Simplex Method, Duel simplex	Lectures Allotted	
	Method DYNA Concep	l, Sensitivity Analysis MIC PROGRAMM ts of sub optimization	G (L.P): Revised Simplex Method, Duel simplex	Lectures Allotted	
Ι	Method DYNA Concep method	l, Sensitivity Analysis MIC PROGRAMM ts of sub optimization, LP as a case of D.P.	G (L.P): Revised Simplex Method, Duel simplex MING (D.P):Multistage decision processes. on, Recursive Relation-calculus method, tabular	Lectures Allotted 8	
	Method DYNA Concep method CLASS	I, Sensitivity Analysis MIC PROGRAMM ts of sub optimization , LP as a case of D.P. SICAL OPTIMIZAT	G (L.P): Revised Simplex Method, Duel simplex MING (D.P):Multistage decision processes. on, Recursive Relation-calculus method, tabular TON TECHNIQUES:	Lectures Allotted	
Ι	Method DYNA Concep method CLASS Single	I, Sensitivity Analysis MIC PROGRAMM ts of sub optimization , LP as a case of D.P. SICAL OPTIMIZAT variable optimization	G (L.P): Revised Simplex Method, Duel simplex MING (D.P):Multistage decision processes. on, Recursive Relation-calculus method, tabular TON TECHNIQUES: n without constraints,ulti variable optimization	Lectures Allotted 8	
Ι	Method DYNA Concep method CLASS Single without	I, Sensitivity Analysis MIC PROGRAMM ts of sub optimization , LP as a case of D.P. SICAL OPTIMIZAT variable optimization c constraints, multiva	G (L.P): Revised Simplex Method, Duel simplex MING (D.P):Multistage decision processes. on, Recursive Relation-calculus method, tabular TION TECHNIQUES: n without constraints, ulti variable optimization riable optimization with constraints –method of	Lectures Allotted 8	
Ι	Method DYNA Concep method CLASS Single without Lagrang	I, Sensitivity Analysis MIC PROGRAMM ts of sub optimizatio , LP as a case of D.P. SICAL OPTIMIZAT variable optimizatio constraints, multiva ge multipliers, Kuhn-T	G (L.P): Revised Simplex Method, Duel simplex MING (D.P):Multistage decision processes. on, Recursive Relation-calculus method, tabular TON TECHNIQUES: n without constraints,ulti variable optimization riable optimization with constraints –method of Fucker conditions.	Lectures Allotted 8	
Ι	Method DYNA Concep method CLASS Single without Lagrang NUME	I, Sensitivity Analysis MIC PROGRAMM ts of sub optimization, LP as a case of D.P. SICAL OPTIMIZAT variable optimization constraints, multivation ge multipliers, Kuhn-T RICAL METHODS	G (L.P): Revised Simplex Method, Duel simplex MING (D.P):Multistage decision processes. on, Recursive Relation-calculus method, tabular TON TECHNIQUES: n without constraints, ulti variable optimization riable optimization with constraints – method of Fucker conditions. FOR OPTIMIZATION:	Lectures Allotted 8	
Ι	Method DYNA Concep method CLASS Single without Lagrang NUME Nelder	I, Sensitivity Analysis MIC PROGRAMM ts of sub optimizatio , LP as a case of D.P. SICAL OPTIMIZAT variable optimizatio c constraints, multiva ge multipliers, Kuhn-T RICAL METHODS Mead's Simplex searc	G (L.P): Revised Simplex Method, Duel simplex MING (D.P):Multistage decision processes. on, Recursive Relation-calculus method, tabular TON TECHNIQUES: n without constraints,ulti variable optimization riable optimization with constraints –method of Fucker conditions.	Lectures Allotted 8	
I	Method DYNA Concep method CLASS Single without Lagrang NUME Nelder method	I, Sensitivity Analysis MIC PROGRAMM ts of sub optimizatio , LP as a case of D.P. SICAL OPTIMIZAT variable optimizatio constraints, multiva ge multipliers, Kuhn-T RICAL METHODS Mead's Simplex searce ,Newton's method.	G (L.P): Revised Simplex Method, Duel simplex MING (D.P):Multistage decision processes. on, Recursive Relation-calculus method, tabular TON TECHNIQUES: n without constraints,ulti variable optimization riable optimization with constraints –method of Fucker conditions. FOR OPTIMIZATION: ch method, Gradient of a function, Steepest descent	Lectures Allotted 8	
Ι	Method DYNA Concep method CLASS Single without Lagrang NUME Nelder method	I, Sensitivity Analysis MIC PROGRAMM ts of sub optimizatio , LP as a case of D.P. SICAL OPTIMIZAT variable optimizatio c constraints, multiva ge multipliers, Kuhn-T RICAL METHODS Mead's Simplex searc ,Newton's method. ERN METHODS OF	G (L.P): Revised Simplex Method, Duel simplex MING (D.P):Multistage decision processes. on, Recursive Relation-calculus method, tabular TION TECHNIQUES: n without constraints, ulti variable optimization riable optimization with constraints –method of Fucker conditions. FOR OPTIMIZATION: ch method, Gradient of a function, Steepest descent OPTIMIZATION:	Lectures Allotted 8	
I	Method DYNA Concep method CLASS Single without Lagrang NUME Nelder method MODE GENE	I, Sensitivity Analysis MIC PROGRAMM ts of sub optimizatio , LP as a case of D.P. SICAL OPTIMIZAT variable optimizatio constraints, multiva ge multipliers, Kuhn-T RICAL METHODS Mead's Simplex searc ,Newton's method. CRN METHODS OF FIC ALGORITHM (G (L.P): Revised Simplex Method, Duel simplex MING (D.P):Multistage decision processes. on, Recursive Relation-calculus method, tabular TON TECHNIQUES: n without constraints, ulti variable optimization riable optimization with constraints –method of Fucker conditions. FOR OPTIMIZATION: ch method, Gradient of a function, Steepest descent OPTIMIZATION: (GA):	Lectures Allotted 8	
I	Method DYNA Concep method CLASS Single without Lagrang NUME Nelder method MODE GENE	I, Sensitivity Analysis MIC PROGRAMM ts of sub optimizatio , LP as a case of D.P. SICAL OPTIMIZAT variable optimizatio constraints, multiva ge multipliers, Kuhn-T RICAL METHODS Mead's Simplex searce ,Newton's method. CRN METHODS OF FIC ALGORITHM (nces and similarities b	G (L.P): Revised Simplex Method, Duel simplex MING (D.P):Multistage decision processes. on, Recursive Relation-calculus method, tabular TON TECHNIQUES: n without constraints,ulti variable optimization riable optimization with constraints –method of FOR OPTIMIZATION: ch method, Gradient of a function, Steepest descent OPTIMIZATION: (GA): petween conventional and evolutionary algorithms,	Lectures Allotted 8	
I	Method DYNA Concep method CLASS Single without Lagrang NUME Nelder method MODE GENE Differen working	I, Sensitivity Analysis MIC PROGRAMM ts of sub optimizatio , LP as a case of D.P. SICAL OPTIMIZAT variable optimizatio c constraints, multiva ge multipliers, Kuhn-T RICAL METHODS Mead's Simplex searce ,Newton's method. ERN METHODS OF FIC ALGORITHM (nces and similarities b g principle, Genetic O	G (L.P): Revised Simplex Method, Duel simplex MING (D.P):Multistage decision processes. on, Recursive Relation-calculus method, tabular TION TECHNIQUES: n without constraints, ulti variable optimization riable optimization with constraints —method of Tucker conditions. FOR OPTIMIZATION: ch method, Gradient of a function, Steepest descent OPTIMIZATION: (GA): between conventional and evolutionary algorithms, perators- reproduction, crossover, mutation	Lectures Allotted 8	
I	Method DYNA Concep method CLASS Single without Lagrang NUME Nelder method MODE GENE Differen working GENE	I, Sensitivity Analysis MIC PROGRAMM ts of sub optimizatio , LP as a case of D.P. SICAL OPTIMIZAT variable optimizatio constraints, multiva ge multipliers, Kuhn-T RICAL METHODS Mead's Simplex searc ,Newton's method. CRN METHODS OF FIC ALGORITHM (nces and similarities b g principle, Genetic O FIC PROGRAMMIN	G (L.P): Revised Simplex Method, Duel simplex MING (D.P):Multistage decision processes. on, Recursive Relation-calculus method, tabular TON TECHNIQUES: n without constraints, ulti variable optimization riable optimization with constraints –method of Fucker conditions. FOR OPTIMIZATION: ch method, Gradient of a function, Steepest descent OPTIMIZATION: (GA): between conventional and evolutionary algorithms, perators- reproduction, crossover, mutation NG (GP):	Lectures Allotted 8	
I	Method DYNA Concep method CLASS Single without Lagrang NUME Nelder method MODE GENE Differen working GENE	I, Sensitivity Analysis MIC PROGRAMM ts of sub optimizatio , LP as a case of D.P. SICAL OPTIMIZAT variable optimizatio constraints, multiva ge multipliers, Kuhn-T RICAL METHODS Mead's Simplex searce ,Newton's method. CRN METHODS OF FIC ALGORITHM (nces and similarities b g principle, Genetic O FIC PROGRAMMIN les of genetic program	G (L.P): Revised Simplex Method, Duel simplex MING (D.P):Multistage decision processes. on, Recursive Relation-calculus method, tabular TON TECHNIQUES: n without constraints,ulti variable optimization riable optimization with constraints –method of FOR OPTIMIZATION: ch method, Gradient of a function, Steepest descent OPTIMIZATION: (GA): between conventional and evolutionary algorithms, perators- reproduction, crossover, mutation NG (GP): mming, terminal sets, functional sets, differences	Lectures Allotted 8	
I	Method DYNA Concep method CLASS Single without Lagrang NUME Nelder method MODE GENE Differen working GENE	I, Sensitivity Analysis MIC PROGRAMM ts of sub optimizatio , LP as a case of D.P. SICAL OPTIMIZAT variable optimizatio constraints, multiva ge multipliers, Kuhn-T RICAL METHODS Mead's Simplex searce ,Newton's method. CRN METHODS OF FIC ALGORITHM (nces and similarities b g principle, Genetic O FIC PROGRAMMIN les of genetic program	G (L.P): Revised Simplex Method, Duel simplex MING (D.P):Multistage decision processes. on, Recursive Relation-calculus method, tabular TON TECHNIQUES: n without constraints,ulti variable optimization riable optimization with constraints –method of Tucker conditions. FOR OPTIMIZATION: ch method, Gradient of a function, Steepest descent OPTIMIZATION: (GA): between conventional and evolutionary algorithms, perators- reproduction, crossover, mutation NG (GP): mming, terminal sets, functional sets, differences a population generation. Fuzzy Systems: Fuzzy set	Lectures Allotted 8	



Transforming Education	System, Transforming Lives Section	21 & 128
IV QUEUING THEORY		8
Queuing Model, poison and exponential distributions -Queues	s with combined	
arrivals and departures-random and series queues.		
V INTEGER PROGRAMMING:		8
Graphical Representation, Gomory's Cutting Plane Method, H	Balas' Algorithm	
for Zero–One Programming, Branch-and-Bound Method.	C	
	ESIGN AND	
MANUFACTURING SYSTEMS:		
Formulation of model- optimization of path synthesis of a four	-bar mechanism,	
minimization of weight of a cantilever beam, general optimization		
machining process, optimization of arc welding paramete		
procedure in optimizing machining operations sequence.	, E	
Text Books:	I	
1. J. K. Sharma, "Operations Research", Macmillan, 5th Edition, 2012.		
2. R. Pannerselvan, "Operations Research", 2nd Edition, PHI Publication	ns. 2006.	
Reference	.,	
1. A. M. Natarajan, P. Balasubramani, A. Tamilarasi, "Operations Research"	Pearson Education. 20)13.
2. Maurice Saseini, ArhurYaspan, Lawrence Friedman, "Operation	, , ,	
Problems",1 st Edition, 1959.		
Evaluation/Assessment Methodology		
	Max. Ma	rks 100
1) Class tasks/ Sessional Examination	15	
2) Presentations /Seminar		
3) Assignments		
4) Research Project Report	10	
Seminar On Research Project Report	10	
5) ESE	75	
Total:	100	
Prerequisites for the course: <i>Problem Solving using C</i>		
Course Learning Outcomes:	-1.1	.
CO1: Identify appropriate optimization method to solve complex pr	oblems involved in	various
industries.	, .	11.
CO2: Demonstrate the optimized material distribution schedule usi	ng transportation me	odel to
minimize total distribution cost.		
CO3: Find the appropriate algorithm for allocation of resources to optimi		
Apply the knowledge of game theory concepts to articulate real-	world competitive sit	tuations
	wond competitive sit	
CO4: toidentify strategic decisions to counter the consequences.	-	
	-	



0	mme: Certit	ïcate	Year: I		
Class:BCA			Semester: II		
Credits	e e				
•	Theory:4Cr				
Practica	al:2Cr				
Course	Course Code: Title:Data Structure Algorithms using C				
BCA-N	3CA-NEP-201				
Course	Objectives	:			
CO1:	Demonstrat	e familiarity with	n major algorithms and data structures.		
CO2:	CO2: Analyze performance of algorithms and choose the appropriate data structure and			algorithm	
	design method for a specified application.				
CO3:	Determine	which algorithm	or data structure to use in different scenarios and be fan	niliar with	
		rsive methods.			
CO4:	U		of the abstract properties of various data structures such	as stacks,	
			uphs and Use various data structures effectively in a		
	programs.	U	-		
CO5:		e understanding of	of various sorting algorithms, including bubble sort, inse	ertion sort,	
		rt, heap sort and		,	
Nature	of Paper: (•		
	<u> </u>	Marks/Credits:	40% Marks		
L:4	8				
L.T					
T:0	Hours/Week)			
T:0 P:0(In I	Hours/Week - 1 Hr. = 1 (
T:0 P:0(In H Theory	- 1 Hr. = 1 (Credit	k=4Credits)		
T:0 P:0(In H Theory Practica	- 1 Hr. = 1 G al- 2 Hrs.=1G		,	No. of	
T:0 P:0(In H Theory	- 1 Hr. = 1 G al- 2 Hrs.=1G	Credit	k=4Credits) Contents	No. of Lectures	
T:0 P:0(In H Theory Practica	- 1 Hr. = 1 G al- 2 Hrs.=1G	Credit	,	Lectures	
T:0 P:0(In H Theory Practica Unit	- 1 Hr. = 1 G al- 2 Hrs.=10	Credit Credit(4Hrs./Wee	Contents	Lectures Allotted	
T:0 P:0(In H Theory Practica	- 1 Hr. = 1 (al- 2 Hrs.=10	Credit Credit(4Hrs./Wee ction: Basic Te	Contents erminology, Data Structures, Classification of Data	Lectures	
T:0 P:0(In H Theory Practica Unit	- 1 Hr. = 1 (al- 2 Hrs.=10 Introdu	Credit Credit(4Hrs./Wee) ction: Basic Te es, Data Structure	Contents erminology, Data Structures, Classification of Data e Operations, Complexity.	Lectures Allotted	
T:0 P:0(In H Theory Practica Unit	- 1 Hr. = 1 (al- 2 Hrs.=10 Introdu Structure Array:	Credit Credit(4Hrs./Wee c tion: Basic Te es, Data Structure Definition, Decla	Contents erminology, Data Structures, Classification of Data e Operations, Complexity. aration, Initialization of Array, Accessing Elements of	Lectures Allotted	
T:0 P:0(In H Theory Practica Unit	- 1 Hr. = 1 (al- 2 Hrs.=10 Introdu Structure Array: Array, N	Credit Credit(4Hrs./Weel ction: Basic Te es, Data Structure Definition, Decla fultidimensional	Contents erminology, Data Structures, Classification of Data e Operations, Complexity. uration, Initialization of Array, Accessing Elements of Arrays, Sparse Matrix, Lower and Upper Triangular	Lectures Allotted	
T:0 P:0(In H Theory Practica Unit	- 1 Hr. = 1 (al- 2 Hrs.=10 Introdu Structure Array: Array, M Matrices	Credit Credit(4Hrs./Weel ction: Basic Te es, Data Structure Definition, Decla Iultidimensional , Vector, Memor	Contents erminology, Data Structures, Classification of Data e Operations, Complexity. aration, Initialization of Array, Accessing Elements of Arrays, Sparse Matrix, Lower and Upper Triangular ry Representation of Array- Row Major and Column	Lectures Allotted	
T:0 P:0(In H Theory Practica Unit I	- 1 Hr. = 1 (al- 2 Hrs.=10 Introdu Structure Array: Array, M Matrices Major, A	Credit Credit(4Hrs./Wee) ction: Basic Te es, Data Structure Definition, Decla fultidimensional , Vector, Memon address Calculatio	Contents erminology, Data Structures, Classification of Data e Operations, Complexity. aration, Initialization of Array, Accessing Elements of Arrays, Sparse Matrix, Lower and Upper Triangular ry Representation of Array- Row Major and Column on of Array, Insertion and Deletion on Array	Lectures Allotted 8	
T:0 P:0(In H Theory Practica Unit	- 1 Hr. = 1 (al- 2 Hrs.=10 Introdu Structure Array: Array, N Matrices Major, A Linked	Credit Credit(4Hrs./Weel ction: Basic Te es, Data Structure Definition, Decla fultidimensional , Vector, Memon ddress Calculation	Contents erminology, Data Structures, Classification of Data e Operations, Complexity. aration, Initialization of Array, Accessing Elements of Arrays, Sparse Matrix, Lower and Upper Triangular ry Representation of Array- Row Major and Column on of Array, Insertion and Deletion on Array n, Dynamic Memory Allocation, Singly Linked Lists,	Lectures Allotted	
T:0 P:0(In H Theory Practica Unit I	- 1 Hr. = 1 (al- 2 Hrs.=10 Introdu Structure Array: Array, M Matrices Major, A Linked Operatio	Credit Credit(4Hrs./Weel ction: Basic Te es, Data Structure Definition, Decla Iultidimensional , Vector, Memor Address Calculation List: Introduction ns on Linked	Contents erminology, Data Structures, Classification of Data e Operations, Complexity. aration, Initialization of Array, Accessing Elements of Arrays, Sparse Matrix, Lower and Upper Triangular ry Representation of Array- Row Major and Column on of Array, Insertion and Deletion on Array n, Dynamic Memory Allocation, Singly Linked Lists, List Such as Traversal, Insertion, Deletion and	Lectures Allotted 8	
T:0 P:0(In H Theory Practica Unit I	- 1 Hr. = 1 (al- 2 Hrs.=10 Introdu Structure Array: Array, M Matrices Major, A Linked Operatio Searchir	Credit Credit(4Hrs./Weel ction: Basic Te es, Data Structure Definition, Decla fultidimensional , Vector, Memon address Calculation List: Introduction ns on Linked g, Use of Header	Contents erminology, Data Structures, Classification of Data e Operations, Complexity. aration, Initialization of Array, Accessing Elements of Arrays, Sparse Matrix, Lower and Upper Triangular ry Representation of Array- Row Major and Column on of Array, Insertion and Deletion on Array n, Dynamic Memory Allocation, Singly Linked Lists, List Such as Traversal, Insertion, Deletion and rs, Introduction to Circularly Linked Lists and Doubly	Lectures Allotted 8	
T:0 P:0(In H Theory Practica Unit I	- 1 Hr. = 1 (al- 2 Hrs.=10 Introdu Structure Array: Array, M Matrices Major, A Linked Operation Searchir Linked I	Credit Credit(4Hrs./Weel ction: Basic Te es, Data Structure Definition, Decla Aultidimensional , Vector, Memon Address Calculation List: Introduction ns on Linked g, Use of Headen Lists, Two-Way L	Contents erminology, Data Structures, Classification of Data e Operations, Complexity. aration, Initialization of Array, Accessing Elements of Arrays, Sparse Matrix, Lower and Upper Triangular ry Representation of Array- Row Major and Column on of Array, Insertion and Deletion on Array n, Dynamic Memory Allocation, Singly Linked Lists, List Such as Traversal, Insertion, Deletion and rs, Introduction to Circularly Linked Lists and Doubly Lists.	Lectures Allotted 8	
T:0 P:0(In H Theory Practica Unit I	- 1 Hr. = 1 (al- 2 Hrs.=10 Introdu Structure Array: Array, M Matrices Major, A Linked Operatic Searchir Linked I Stacks	Credit Credit(4Hrs./Weel Credit(4Hrs./Weel ction: Basic Te es, Data Structure Definition, Decla fultidimensional , Vector, Memon Address Calculation List: Introduction ns on Linked g, Use of Header Lists, Two-Way L and Queues: Int	Contents erminology, Data Structures, Classification of Data e Operations, Complexity. aration, Initialization of Array, Accessing Elements of Arrays, Sparse Matrix, Lower and Upper Triangular ry Representation of Array- Row Major and Column on of Array, Insertion and Deletion on Array n, Dynamic Memory Allocation, Singly Linked Lists, List Such as Traversal, Insertion, Deletion and rs, Introduction to Circularly Linked Lists and Doubly Lists. troduction and Primitive Operations on Stack, Stack	Lectures Allotted 8	
T:0 P:0(In H Theory Practica Unit I	- 1 Hr. = 1 (al- 2 Hrs.=10 Introdu Structure Array: Array, M Matrices Major, A Linked Operatio Searchir Linked I Stacks Applicat	Credit Credit(4Hrs./Weel Credit(4Hrs./Credit(4Hrs./Credit(4Hrs.))) Credit(1Hrs.) Credit Credit(1Hrs.) Credit(1Hrs.	Contents erminology, Data Structures, Classification of Data e Operations, Complexity. aration, Initialization of Array, Accessing Elements of Arrays, Sparse Matrix, Lower and Upper Triangular ry Representation of Array- Row Major and Column on of Array, Insertion and Deletion on Array n, Dynamic Memory Allocation, Singly Linked Lists, List Such as Traversal, Insertion, Deletion and rs, Introduction to Circularly Linked Lists and Doubly Lists. troduction and Primitive Operations on Stack, Stack postfix, Prefix Expressions; Evaluation of Postfix	Lectures Allotted 8	
T:0 P:0(In H Theory Practica Unit I	- 1 Hr. = 1 (al- 2 Hrs.=10 Introdu Structure Array: Array, M Matrices Major, A Linked Operation Searchir Linked I Stacks Applicat Expression	Credit Credit(4Hrs./Wee) Credit(4Hrs./Credit(4Hrs./Wee) Credit(4Hrs./Credit(4Hrs.)) Credit(4Hrs.) Cred	Contents erminology, Data Structures, Classification of Data e Operations, Complexity. aration, Initialization of Array, Accessing Elements of Arrays, Sparse Matrix, Lower and Upper Triangular ry Representation of Array- Row Major and Column on of Array, Insertion and Deletion on Array n, Dynamic Memory Allocation, Singly Linked Lists, List Such as Traversal, Insertion, Deletion and rs, Introduction to Circularly Linked Lists and Doubly Lists. troduction and Primitive Operations on Stack, Stack patrix, Prefix Expressions; Evaluation of Postfix a mong Prefix, Infix and Postfix; Recursion;	Lectures Allotted 8	
T:0 P:0(In H Theory Practica Unit I	- 1 Hr. = 1 (al- 2 Hrs.=10 Introdu Structure Array: Array, M Matrices Major, A Linked Operatic Searchir Linked I Stacks Applicat Expressi Introduc	Credit Credit(4Hrs./Weel Credit(4Hrs./Credit(4Hrs.)) Credit Credit(1Hrs.) Credit Credit(1Hrs.) Credit Credit(1Hrs.) Credit Credit(1Hrs.) Credit Credit(1Hrs.) Credit Cred	Contents erminology, Data Structures, Classification of Data e Operations, Complexity. aration, Initialization of Array, Accessing Elements of Arrays, Sparse Matrix, Lower and Upper Triangular ry Representation of Array- Row Major and Column on of Array, Insertion and Deletion on Array n, Dynamic Memory Allocation, Singly Linked Lists, List Such as Traversal, Insertion, Deletion and rs, Introduction to Circularly Linked Lists and Doubly Lists. troduction and Primitive Operations on Stack, Stack postfix, Prefix Expressions; Evaluation of Postfix	Lectures Allotted 8	
T:0 P:0(In H Theory Practica Unit I I II	- 1 Hr. = 1 (al- 2 Hrs.=10 Introdu Structure Array: Array, M Matrices Major, A Linked Operatio Searchir Linked I Stacks Applicat Expressi Introduc Applicat	Credit Credit(4Hrs./Weel Credit(4Hrs./Credit(4Hrs./Credit(4Hrs.))) Credit(1Hrs.) Credit(1Hrs	Contents erminology, Data Structures, Classification of Data e Operations, Complexity. aration, Initialization of Array, Accessing Elements of Arrays, Sparse Matrix, Lower and Upper Triangular ry Representation of Array- Row Major and Column on of Array, Insertion and Deletion on Array n, Dynamic Memory Allocation, Singly Linked Lists, List Such as Traversal, Insertion, Deletion and rs, Introduction to Circularly Linked Lists and Doubly Lists. troduction and Primitive Operations on Stack, Stack ostfix, Prefix Expressions; Evaluation of Postfix a mong Prefix, Infix and Postfix; Recursion; ve Operation on Queues, Deques, Priority Queues,	Lectures Allotted 8 8 8	
T:0 P:0(In H Theory Practica Unit I	 1 Hr. = 1 (al- 2 Hrs.=10) Introdu Structure Array: Array, M Matrices Major, A Linked Operation Searchir Linked I Stacks Applicat Expressi Introduc Applicat 	ction: Basic Te es, Data Structure Definition, Decla Aultidimensional , Vector, Memor Address Calculation Ist: Introduction ns on Linked g, Use of Header Lists, Two-Way L and Queues: Intri ions; Infix, Po on; Conversion tion and Primiti ions of Queue. Introduction and	Contents erminology, Data Structures, Classification of Data e Operations, Complexity. aration, Initialization of Array, Accessing Elements of Arrays, Sparse Matrix, Lower and Upper Triangular ry Representation of Array- Row Major and Column on of Array, Insertion and Deletion on Array n, Dynamic Memory Allocation, Singly Linked Lists, List Such as Traversal, Insertion, Deletion and rs, Introduction to Circularly Linked Lists and Doubly Lists. troduction and Primitive Operations on Stack, Stack patients, Prefix Expressions; Evaluation of Postfix a among Prefix, Infix and Postfix; Recursion; ve Operation on Queues, Deques, Priority Queues, Basic Terminology; Tree Representations as Array	Lectures Allotted 8	
T:0 P:0(In H Theory Practica Unit I I II	- 1 Hr. = 1 (al- 2 Hrs.=10 Introdu Structure Array: Array, M Matrices Major, A Linked Operatio Searchir Linked I Stacks Applicat Expressi Introduc Applicat Expressi Kalinked	ction: Basic Te es, Data Structure Definition, Decla Iultidimensional , Vector, Memor ddress Calculation Ist: Introduction and Queues: Introduction ists, Two-Way L and Queues: Introduction ions; Infix, Po on; Conversion tion and Primiti ions of Queue. Introduction and List, Recursive	Contents erminology, Data Structures, Classification of Data e Operations, Complexity. aration, Initialization of Array, Accessing Elements of Arrays, Sparse Matrix, Lower and Upper Triangular ry Representation of Array- Row Major and Column on of Array, Insertion and Deletion on Array n, Dynamic Memory Allocation, Singly Linked Lists, List Such as Traversal, Insertion, Deletion and rs, Introduction to Circularly Linked Lists and Doubly Lists. troduction and Primitive Operations on Stack, Stack patrix, Prefix Expressions; Evaluation of Postfix a among Prefix, Infix and Postfix; Recursion; ve Operation on Queues, Deques, Priority Queues, Basic Terminology; Tree Representations as Array e algorithms for Tree Operations such as Insertion,	Lectures Allotted 8 8 8	
T:0 P:0(In H Theory Practica Unit I I II	- 1 Hr. = 1 (al- 2 Hrs.=10 Introdu Structure Array: Array, M Matrices Major, A Linked Operation Searchin Linked I Stacks Applicat Expressi Introduc Applicat Expressi Introduc Deletion	ction: Basic Te es, Data Structure Definition, Decla Iultidimensional , Vector, Memon Address Calculation Ist: Introduction ns on Linked g, Use of Header Lists, Two-Way L and Queues: Intri ions; Infix, Po on; Conversion tion and Primiti ions of Queue. Introduction and List, Recursive , Traversal;Trave	Contents erminology, Data Structures, Classification of Data e Operations, Complexity. aration, Initialization of Array, Accessing Elements of Arrays, Sparse Matrix, Lower and Upper Triangular ry Representation of Array- Row Major and Column on of Array, Insertion and Deletion on Array n, Dynamic Memory Allocation, Singly Linked Lists, List Such as Traversal, Insertion, Deletion and rs, Introduction to Circularly Linked Lists and Doubly Lists. troduction and Primitive Operations on Stack, Stack patients, Prefix Expressions; Evaluation of Postfix a among Prefix, Infix and Postfix; Recursion; ve Operation on Queues, Deques, Priority Queues, Basic Terminology; Tree Representations as Array	Lectures Allotted 8 8 8	



	Transforming Education System, Transfo	ming Lives Section 2f & 12B
V	Searching & Sorting Techniques: Bubble Sort, Insertion sort, Select	ction sort, 8
	Merge Sort, Heap Sort, Linear Search, Binary Search and Hashing.	
Text	Books:	
1. T	enenbaum, "Data Structures Using C", Pearson Education.	
2. S	amir Kumar Bandyopadhyay, K. N. Dey, "Data Structures Using C", Pearso	on Education.
3. L	ipschutz (Schaum's Series), "Data Structure with C", Tata McGraw Hill Ed	ucation
Refe		
1. R	obert Kruse, C. L.Tondo, "Data Structures and Program Design in C", Pea	rson Education.
2. E	. Horowitz, S. Sahni& D. Mehta, "Fundamentals of Data Structures", Galgo	tia Publications.
3. R	. S. Salaria, "Data Structures & Algorithms", Khanna Book Publishing Co. ((P) Ltd.
	Evaluation/Assessment Methodology	
		Max. Marks 100
1) C	lass tasks/ Sessional Examination	15
2) P	resentations /Seminar	
3) A	ssignments	
4) R	esearch Project Report	10
S	eminar On Research Project Report	
5) E	SE	75
	Total:	100
Prere	quisites for the course: Problem Solving using C	
Cour	se Learning Outcomes:	
CO1:	Demonstrate familiarity with major algorithms and data structures.	
CO2:	Analyze performance of algorithms and choose the appropriate data str	ucture and algorithm
	design method for a specified application.	
CO3:	Determine which algorithm or data structure to use in different scenarios	and be familiar with
	writing recursive methods.	
CO4:		
	queues, lists, trees and graphs and Use various data structures effec	tively in application
	programs.	
CO5:		le sort, insertion sort,
	selection sort, heap sort and quick sort.	



0	nme: Certificate Yea				
Class:B	1				
Credits	0				
Theory:					
	Course Code: Title:DATA BASE MANAGEMENT SYSTEM 3CA-NEP-202				
	Objectives:				
CO 1:		database system and its application and compa	are various		
$CO \lambda$	types of data models.				
CO 2:	Describe the E-R Models and Relati				
CO 3:	calculus.	nmands, relational algebra, tuple calculus a	na aomain		
CO 4.		nd normalize a given relation to the desired no	maal famma		
CO 4:	-	nd normalize a given relation to the desired no			
CO 5:	· · · · ·	transaction processing and concurrency control	51.		
	of Paper: CORE				
	m Passing Marks/Credits:40% Ma	IFKS			
L:4					
T:0					
	ours/Week)				
•	1 Hr. = 1 Credit	:>			
	- 2 Hrs.=1Credit(4Hrs./Week=4Cred		N C		
Unit		Contents	No. of		
			Lectures		
т			Allotted		
Ι		e System vs File System, Database System	8		
	1	a Model Schema and Instances, Data			
		nguage and Interfaces, Data Definitions			
		Structure. Data Modelling Using the Entity			
	Constraints, Keys, Concepts of Sup	ncepts, Notation for ER Diagram, Mapping			
	Diagrams to Tables, Extended ER M	ralization, Aggregation, Reduction of an ER			
	Diagrams to Tables, Extended EK N				
II	Rolational data Model and Lar		Q		
II		nguage: Relational Data Model Concepts,	8		
II	Integrity Constraints, Entity Integr	nguage: Relational Data Model Concepts, ity, Referential Integrity, Keys Constraints,	8		
II	Integrity Constraints, Entity Integr Domain Constraints, Relational	nguage: Relational Data Model Concepts, ity, Referential Integrity, Keys Constraints, Algebra, Relational Calculus, Tuple and	8		
II	Integrity Constraints, Entity Integr Domain Constraints, Relational Domain Calculus. Introduction to S	nguage: Relational Data Model Concepts, ity, Referential Integrity, Keys Constraints, Algebra, Relational Calculus, Tuple and SQL: Characteristics of SQL, Advantage of	8		
II	Integrity Constraints, Entity Integr Domain Constraints, Relational Domain Calculus. Introduction to S SQL. SQL Data Type and Literals.	nguage: Relational Data Model Concepts, ity, Referential Integrity, Keys Constraints, Algebra, Relational Calculus, Tuple and SQL: Characteristics of SQL, Advantage of Types of SQL Commands. SQL Operators	8		
II	Integrity Constraints, Entity Integr Domain Constraints, Relational Domain Calculus. Introduction to S SQL. SQL Data Type and Literals. and their Procedure. Tables, View	nguage: Relational Data Model Concepts, ity, Referential Integrity, Keys Constraints, Algebra, Relational Calculus, Tuple and SQL: Characteristics of SQL, Advantage of Types of SQL Commands. SQL Operators vs and Indexes. Queries and Sub Queries.	8		
II	Integrity Constraints, Entity Integr Domain Constraints, Relational Domain Calculus. Introduction to S SQL. SQL Data Type and Literals. and their Procedure. Tables, View Aggregate Functions. Insert, Upda	nguage: Relational Data Model Concepts, ity, Referential Integrity, Keys Constraints, Algebra, Relational Calculus, Tuple and SQL: Characteristics of SQL, Advantage of Types of SQL Commands. SQL Operators vs and Indexes. Queries and Sub Queries. ate and Delete Operations, Joins, Unions,	8		
Π	Integrity Constraints, Entity Integr Domain Constraints, Relational Domain Calculus. Introduction to S SQL. SQL Data Type and Literals. and their Procedure. Tables, View Aggregate Functions. Insert, Upda Intersection, Minus, Cursors, Trigge	nguage: Relational Data Model Concepts, ity, Referential Integrity, Keys Constraints, Algebra, Relational Calculus, Tuple and SQL: Characteristics of SQL, Advantage of Types of SQL Commands. SQL Operators vs and Indexes. Queries and Sub Queries. ate and Delete Operations, Joins, Unions,	8		
	Integrity Constraints, Entity Integr Domain Constraints, Relational Domain Calculus. Introduction to S SQL. SQL Data Type and Literals. and their Procedure. Tables, View Aggregate Functions. Insert, Upda Intersection, Minus, Cursors, Trigge SQL/PL SQL.	nguage: Relational Data Model Concepts, ity, Referential Integrity, Keys Constraints, Algebra, Relational Calculus, Tuple and SQL: Characteristics of SQL, Advantage of Types of SQL Commands. SQL Operators vs and Indexes. Queries and Sub Queries. ate and Delete Operations, Joins, Unions, ers, Procedures in			
II III	Integrity Constraints, Entity Integrity Constraints, Relational Domain Constraints, Relational Domain Calculus. Introduction to S SQL. SQL Data Type and Literals. and their Procedure. Tables, View Aggregate Functions. Insert, Upda Intersection, Minus, Cursors, Trigge SQL/PL SQL. Data Base Design & Normalization	nguage: Relational Data Model Concepts, ity, Referential Integrity, Keys Constraints, Algebra, Relational Calculus, Tuple and SQL: Characteristics of SQL, Advantage of Types of SQL Commands. SQL Operators vs and Indexes. Queries and Sub Queries. ate and Delete Operations, Joins, Unions, ers, Procedures in	8		
	Integrity Constraints, Entity Integr Domain Constraints, Relational Domain Calculus. Introduction to S SQL. SQL Data Type and Literals. and their Procedure. Tables, View Aggregate Functions. Insert, Upda Intersection, Minus, Cursors, Trigge SQL/PL SQL. Data Base Design & Normalization first, second, third normal forms, 1	nguage: Relational Data Model Concepts, ity, Referential Integrity, Keys Constraints, Algebra, Relational Calculus, Tuple and SQL: Characteristics of SQL, Advantage of Types of SQL Commands. SQL Operators vs and Indexes. Queries and Sub Queries. ate and Delete Operations, Joins, Unions, ers, Procedures in on: Functional dependencies, normal forms, BCNF, inclusion dependence, loss less join			
	Integrity Constraints, Entity Integr Domain Constraints, Relational Domain Calculus. Introduction to S SQL. SQL Data Type and Literals. and their Procedure. Tables, View Aggregate Functions. Insert, Upda Intersection, Minus, Cursors, Trigge SQL/PL SQL. Data Base Design & Normalizatio first, second, third normal forms, I decompositions, normalization u	nguage: Relational Data Model Concepts, ity, Referential Integrity, Keys Constraints, Algebra, Relational Calculus, Tuple and SQL: Characteristics of SQL, Advantage of Types of SQL Commands. SQL Operators vs and Indexes. Queries and Sub Queries. ate and Delete Operations, Joins, Unions, ers, Procedures in			
	Integrity Constraints, Entity Integr Domain Constraints, Relational Domain Calculus. Introduction to S SQL. SQL Data Type and Literals. and their Procedure. Tables, View Aggregate Functions. Insert, Upda Intersection, Minus, Cursors, Trigge SQL/PL SQL. Data Base Design & Normalization first, second, third normal forms, 1	nguage: Relational Data Model Concepts, ity, Referential Integrity, Keys Constraints, Algebra, Relational Calculus, Tuple and SQL: Characteristics of SQL, Advantage of Types of SQL Commands. SQL Operators ws and Indexes. Queries and Sub Queries. ate and Delete Operations, Joins, Unions, ers, Procedures in on: Functional dependencies, normal forms, BCNF, inclusion dependence, loss less join using FD, MVD, and JDs, alternative			



Transforming Education	System, Transforming Lives Section 2f & 12B
Schedule, Recoverability, Recovery from Transaction Failur	res, Log Based
Recovery, Checkpoints, Deadlock	
Handling. Distributed Database: Distributed Data Storage	e, Concurrency
Control, Directory System	
V Concurrency Control Techniques: Concurrency Control, Loc	king Techniques 8
for Concurrency Control, Time Stamping Protocols for Concu	arrency Control,
Validation Based Protocol, Multiple Granularity, Multi Ve	rsion Schemes,
Recovery with	
Concurrent Transaction, Case Study of Oracle	
Text Books:	
1. Korth, Silbertz, Sudarshan," Database Concepts", McGraw Hill.	
2. Date C J, "An Introduction to Database Systems", Addision Wesley.	
3. Elmasri, Navathe, "Fundamentals of Database Systems", Addision We	esley.
4. O'Neil, "Databases", Elsevier Pub	-
Reference	
1. Ramakrishnan, "Database Management Systems", McGraw Hill.	
2. Leon & Leon, "Database Management Systems", Vikas Publishing Ho	ouse.
3. Bipin C. Desai, "An Introduction to Database Systems", Gagotia Publ	ications.
4. Majumdar& Bhattacharya, "Database Management System", McGraw	Hill.
Evaluation/Assessment Methodology	
	Max. Marks100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100
Prerequisites for the course: SQL	
Course Learning Outcomes:	
CO1: Describe the features of a database system and its application a	nd compare various types of
data models.	- • •
CO2: Construct an ER Model for a given problem and transform it into	o a relation database schema
CO3: Formulate solution to a query problem using SQL Comman	
calculus and domain calculus.	
CO4. Explain the need of normalization and normalize a given relation	to the desired normal form

CO4: Explain the need of normalization and normalize a given relation to the desired normal form.

CO5: Explain different approaches of transaction processing and concurrency control.



	nme:Certificate		Year:I			
Class:B	_		Semester: II			
Credits						
Theory:						
	e Code: Title:Environment and Ecology					
	J-112					
	Objectives:					
CO1:	-		bout environmental problems among people			
CO2:	Imparting basic knowledge about the environment and its allied problems.					
CO3:	Developing an attitude of concern for the environment.					
CO4:	• •	-	ticipate in environment protection and environment im	-		
CO5:	Grasp the signifi	icance ar	nd issues related to ecosystems, biodiversity and natura	al resources.		
Nature	of Paper: AECC					
Minimu	m Passing Mar	ks/Credi	its: 40% Marks			
L:3						
T:0						
P:0(In H	lours/Week)					
Theory-	1Hr.=1Credit					
Unit			Contents	No.		
				ofLectures		
				Allotted		
Ι	The Multidisci	iplinary	Nature Of Environmental Studies:	8		
	Definition, Sco	pe and I	mportance, Need for Public Awareness.			
II	Natural Resou	rces: Re	enewable And Non-Renewable Resources;	8		
	Natural Resou	rces and	l Associated Problems: -			
	A. Forest Res	sources:	Use and Over-Exploitation, Deforestation, Case			
			traction, Mining, Dams and Their Effects on Forests			
	and Tribal I					
		-	Use and Over-Utilization of Surface and Ground			
	Water, Flo	ods. Dr	ought, Conflicts Over Water, Dams-Benefits and			
	Problems.	,				
		esources:	: Use and Exploitation, Environmental Effects of			
			g Mineral Resources, Case Studies.			
	-		orld Food Problems, Changes Caused By Agriculture			
			Effects of Modern Agriculture, Fertilizer-Pesticide			
	-	-	ogging, Salinity, Case Studies.			
	E Energy Re	sources.	Growing Energy Needs Renewable and Non			
			Growing Energy Needs, Renewable and Non Sources Use of Alternate Energy Sources Case			
	renewable		Growing Energy Needs, Renewable and Non Sources, Use of Alternate Energy Sources, Case			
	renewable Studies	Energy	Sources, Use of Alternate Energy Sources, Case			
	renewable Studies F. Land Resou	Energy urces: La	Sources, Use of Alternate Energy Sources, Case and as a Resource, Land Degradation, Man Induced			
	renewable Studies F. Land Resou Landslides,	Energy urces: La Soil Ero	Sources, Use of Alternate Energy Sources, Case and as a Resource, Land Degradation, Man Induced osion and Desertification.			
	renewable Studies F. Land Resou Landslides, G. Role of an	Energy urces: La Soil Ero Individu	Sources, Use of Alternate Energy Sources, Case and as a Resource, Land Degradation, Man Induced osion and Desertification. al In Conservation Of Natural Resources; Equitable			
	renewable Studies F. Land Resou Landslides, G. Role of an Use of Reso	Energy urces: La Soil Ero Individu	Sources, Use of Alternate Energy Sources, Case and as a Resource, Land Degradation, Man Induced osion and Desertification.	0		
III	renewable Studies F. Land Resou Landslides, G. Role of an Use of Reso Ecosystems:	Energy urces: La Soil Ero Individu purces fo	Sources, Use of Alternate Energy Sources, Case and as a Resource, Land Degradation, Man Induced osion and Desertification. al In Conservation Of Natural Resources; Equitable or Sustainable Lifestyles	8		
III	renewable Studies F. Land Resou Landslides, G. Role of an Use of Reso Ecosystems: Concept of an	Energy urces: La Soil Ero Individu ources fo n Ecosy	Sources, Use of Alternate Energy Sources, Case and as a Resource, Land Degradation, Man Induced osion and Desertification. al In Conservation Of Natural Resources; Equitable or Sustainable Lifestyles	8		
III	renewable Studies F. Land Resou Landslides, G. Role of an Use of Reso Ecosystems: Concept of an Producers, Cor	Energy urces: La Soil Ero Individu <u>ources fo</u> n Ecosy nsumers	Sources, Use of Alternate Energy Sources, Case and as a Resource, Land Degradation, Man Induced osion and Desertification. al In Conservation Of Natural Resources; Equitable or Sustainable Lifestyles	8		



Transforming Education System, I	ansforming Lives	Section 2f & 12B
Introduction, Types, Characteristic Features, Structure And Functi	on of the	
Following Ecosystem: -		
A) Forest Ecosystem		
B) Grassland Ecosystem		
C) Desert Ecosystem		
D) Aquatic Ecosystems (Ponds, Streams, Lakes, Rivers, Oceans, Es	uaries)	
IV Biodiversity and Its Conservation:		8
Introduction – Definition: Genetic, Species and Ecosystem I	Diversity;	
Biogeographical Classification of India; Value of Biodiversity: Con	sumptive	
Use, Productive Use, Social, Ethical, and Aesthetic and Option	Values;	
Biodiversity at Global, National and Local Levels; India as	a Mega-	
Diversity Nation; Hot-Sports of Biodiversity; Threats to Bio	-	
Habitat Loss, Poaching of Wildlife, Man-Wildlife Conflicts; En	•	
and Endemic Species of India; Conservation of Biodiversity: In-Situ	-	
Situ Conservation of Biodiversity.		
V Environmental Pollution:		8
Definition, Causes, Effects and Control Measures of Air Pollution	n. Water	-
Pollution, Soil Pollution, Marine Pollution, Noise Pollution,		
Pollution, Nuclear Pollution; Solid Waste Management: Causes, Ef		
Control Measures of Urban and Industrial Wastes; Role of an Indi		
Prevention of Pollution; Pollution Case Studies; Disaster Man		
Floods, Earthquake, Cyclone and Landslides.	"Bonnoniti	
Text Books:		
1. A. Basak, " <i>Environmental Studies</i> ", Pearson Education.		
 Anil Kumar De, "Environmental Studies", New Age International 		
Reference:		
1. J. P. Sharma, " <i>Environmental Studies</i> ", University Science Press.		
Evaluation/Assessment Methodology		
	May	x. Marks 50
1. Class tasks/SessionalExamination		15
2. Presentations /Seminar		10
3. Assignments		
4. Research Project Report/Seminar On Research Project Report		
5. ESE		35
Total:		
Prerequisites for the course:		50
Course Learning Outcomes:		
CO1: Student will be able to recognize the physical and biological component	nts of ear	th's system
CO2: Student will be able to recognize the physical and biological components CO2: Student will be able to examine all environmental issues.		
CO3: Student will be able to do independent research on human interaction	with the e	nvironment
CO4: Student will be able to do independent research on numan interaction CO4: Student will be able to develop and attitude of concern for the enviror		n, nonnont,
CO5: Student will be able to motivate public to participate in environmental		n
COS. Student will be able to motivate public to participate in environmenta.	protection	11



Programme: Certificate			Year: I			
Class:BCA			Semester: II			
Credits		Subject:Mat	hematics-II			
Theory: 4Cr		5				
		Title:Mather	natics-II			
BCA-NEP-204						
Course	Course Objectives:					
	CO 1: Apply mathematical concepts and principles to perform computations.					
CO 2: Apply mathematics to solve problems.						
CO 3: C	reate, use and ana	alyze graphica	l representations of mathematical relationships.			
			wledge and understanding.			
CO 5: A	pply technology	tools to solve	problems.			
	of Paper: DSE		^			
	m Passing Marl	ks/Credits: 40	% Marks			
L:4						
T:0						
P:0(In H	Iours/Week)					
Theory	-1 Hr. $= 1$ Credit					
Unit			Contents	No. of		
				Lectures		
				Allotted		
Ι			ar differential equations of nth order with constant			
		-	function and Particular integral, Simultaneous	8		
			Solution of second order differential equations by			
			ndent variables, Normal form,			
			eters, Applications (without derivation).			
II			al Functions: Series solution of second order	8		
			ns with variable coefficient (Frobenius method),			
			ns and their series solutions, Properties of Bessel			
	function and Le					
III			lace transform, Existence theorem, Laplace	8		
			l integrals, Initial and final value theorems, Unit			
	-		unction, Laplace transform of periodic function,			
	-		convolution theorem, Application to solve simple			
13.7			ential equations.	0		
IV			ulae, Functions having arbitrary periods, Periodic	8		
			period 2π , Change of interval, Even and odd			
N/	functions, Half			0		
V			ons: Solution of first order partial differential	8		
	- ·	0 0	ethod, Solution of second order linear partial			
	-		nstant coefficients, Classification of second order			
	_	-	Method of separation of variables for solving			
	-	-	Solution of one and two dimensional wave and			
			Laplace equation in two dimension, Equation of			
	transmission line	C3				



Text Books:

- 1. E. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons
- 2. B. V. Ramana, "Higher Engineering Mathematics", Tata Mc Graw-Hill Publishing Company Ltd
- 3. R.K. Jain & S.R.K. Iyenger, "Advance Engineering Mathematics", Narosa Publishing House.

Reference:

- 1. H. K. Dass, "Introduction to Engineering Mathematics", S. Chand, New Delhi
- 2. R. Wylie, "Advanced Engineering Mathematics", McGraw-Hill.

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100
Prerequisites for the course: MATHEMATICS-I	
Course Learning Outcomes:	
CO 1: Apply mathematical concepts and principles to perform computations	
CO 2: Apply mathematics to solve problems.	
CO 3: Create, use and analyze graphical representations of mathematical rela	ationships.
CO 4: Communicate mathematical knowledge and understanding.	-
CO 5: Apply technology tools to solve problems	

CO 5: Apply technology tools to solve problems.



Programme:UG	Year: I		
Class:BCA	Semester:II Subject:Data Structure and algorithm using C La		
Credits	ıb		
Theory: 0			
Practical: 2			
Course Code:	Title:Data Structure and algorithm using C Lab		
BCA-NEP-205P			
Course Objectives			
	d and Implement basic Data Structure using C		
	ar an Non Linear Data Structure in Problem Solving.		
	Searching and Sorting Algorithm.		
Nature of Paper: C			
L:0	Marks/Credits: 50% Marks		
L:0 T:0			
P:4(In Hours/Week)			
Theory - 1 Hr. = 1 C			
•	Credit(4Hrs./Week=4Credits)		
Unit Contents			No. of
Contents			Lectures
			Allotted
I Basic of D	ata Structure Programs- Looping, Data Manipulation	. arrav.	2
	sing Structures and dynamic Memory allocations.	,	2
	lementation of Stacks and queues		2
	st Implementation of Stacks and Queues		2
	n of Stacks and Queues		2
	tation of Trees, Tree Traversals		2
*	tation of Binary Search Trees		2
-	tation of Linear search and Binary Search		2
	tation of Insertion Sort, Bubble Sort, Quick Sort and I	Merge Sort.	2
	Evaluation/Assessment Methodology	U	
		I	Max. Marks:50
1) Class tasks/ Ses	sional Examination	25	
2) Presentations /S	eminar		
3) Assignments			
4) Research Projec	t Report/Seminar On Research Project Report		
5) ESE		25	
	Total:	50	
CourseLearning O			
Student will be able			
	nd advanced Program in C using Linear and Non-Line	ear Data Struc	ture.
-	ta Structure using C.	_	
	opriate Sorting Algorithm for an application and in	nplement it in	a modularized
way.			
	ructures and their applications such as Stacks, Queu	es and Lists	and Non-Linear
Data Structures and	their Applications such as Trees.		



Progra	mme:UG		Year: I	
Class: BCA			Semester: II	
Credits	5	Subject:Data Base	Management System Lab	
Theory: 0				
Practica				
Course		Title:Data Base Ma	anagement System Lab	
	EP-206P		0 v	
Course	Objectives			
To learn	n the studen	t should be made to:		
CO1: F	Foundation 1	knowledge in databa	se concepts, technology and practice to groom	students into
		base application deve		
		ed with a query langu		
		on experience on DDI		
			L Commands and DCL commands	
CO5: F	amiliarize a	dvanced SQL queries	and exposed to different applications	
	of Paper: (
		Marks/Credits: 50	% Marks	
L:0				
T:0				
P:4 (In	Hours/Weel	k)		
Theory	- 1 Hr. = 1 (Credit		
Practica	al- 2 Hrs.=10	Credit(4Hrs./Week=4	Credits)	
Unit	Contents			No. of
				Lectures
				Allotted
Ι			iting SQL queries to retrieve information from	2
	the databa			
II		C ,	, Modifying, Altering, Updating and Viewing	2
		ased on conditions.		
III		he following:		2
			ating a Database, Viewing all Tables in a	
		_	bles (With and Without Constraints),	
		ing/Updating/Deleting		
			(Commit) and Undoing (rollback).	
IV		he following:		2
			g/Truncating/Renaming Tables, backing up /	
		ing a Database.		
V	-		emes, create tables and perform the following	2
			ries with Aggregate functions, Queries with	
	Aggregate			
			g clause), Queries involving- Date Functions,	
	0		ons Join Queries- Inner Join, Outer Join	
x / 7	-	es- With IN clause, W		
VI	-		s perform the following	2
		•	d without check option), Dropping views,	
	Select	ing from view.		



VII	Write a Pl/SQL program using FOR loop to insert ten rows into a database	2
	table.	
VIII	Given the table EMPLOYEE (EmpNo, Name, Salary, Designation, DeptID)	2
	write a cursor to select the five highest paid employees from the table.	

Reference / Text Books:

- 1. Fundamentals of Database System By Elmasari & Navathe, 7th Edition, 2018, Pearson Education.
- 2. Database System Concepts by Silberschatz, Korth & Sudarshan, 6th Edition, 2019, McGraw-Hill Education.

Evaluation/Assessment Methodology	
	Max. Marks:50
1) Class tasks/ Sessional Examination	25
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	
Seminar On Research Project Report	
5) ESE	25
Total:	50
Course Learning Outcomes:	
Student will be able to:	
CO1: Design and implement a database schema for a given problem-domain	
CO2: Populate and query a database	
CO3: Create and maintain tables using PL/SQL.	



IIMTU-NEP IMPLEMENTATION Year- II / Semester –III

file system.
No. of
Lectures
Allotted
12
12
12
12
12
12
12
12
12
12

3. Tanenbaum/Woodhaull "Operating System Design and Implementation", Pearson Publication



Reference

- 1. 4. Harvey M Dietel, "An Introduction to Operating System", Pearson Education
- 2. Flynn, "Understanding Operating System", Cengage.
- 3. D M Dhamdhere, "Operating Systems : A Concept basedApproach", McGraw Hill.
- 4. Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Education".

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100
Prerequisites for the course: NIL	

Course Learning Outcomes:

C01: Describe the important computer system resources and the role of operating system in their management policies and algorithms.

CO2: Understand the process management policies and scheduling of processes by CPU

CO3: Evaluate the requirement for process synchronization and coordination handled by operating system

CO4: Describe and analyze the memory management and its allocation policies.

CO5: Identify use and evaluate the storage management policies with respect to different storage management technologies.



Progra	mme: Dip	loma	Year: II		
Class:I	BCA		Semester: III		
Credits	Credits Subject: Communication Skill & Personality Development				
Theory	Theory:4Cr				
Practica	al:2Cr				
Course		Title: Communicatio	on Skill & Personality Development		
	EP-303				
	• Objective				
		1 • 1	ess and importance of communication.		
	-		mmunication both written and oral.		
			n of communication skills in the world of business.		
		1 1	rsonality and personality development and its signif	icance.	
		<u>+</u>	ous traits required for personality development.		
	of Paper:				
	um Passin	g Marks/Credits: 40	% Marks		
L:3					
T:0					
	Hours/Wee				
	- 1 Hr. = 1				
	al- 2 Hrs.=1	1Credit(4Hrs./Week=4			
Unit			Contents	No. of	
				Lectures	
-				Allotted	
Ι		tion to Communicati		8	
	0		ess, Functions, Objectives, Importance, Essentials		
	ofGood Communication, Communication Barriers, Overcoming Communication				
II	Barriers.	Communications No	ed and functions of business letters. Dianning and	8	
11			ed and functions of business letters, Planning and	0	
			ntages and limitations of written communication.		
			ng, nature and scope, Principles of Effective Oral of Effective Speech, The Art of Listening,		
			ing, Advantages and Limitations of Oral		
	Communi		ing, Auvantages and Emitations of Ora		
III			The concept of personality, Dimensions of	8	
			evelopment, Significance.	0	
	-		ttitude, Concept, Significance, Factors affecting		
			vantages, Negative attitude, Disadvantages, Ways		
			ference between Personalities having Positive and		
	-		f motivation, Significance, Internal and external		
	motives, Importance of self-motivation, Factors leading to demotivation.				
IV		-	, Symptoms, Advantages, Do's and Don'ts to	8	
			Low self-esteem, Symptoms, Personality having		
	low self-esteem, Positive and negative self-esteem.				
		sonal Relationships:	~		
	Interpers	-	aming, Developing positive personality, Analysis		



	System, Transforming Lives Section 2f & 128				
V Goal-Setting: Concept of goal-setting, Importance of goals,	U				
Why goal-setting fails- SMART (Specific, Measurable, Achie					
Time-bound) goals, Art of Prioritisation, Do's and Don'ts about					
Essential soft skills Assertiveness - Lateral thinking - Work ethics, Good					
manners and etiquettes Concept, significance.					
Text Books:					
1. Cloninger, S.C., "Theories of Personality: Understanding Person",	Pearson, New York, 2008,				
5 th edition.	th				
2. Luthans F, "Organizational Behaviour", McGraw Hill, New York, 20	$05, 12^{\text{m}}$ edition.				
3. Barron, R.A. & Brian D, "Social Psychology", Prentice Hall of India,	1998, 8 th edition.				
Reference					
3. Adler R.B., Rodman G. & Hutchinson C.C., "Understanding Hum	an Communication", Oxford				
University Press: New York, 2011.					
Evaluation/Assessment Methodology					
	Max. Marks 100				
1) Class tasks/ Sessional Examination15					
2) Presentations /Seminar					
3) Assignments					
4) Research Project Report					
Seminar On Research Project Report					
5) ESE	35				
Total:	50				
Prerequisites for the course: <i>Problem Solving using C</i>					
Course Learning Outcomes:					
CO1: Identify different concept of Personality					
CO2: Able to Compare and contrast different personal grooming perta	iins.				
CO3: Able to explore communication beyond language.					
CO4: Able to manage oneself while communicating.					
CO5: Able to acquire good communication skills and develop confidence.					



Progra	mme:DIPLOMA	Year: II		
Class:E		Semester: III		
Credits	Credits Subject:Computer System Architecture			
Theory	4Cr			
Course	Code: Title:Computer	System Architecture		
BCA-N	EP-304			
Course	Objectives:			
CO1: T	o learn the concepts regardi	ng microprocessor with 8 bit. To learn the concepts regar	rding	
CO2: N	licroprocessor with 16 bit.	To understand the basic idea of the internal architecture a	and register	
configu	ration of respective devices			
		amming techniques of with the help of Assembly	Language	
Program	6			
	o understand the basic conc			
		f pipelining and parallelism, so that the devices used to p	erform	
	of Paper: DISCIPLINE S			
	um Passing Marks/Credit	s: 40% Marks		
L:4				
T:0	T // X / 1 \			
,	Hours/Week)			
	- 1 Hr. = 1 Credit	Contanta	NT. C	
Unit		Contents	No. of Lectures	
			Allotted	
Ι	Basic Computer Organize	ation and Design: Instructions and Instruction Codes,	8	
1		ing and Control, Instruction Cycle, Register Transfer	0	
	and Micro Operations-Registration Transfer Language, Register Transfer			
	1	lemory Transfer Instructions, Arithmetic and Logic		
		Micro-Operations, Arithmetic Logic Shift Unit;		
		ructions, Input-Output and Interrupts, Complete		
		Design of Basic Computer, Design of Accumulator		
	Logic.			
II		: General Register Organization, Stacks Organization,	8	
		dressing Modes, RISC, CISC, Parallel Processing,		
	Pipelining, Instruction a	nd Arithmetic Pipeline, Vector Processing, Matrix		
	Multiplication, Array Proc	essors.		
III	Computer Arithmetic:	Addition, Subtraction Algorithms; Multiplication	8	
	Algorithms: Shift and Add	d Algorithms, Booth's Algorithm; Divisor Algorithms,		
	Floating Point Representations, Arithmetic Operations on Floating-Point			
	Numbers, Decimal Arithm	netic Operations.		
IV		tion: Peripheral Devices, Input-Output Interface,		
		nsfer, Mode of Transfer, Priority Interrupts, Direct		
	Memory Address (DMA), Input/ Output Processor (IOP), Serial Communication.			
V	Memory Organization: N	Memory Hierarchy, Main Memory, Auxiliary Memory,	8	
V	Memory Organization: Massociative Memory, Cau	Memory Hierarchy, Main Memory, Auxiliary Memory, che Memory, Virtual Memory, Memory Management	8	
	Memory Organization: Massociative Memory, Cao Hardware		8	
Text B	Memory Organization: Memory, Cas Associative Memory, Cas Hardware ooks:		8	



W. Stallings, "Computer Organisation And Architecture", Pearson Education.

Reference

1.	Rao, "Prospective in Computer Architecture", Prentice Hall of India	
2.	John P. Hayes, "Computer Architecture and Organization", McGraw-	Hill
	Evaluation/Assessment Methodology	
		Max. Marks 100
1)	Class tasks/ Sessional Examination	15
2)	Presentations /Seminar	
3)	Assignments	
4)	Research Project Report	10
	Seminar On Research Project Report	
5)	ESE	75
	Total:	100

Prerequisites for the course:NIL

Course Learning Outcomes:

- CO1: For a microprocessor system, student should be able to deal with the internalarchitecture of 8 bits and 16-bit microprocessor to analyze the working operation and to know the pin configuration for the respective microprocessor. A student should be goodenough to deal with interrupts internally or externally.
- CO2: He/she should be able to understand the basic concepts of Assembly languageprogramming. For a particular data instruction set, student should be having a clear idea of solving machine language programs using kit. He/she shall be having an idea totackle with counter delays and subroutines.
- CO3: He/she should be able to know the concept of pipelining and parallelism in uniprocessor system for hazard detection. Understand the basic concept of Parallel computing. A student should have a basic idea of job levels that are governed by an organization on

priority basis. He/she should know the Pipeline scheduling theory.

- CO4: For good networking, a student should be able to draw SIMD interconnections and FFTor a butterfly method system for collision prevention and vector dispatching.
- He/sheshould be able to make Cube Interconnection Network, Shuffle-Exchange and CO5: OmegaNetwork.



	r amme: Diploma : BCA	1	Year: II Semester: III	
	redits Subject: Data Analytics			
	se Code:	Title:Data Analy	stice	
	NEP-304	The:Data Anar	ytics	
	se Objectives:			
CO1:	0	tem sets Clusteri	ng, frame works & Visualizations.	
CO2:			nd evaluating real time applications.	
CO3:		arious Data stream	• • • • • • • • • • • • • • • • • • • •	
CO4:	1		nalysis Techniques.	
CO5:			of Data Analytics through discovery, planning an	dbuilding.
Natur		scipline Specific E		U
Minir	num Passing N	larks/Credits:40	% Marks	
L:4				
T:0				
P:0(In	n Hours/Week)			
Theor	y-1Hr.=1Credit			
Unit			Contents	No.
				ofLectures
				Allotted
Ι		•	ics: Sources and nature of data, classification	8
		,	ructured, unstructured), characteristics of	
		U .	platform, need of data analytics, evolution of	
		• • •	ocess and tools, analysis vs reporting, modern	
	•	ools, applications	•	
	•	•	ed, key roles for successful analytic projects,	
	_	-	s lifecycle – discovery, data preparation, model	
II			nunicating results, operationalization leling, multivariate analysis, Bayesian modeling,	8
11	•	0	ks, support vector and kernel methods, analysis	0
		•	analysis & nonlinear dynamics, rule induction,	
		-	l generalization, competitive learning, principal	
		-	ral networks, fuzzy logic: extracting fuzzy	
			a trees, stochastic search methods.	
III			ction to streams concepts, stream data model and	8
	-		, sampling data in a stream, filtering streams,	
		· · ·		1
		ct elements in a s	tream, estimating moments, counting oneness in	
	counting distin		stream, estimating moments, counting oneness in eal-time Analytics Platform (RTAP)applications,	



15.7		1 (1 1	8			
IV	IV Frequent Itemset and Clustering: Mining frequent itemsets, market based					
	modelling, Apriori algorithm, handling large data sets in main memory,					
	limitedpass algorithm, counting frequent itemsets in a stream					
	techniques:hierarchical, K-means, clustering high dimensional data, CLIQUE					
	andProCLUS, frequent pattern-based clustering methods, cluster	ering in non-				
	Euclidean space, clustering for streams and parallelism.					
V	Frame Works and Visualization: Map Reduce, Hadoop, Pig,		8			
	MapR, Sharding, NoSQL Databases, S3, Hadoop Dist					
	Systems, Visualization: visual data analysis techniques, interaction	on techniques,				
	systems					
	and applications.					
Text l						
	hn Garrett, "Data Analytics for IT Networks: Developing Innova	tive Use Case	es", Pearson			
	ucation.					
2. Mi	chael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, "	Big Analytics:	Emerging			
3. Bu	siness Intelligence and Analytic Trends for Today's Businesses", W	iley.				
Refer	ence Book:					
1. Pe	te Warden, "Big Data Glossary", O'Reilly.					
2. Gl	enn J. Myatt, "Making Sense of Data", John Wiley & Sons.					
	Evaluation/Assessment Methodology					
	Max. Marks 100					
1) Cla	ass tasks /Sessional Examination	1:	5			
2) Pro	esentations /Seminar					
3) As	signments					
4) Re	search Project	10	C			
	port					
	minar On Research Project Report	7:	5			
5) ES	0 I					
	Total: 100					
Prere	equisites for the course: NIL					
	rse Learning Outcomes:					
CO1:	Able to Perform data gathering of large data from a range of data	sources.				
CO1:	Able to Critically analyse existing Big Data datasets and		ons, taking			
	practicality, and usefulness metrics into consideration.	I	, 8			
CO3:	Able to perform the role of statistics in the analysis of large of dat	tasets.				
CO4:	Able to apply advanced knowledge of statistical data analytics as		e data sets.			
CO5:	Employ advanced statistical analytical skills to test assumption					
000.	present new information and insights from large datasets.	ons, und to g	cherate and			
L	present new internation and morghes from high databolis.					



Programme:UG			Year: II		
Class: BCA			Semester:III		
Credits Subject: OOPS US		Subject: OOPS US	SING JAVA LAB		
Theory: 0					
	Practical: 2				
		Title:OOPS USING	G JAVA LAB		
BCA-NEP-305P					
Course Objectives:					
CO1: To write GUI programs using swing in java.					
CO2: To write programs implementing OOPS concepts.					
CO3: To write programs based on real world problems using java collection frame work					
Nature of Paper: Core					
Minimum Passing Marks/Credits: 50% Marks					
L:0					
P:4(In Hours/Week)					
Theory - 1 Hr. = 1 Credit $P_{\text{red}} = 1 C_{\text{red}} = 1 C_{re$					
Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)					
Unit	nit Contents				No. of
					Lectures
Ι	Write a program to enter a number from user and print the odd numbers				Allotted 2
1	between 1 to that number.				
II		ogram to find perimet	2		
III		a program to handle Array indexOutofBounds exception.			
IV	-	va program to copy a	2		
V		ogram to demonstrate	2		
VI		a program to get the ch	2		
VII	Write a program to find the sum of each row of a matrix.				2
VIII	Write a pro	a program to find area of rectangle using parameterized constructor.			
Reference / Text Books:					
1. Patrick Naughton and Herbertz Schildt, "Java-2 The Complete Reference", Mc. Graw Hill.					
2. Balaguruswamy, "Programming with Java: A Primer", Tata McGraw Hill Education.					
Evaluation/Assessment Methodology					
				x. Marks:50	
1) Class tasks/ Sessional Examination25					
2) Presentations /Seminar					
3) Assignments					
5) ESE 25					
Total: 50					
Course Learning Outcomes: Student will be able to:					
CO1: Write programs based on real world problems using java collection frame work CO2::Write GUI programs using swing in java.					
	-		in java.		
CO3: Implement OOPS concepts.					



IIMTU-NEP IMPLEMENTATION Year- II / Semester –III

Drogram	me:Diploma		Year: II	
Class:BC	-		Semester: III	
Class: BC Credits	A	Subjection	ect Oriented Programming Using Java	
	¬"	Subject:Obj	eet Onemed Programming Osing Java	
Theory:40		TitlesObject	Oriented Drogramming Lleing Love	
		The:Object	Oriented Programming Using Java	
BCA-NEI				
	bjectives:			
CO 1:			OOPs concepts.	
CO 2:			lems using OOP techniques.	
CO 3:	Able to understa			
CO 4:			Packages and Interface in java.	
CO 5:	Able to develop and understand exception handling, multithreaded applications with			
	synchronization	l .		
Nature of	Paper: Core			
	n Passing Marks	s/Credits: 40°	% Marks	
L:4				
T:0				
P:0(In Ho	urs/Week)			
Theory - 1	Hr. = 1 Credit			
Practical-	2 Hrs.=1Credit(4	Hrs./Week=4	(Credits)	
Unit	Contents			No. of
				Lectures
				Allotted
Ι	Introduction to	OOPs and Ja	ava: OOPs Concepts, Top-Down Approach and	12
	Bottom Up App	proach, Introd	uction to Java, History of Java, Features of Java,	
	Byte Code, JVN	A, JRE, JDK,	JIT, Java Applications, Character Set, Identifiers,	
	Literals, Comm	ents, Keywor	d, Data Type, Operators, Conditional Statements,	
	Looping State	ments, Arra	yDeclaration, Creation, Initialization, String	
	Handling- Pre	defined Fun	ctions in String, String Methods, Vectors,	
	Command-Line	Arguments.		
II	•		hods: Object Class, Defining Class, Adding	12
	Variables, Add	ling Method	s, Creating Objects, Constructors, Types of	
	Constructors, th	nis & static k	eyword, Garbage Collection, Inheritance, Types	
	of Inheritance,	Creating M	ultilevel Hierarchy, Method Over Loading &	
	Overriding, Dy	namic Method	l Dispatching, final keyword, Abstract Class.	
III	Interfaces and	Packages: De	efining Interfaces, Extending and Implementing	12
	Interfaces, Det	fining Packa	ges, Access Protection, Importing Packages,	
	Exception Han	dling: Except	ion Types, Multiple Catch Clauses, Nested Try	
	Statements, Th	row, Throws	, Finally, Java's Built-in Exceptions, Creating	
	Your Own Exc	eption Subcla	asses. Multithreaded Programming: Thread Life	
	Cycle, Creating	Threads, Thr	ead Methods, Thread Priority	
IV			duction, Streams, Stream Classes, File Class,	12
			and Writing to File, Buffering Files, Random	
		-	D. GUI Programming: GUIComponents, AWT,	
	Swings, Event I			
V	Introduction to		ogramming: Introduction to Applet, Applet	12



Architecture Applet Life Cycle Applet Class Applet Teg Applet A	(athoda
Architecture, Applet Life Cycle, Applet Class, Applet Tag, Applet M	
Running the Applet. JDBC: Accessing Databases With Java D	Database
Connectivity	
Text Books:	
1. Patrick Naughton and Herbertz Schildt, "Java-2 The Complete Reference", M	cGraw Hill.
2. Ivor Horton, "Beginning Java-2", Wiley Publishing.	
3. Bala guru swamy, "Programming with Java: A Primer", Tata McGraw Hill Ec	lucation.
Reference	
1. Horetmann Cay and Cornell Gary, "Core Java Volume – I", Pearson Educatio	n
2. Horetmann Cay and Cornell Gary, "Core JavaTM 2, Volume II – Advance	
Education.	
Evaluation/Assessment Methodology	
Evaluation/Assessment Methodology	M. M. J. 100
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO 1: Able to understand the use of OOPs concepts.	
CO 2: Able to solve real world problems using OOP techniques.	
CO 3: Able to understand the use of abstraction.	
CO 4: Able to understand the use of Packages and Interface in java.	
CO 5: Able to develop and understand exception handling, multithreade	ed applications with
,	

synchronization.



IIMTU-NEP IMPLEMENTATION Year- II / Semester –III

Program	nme:UG		Year: II		
Class: B	CA		Semester:III		
Credits		Subject:Operating	System Lab		
Theory:					
Practical					
Course		Title:Operating Sy	rstem Lab		
	EP-306P				
	Objectives		· c		
	-	t the paging Technique			
	1	t various Page Replac	6	lagnithma	
			gorithms and memory management a	igoriums.	
	of Paper: (m Pagging		7. Monka		
L:0	in Passing	Marks/Credits: 509	70 Marks		
L.0 T:0					
	ours/Week)			
	1 Hr. = 1 (/			
		Credit(4Hrs./Week=4	Credits)		
Unit	Contents				No. of
eme	contents				Lectures
					Allotted
Ι	Write C p	rograms to implemen	t the various Page Replacement Algo	rithms	2
II			ate various process related concepts.		2
III			t the various CPU Scheduling Algori	thms	2
IV		programs to simulat	e CPU scheduling algorithms: FCF		2
V	Implemen	t the following File A	Allocation Strategies using C program	S	2
VI		programs to simulate	e solutions to Classical Process Syr		2
VII	Write C p	rograms for the imple	ementation of various disk scheduling	galgorithms	2
VIII	Write a C	program to simulate	Bankers Algorithm for Deadlock Ave	oidance.	2
Referen	ce / Text B	ooks:			
			alvin, Greg Gagne (2006), Operating	System Princ	iples. 7 the
		ndia Private Limited,		<u> </u>	1 /
			ion/Assessment Methodology		
				Max.	Marks:50
1) Class	s tasks/ Ses	sional Examination		25	
2) Prese	entations /S	eminar			
· ·	gnments				
	arch Projec	-			
	inar On Res	search Project Report			
5) ESE				25	
			Total:	50	



Course Learning Outcomes:

Student will be able to:

CO1: Identify the performance of various page replacement algorithms. CO2: Develop algorithm for deadlock CO3: Choose the best CPU scheduling algorithm for a given problem instance.



IIMTU-NEP IMPLEMENTATION Year- II / Semester –IV

rrogra	mme: Diploma		Year: II	
Class: 1	BCA		Semester: IV	
Credits		Subject: S	Software Engineering	
Theory:				
Course	Code:	Title: Soft	tware Engineering	
BCA-N	EP-401			
Course	Objectives:			
CO 1:			rent software development process models.	
CO 2:	Extract and anal	lyze softwar	re requirements specifications for different projects. De	evelop
CO 3:	some basic leve	l of software	e architecture/design.	
CO 4:	Define the basic	concepts a	nd importance of Software project management concept	pts like cost
CO 5:	estimation, sche	duling and	reviewing the progress.	
	Apply different	testing and	debugging techniques and analyzing their effectiveness	SS.
Nature	of Paper: Core			
	um Passing Mar	ks/Credits:	40% Marks	
L:4	<u> </u>			
T:0				
P:0(In H	Hours/Week)			
	- 1 Hr. = 1 Credit			
•	al- 2 Hrs.=1Credit		k=4Credits)	
Unit	Contents		/	No. of
				Lectures
				Allotted
Ι	Introduction: Se	ftwara Ch		
	muouucuon. Do	ntwale- Cha	aracteristics and Applications, Software Engineering,	10
-			aracteristics and Applications, Software Engineering, ers, Software Process Framework, CMM, Software	10
-	Software Engin	eering Laye	ers, Software Process Framework, CMM, Software	10
-	Software Engin Quality Attribu	eering Laye te and Met	ers, Software Process Framework, CMM, Software trics, Software Development Life Cycle, Software	10
-	Software Engin Quality Attribu Process Models	eering Laye te and Met s: Water Fa	ers, Software Process Framework, CMM, Software trics, Software Development Life Cycle, Software all Model, Prototyping Model, RAD Model, Spiral	10
	Software Engin Quality Attribu Process Models Model, Evolutio	eering Laye te and Met : Water Fa onary Model	ers, Software Process Framework, CMM, Software trics, Software Development Life Cycle, Software all Model, Prototyping Model, RAD Model, Spiral ls, Component-based Development Model.	
I	Software Engin Quality Attribu Process Models Model, Evolutio Software Requ	eering Laye te and Met Water Fa onary Model urements	ers, Software Process Framework, CMM, Software trics, Software Development Life Cycle, Software all Model, Prototyping Model, RAD Model, Spiral ls, Component-based Development Model. Engineering and Analysis Modeling: Software	10
	Software Engin Quality Attribu Process Models Model, Evolutio Software Requ Requirements,	eering Laye te and Met Water Fa onary Model uirements Requirement	ers, Software Process Framework, CMM, Software trics, Software Development Life Cycle, Software all Model, Prototyping Model, RAD Model, Spiral ls, Component-based Development Model. Engineering and Analysis Modeling: Software nt Engineering Process, Elicitation Requirements,	
	Software Engin Quality Attribu Process Models Model, Evolutio Software Requ Requirements, Analysis and M	eering Laye te and Met S: Water Fa Dary Model uirements Requirement Negotiating	ers, Software Process Framework, CMM, Software trics, Software Development Life Cycle, Software all Model, Prototyping Model, RAD Model, Spiral ls, Component-based Development Model. Engineering and Analysis Modeling: Software nt Engineering Process, Elicitation Requirements, Requirements, Requirement Specification, System	
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	Software Engin Quality Attribu Process Models Model, Evolutio Software Requ Requirements, Analysis and M Modeling, Req Software Requ	eering Laye te and Met Water Fa onary Model uirements Requirement Negotiating uirements irements Space	ers, Software Process Framework, CMM, Software trics, Software Development Life Cycle, Software all Model, Prototyping Model, RAD Model, Spiral ls, Component-based Development Model. Engineering and Analysis Modeling: Software nt Engineering Process, Elicitation Requirements, Requirements, Requirement Specification, System Validation, Requirement Management, Creating a pecification Document, IEEE Standards for SRS,	
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II	Software Engin Quality Attribu Process Models Model, Evolutio Software Requ Requirements, Analysis and M Modeling, Req Software Requ Feasibility Stud Information M Process Specifi Metrics for Ana Software Desig Concepts-Abstr Information Hi	eering Laye te and Met Water Fa mary Model urements Requirements Vegotiating uirements Sp y, Elements odeling- D cation, Data lysis Model n and Imple action, Arc ding, Func	ers, Software Process Framework, CMM, Software trics, Software Development Life Cycle, Software all Model, Prototyping Model, RAD Model, Spiral ls, Component-based Development Model. Engineering and Analysis Modeling: Software nt Engineering Process, Elicitation Requirements, Requirements, Requirement Specification, System Validation, Requirement Management, Creating a pecification Document, IEEE Standards for SRS, s of Analysis Model, Data Modeling- ER Diagram, PFD, Behavioral Modeling, Control Specification, a Dictionary, Software Quality Framework, Quality L ementation: Design Process, Principles, and Design hitecture, Refinement, Modularity, Data Structure, tional Independence, Cohesion, Coupling; Design	10
Π	Software Engin Quality Attribu Process Models Model, Evolutio Software Requ Requirements, Analysis and M Modeling, Req Software Requ Feasibility Stud Information M Process Specifi Metrics for Ana Software Desig Concepts-Abstr Information Hi Documentation,	eering Laye te and Met Water Fa onary Model urements Requirements Vegotiating uirements Si y, Elements odeling- D cation, Data <u>lysis Model</u> n and Imple action, Arc ding, Func Design Str	ers, Software Process Framework, CMM, Software trics, Software Development Life Cycle, Software all Model, Prototyping Model, RAD Model, Spiral ls, Component-based Development Model. Engineering and Analysis Modeling: Software nt Engineering Process, Elicitation Requirements, Requirements, Requirement Specification, System Validation, Requirement Management, Creating a pecification Document, IEEE Standards for SRS, s of Analysis Model, Data Modeling- ER Diagram, PD, Behavioral Modeling, Control Specification, a Dictionary, Software Quality Framework, Quality l. ementation: Design Process, Principles, and Design hitecture, Refinement, Modularity, Data Structure, tional Independence, Cohesion, Coupling; Design rategies-Top Down and Bottom Up Design; Design	10
Π	Software Engin Quality Attribu Process Models Model, Evolutio Software Requ Requirements, Analysis and M Modeling, Req Software Requ Feasibility Stud Information M Process Specifi Metrics for Ana Software Desig Concepts-Abstr Information Hi Documentation, ModelData Desig	eering Laye te and Met Water Fa onary Model uirements Requirements vegotiating uirements Si y, Elements odeling- D cation, Data lysis Model n and Imple action, Arc ding, Func Design Str sign Eleme	ers, Software Process Framework, CMM, Software trics, Software Development Life Cycle, Software all Model, Prototyping Model, RAD Model, Spiral ls, Component-based Development Model. Engineering and Analysis Modeling: Software nt Engineering Process, Elicitation Requirements, Requirements, Requirement Specification, System Validation, Requirement Management, Creating a pecification Document, IEEE Standards for SRS, s of Analysis Model, Data Modeling- ER Diagram, PFD, Behavioral Modeling, Control Specification, a Dictionary, Software Quality Framework, Quality L ementation: Design Process, Principles, and Design thitecture, Refinement, Modularity, Data Structure, tional Independence, Cohesion, Coupling; Design rategies-Top Down and Bottom Up Design; Design	10
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Π	Software Engin Quality Attribu Process Models Model, Evolutio Software Requ Requirements, Analysis and M Modeling, Req Software Requ Feasibility Stud Information M Process Specifi Metrics for Ana Software Desig Concepts-Abstr Information Hi Documentation, ModelData Des Component-Lev and Programmin	eering Laye te and Met : Water Fa onary Model arements Requirements Vegotiating uirements Sp y, Elements odeling- D cation, Data lysis Model n and Imple action, Arc ding, Func Design Str sign Eleme vel Design,	ers, Software Process Framework, CMM, Software trics, Software Development Life Cycle, Software all Model, Prototyping Model, RAD Model, Spiral ls, Component-based Development Model. Engineering and Analysis Modeling: Software nt Engineering Process, Elicitation Requirements, Requirements, Requirement Specification, System Validation, Requirement Management, Creating a pecification Document, IEEE Standards for SRS, s of Analysis Model, Data Modeling- ER Diagram, PFD, Behavioral Modeling, Control Specification, a Dictionary, Software Quality Framework, Quality L ementation: Design Process, Principles, and Design thitecture, Refinement, Modularity, Data Structure, tional Independence, Cohesion, Coupling; Design rategies-Top Down and Bottom Up Design; Design	10
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Π	Software Engin Quality Attribu Process Models Model, Evolutio Software Requ Requirements, Analysis and M Modeling, Req Software Requ Feasibility Stud Information M Process Specifi Metrics for Ana Software Desig Concepts-Abstr Information Hi Documentation, ModelData Des Component-Lev and Programmi Source Code	eering Laye te and Met : Water Fa onary Model urements Requirements Vegotiating uirements S y, Elements odeling- D cation, Data lysis Model n and Imple action, Arc ding, Func Design Str sign Eleme vel Design, ng Support	ers, Software Process Framework, CMM, Software trics, Software Development Life Cycle, Software all Model, Prototyping Model, RAD Model, Spiral ls, Component-based Development Model. Engineering and Analysis Modeling: Software nt Engineering Process, Elicitation Requirements, Requirements, Requirement Specification, System Validation, Requirement Management, Creating a pecification Document, IEEE Standards for SRS, s of Analysis Model, Data Modeling- ER Diagram, PFD, Behavioral Modeling, Control Specification, a Dictionary, Software Quality Framework, Quality L ementation: Design Process, Principles, and Design hitecture, Refinement, Modularity, Data Structure, tional Independence, Cohesion, Coupling; Design rategies-Top Down and Bottom Up Design; Design ents, Architectural Design, User Interface Design, Deployment-Level Design, Implementation Issues	10



	Transforming Education System, Transforming	Lives Sectio	n 2f & 12B
	Regression Testing, Test Characteristics, White Box Testing, Basic	Path	
	Testing, Control Structure Testing, Black Box Testing, Test Plan, Test	Case	
	Design, Quality Metrics for Testing.		
V	Software Maintenance: Nature and Need of Maintenance, Types of Mainter	nance	10
	(Perceptive, Preventive, Adoptive, Corrective), Cost of Maintenance, Evol	ution	
	of Software, Software Maintenance Process, Software Maintenance Techni		
	Reverse Engineering, Reengineering; Factors affecting Software Mainten	1	
	Key Issues in Maintenance, Software Configuration Management, Version		
	Release Control, Change Control, Configuration Audit, Metrics		
	Maintenance.		
Text Bo	ooks:		
1. Rog	er S. Pressman, "Software Engineering: A Practitioner's Approach", Addison	Wesley	
2. Pan	kaj Jalote, "An Integrated Approach to Software Engineering", Springer	·	
Referen	ice:		
1. K. F	K. Aggarwal & Yogesh Singh "Software Engineering", New Age Internationa	ıl.	
	ommerville, "Software Engineering", Pearson Education.		
	es Peter, W. Pedrycz, "Software Engineering: An Engineering Approach", Jo	hn Wiley	& Sons
	ramanian Chandramouli, SaikatDutt, ChandramouliSeetharaman, B. G C		
Eng	ineering", Pearson Education India		
	Evaluation/Assessment Methodology		
		Max. Ma	arks 100
1) Clas	ss tasks/ Sessional Examination	1	5
2) Pres	sentations /Seminar		
,	ignments		
	earch Project Report	1	0
	ninar On Research Project Report		
5) ESE	0 1	7	5
	Total:	10	00
Prerequ	isites for the course: NIL	•	
Course	Learning Outcomes:		
CO 1:	Select and implement different software development process models.		
CO 2:	Extract and analyze software requirements specifications for different proje	cts.	
CO 3:	Develop some basic level of software architecture/design.		
CO 4:	Define the basic concepts and importance of Software project management	concepts	like cos
	estimation, scheduling and reviewing the progress.	-	

CO 5: Apply different testing and debugging techniques and analyzing their effectiveness.



IIMTU-NEP IMPLEMENTATION Year- II / Semester –IV

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Reference

- 1. Margaret H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education.
- 2. Arun K. Pujari, "Data Mining Techniques", Universities Press
- 3. Pieter Adriaans & Dolf Zantinge, "Data Mining", Pearson Education

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	

CO1: Understand the functionality of the various data mining and data warehousing component.

CO2: Appreciate the strengths and limitations of various data mining and data warehousing models.

CO3: Explain the analyzing techniques of various data

CO4: Describe different methodologies used in data mining and data ware housing.

CO5: Compare different approaches of data ware housing and data mining with various technologies.



IIMTU-NEP IMPLEMENTATION Year- II / Semester –IV

UG(R)/PG/Ph.D. Semester: IV Certificate Class: All UG Classes of IIMT University Credits Subject: Human values and professional ethics Theory- 3Cr Title:Human values and professional ethics Course Code Theory Title:Human values and professional ethics UVE-401 Title:Human values and professional ethics Course Objectives: Col: CO1: To reinstate the rich cultural legacy and human values of which we are the custor CO2: To focus on professional ethics which are broader indicators of desirable actions? CO3: To lay down broader guidelines of values and ethics for internal and external states To suggest operational guidelines for value-based and ethical practices CO4: educational institutions leading to implementation and monitoring.	tions vis-à-vi akeholders.
Class: All UG Classes of IIMT University Credits Subject: Human values and professional ethics Theory- 3Cr Title:Human values and professional ethics Course Code Theory Title:Human values and professional ethics UVE-401 Title:Human values and professional ethics Course Objectives: Coll: CO1: To reinstate the rich cultural legacy and human values of which we are the custor CO2: To focus on professional ethics which are broader indicators of desirable actions? CO3: To lay down broader guidelines of values and ethics for internal and external state to suggest operational guidelines for value-based and ethical practices	tions vis-à-vi akeholders.
Credits Theory- 3CrSubject: Human values and professional ethicsCourse Code Theory UVE-401Title:Human values and professional ethicsCourse Objectives: CO1:To reinstate the rich cultural legacy and human values of which we are the custor CO2:CO2:To focus on professional ethics which are broader indicators of desirable actions?CO3:To lay down broader guidelines of values and ethics for internal and external state To suggest operational guidelines for value-based and ethical practices	tions vis-à-vi akeholders.
Theory- 3Cr Title:Human values and professional ethics Course Code Theory Title:Human values and professional ethics UVE-401 Title:Human values and professional ethics Course Objectives: CO1: CO1: To reinstate the rich cultural legacy and human values of which we are the custor CO2: To focus on professional ethics which are broader indicators of desirable actions? CO3: To lay down broader guidelines of values and ethics for internal and external state To suggest operational guidelines for value-based and ethical practices	tions vis-à-vi akeholders.
Course Code Theory UVE-401Title:Human values and professional ethicsCourse Objectives: CO1: To reinstate the rich cultural legacy and human values of which we are the custo CO2: To focus on professional ethics which are broader indicators of desirable act undesirable actions?CO3: 	tions vis-à-vi akeholders.
UVE-401 Course Objectives: CO1: To reinstate the rich cultural legacy and human values of which we are the custor CO2: To focus on professional ethics which are broader indicators of desirable actions? CO3: To lay down broader guidelines of values and ethics for internal and external state to suggest operational guidelines for value-based and ethical practices	tions vis-à-vi akeholders.
 Course Objectives: CO1: To reinstate the rich cultural legacy and human values of which we are the custor CO2: To focus on professional ethics which are broader indicators of desirable actions? CO3: To lay down broader guidelines of values and ethics for internal and external state To suggest operational guidelines for value-based and ethical practices 	tions vis-à-vi akeholders.
 CO1: To reinstate the rich cultural legacy and human values of which we are the custo CO2: To focus on professional ethics which are broader indicators of desirable actions? CO3: To lay down broader guidelines of values and ethics for internal and external state To suggest operational guidelines for value-based and ethical practices 	tions vis-à-vi akeholders.
 CO2: To focus on professional ethics which are broader indicators of desirable actual undesirable actions? CO3: To lay down broader guidelines of values and ethics for internal and external states To suggest operational guidelines for value-based and ethical practices 	tions vis-à-vi akeholders.
undesirable actions? CO3: To lay down broader guidelines of values and ethics for internal and external sta To suggest operational guidelines for value-based and ethical practices	akeholders.
CO3: To lay down broader guidelines of values and ethics for internal and external sta To suggest operational guidelines for value-based and ethical practices	
To suggest operational guidelines for value-based and ethical practices	
	in the later
CO4: educational institutions leading to implementation and monitoring	in the highe
CO5: To indicate the outcomes of creating a value-based and ethical culture in HEIs.	
CO6: To suggest indicative reinforcement programmes for nurturing human values an	d ethics in
HEIs.	
Nature of Paper: Core/DSE/SEC/GE/AECC-AECC	
Minimum Passing Marks/Credits:20	
L:3	
T:0	
P: 0 (In Hours/Week)	
Theory - 1 Hr. = 1 Credit	
Practical- NA.	<u> </u>
Unit Contents(Theory)	No. of
	Lectures
	Allotted
I Course Introduction - Need, Basic Guidelines, Content and Process for Value	6
Education	
Education	
II Understanding Harmony in the Human Being - Harmony in Myself	6
IIUnderstanding Harmony in the Human Being - Harmony in MyselfIIIUnderstanding Harmony in the Family and Society- Harmony in Human-	
IIUnderstanding Harmony in the Human Being - Harmony in MyselfIIIUnderstanding Harmony in the Family and Society- Harmony in Human- Human Relationship	6
IIUnderstanding Harmony in the Human Being - Harmony in MyselfIIIUnderstanding Harmony in the Family and Society- Harmony in Human- Human RelationshipIVUnderstanding Harmony in the Nature and Existence - Whole existence as	6
II Understanding Harmony in the Human Being - Harmony in Myself III Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship IV Understanding Harmony in the Nature and Existence - Whole existence as Co-existence	6 6
II Understanding Harmony in the Human Being - Harmony in Myself III Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship IV Understanding Harmony in the Nature and Existence - Whole existence as Co-existence V Implications of the above Holistic Understanding of Harmony on	6 6 6
II Understanding Harmony in the Human Being - Harmony in Myself III Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship IV Understanding Harmony in the Nature and Existence - Whole existence as Co-existence V Implications of the above Holistic Understanding of Harmony on Professional Ethics.	6 6
II Understanding Harmony in the Human Being - Harmony in Myself III Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship IV Understanding Harmony in the Nature and Existence - Whole existence as Co-existence V Implications of the above Holistic Understanding of Harmony on Professional Ethics. Suggested Readings: For Theory	6 6 6
II Understanding Harmony in the Human Being - Harmony in Myself III Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship IV Understanding Harmony in the Nature and Existence - Whole existence as Co-existence V Implications of the above Holistic Understanding of Harmony on Professional Ethics. Suggested Readings: For Theory I. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Colling	6 6 6 8 6
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II Understanding Harmony in the Human Being - Harmony in Myself III Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship IV Understanding Harmony in the Nature and Existence - Whole existence as Co-existence V Implications of the above Holistic Understanding of Harmony on Professional Ethics. Suggested Readings: For Theory I. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collin 2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people matter Briggs, Britain. 3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1995	6 6 6 8 9 9 9 1
II Understanding Harmony in the Human Being - Harmony in Myself III Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship IV Understanding Harmony in the Nature and Existence - Whole existence as Co-existence V Implications of the above Holistic Understanding of Harmony on Professional Ethics. Suggested Readings: For Theory Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Colling E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people matter Briggs, Britain.	6 6 6 8 9 9 9 1

- 5. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
- 6. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
- 7. A N Tripathy, 2003, Human Values, New Age International Publishers.



8. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaid	ik) KrishiTantra Shodh,			
Amravati.				
9. E G Seebauer& Robert L. Berry, 2000, Fundamentals of Ethics for Scienti	sts & Engineers, Oxford			
UniversityPress				
10. M Govindrajran, S Natrajan& V.S. Senthil Kumar, Engineering Eth	nics (including Human			
Values), Eastern Economy Edition, Prentice Hall of India Ltd.				
11. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books				
12. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow.				
Reprinted2008.				
13. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in	Human Values and			
Professional Ethics.				
Evaluation/Assessment Methodology				
	Max. Marks			
1) Class tasks/ Sessional Examination	10 marks			
2) Presentations /Seminar	05 marks			
3) Assignments				
4) Research Project Report				
Seminar On Research Project Report				
5) ESE	35			
Total:	50			
Prerequisites for the course: First year must be clear for appearing in III rd /IV	V th for the study of this			
Audit/Qualifying course- for theory				
Second year must be clear for appearing in VI th Sem for the study of this audit/	Qualifying Course - for			
theory				
Course Learning Outcomes:				
CO1: The learning process for holistic development.				
CO2: Impeccable governance.				
CO3: Effective institutional management.				
CO4: Well laid system of rewards and chastisement.				
CO5: Institutional climate where 'rights' enjoy and 'wrongs' are discourage	d.			



IIMTU-NEP IMPLEMENTATION Year- II / Semester –IV

Program	mme: Diplon	na	Year: II	
Class: I	BCA		Semester: IV	
Credits		Subject: Numeric	al Analysis	
Theory:	4Cr			
Practica	l:2Cr			
Course	Code:	Title: Numerical A	Analysis	
BCA-N	EP-404			
Course	Objectives:			
CO1:		standing of numeric	6	
CO2:	-	-	alternative methods and analyze mathematical pr	roblems to
		ne suitable numerica	1	
CO3:			on, eigen value problem techniques for mathematica	l problems
~ ~ .	•	arious fields.		~ .
CO4:			ndary value problems which have great signi	ficance in
GO 5			nary and partial differential equations.	
CO5:			mming language, implementation of algorithms and	a computer
NI-4-	<u> </u>	solve mathematica	i problems.	
	of Paper: DS		(Marila	
L:4	im Passing N	/larks/Credits:40%	o Marks	
L:4 T:0				
	Hours/Week)			
	- 1 Hr. = 1 Ci	odit		
THEOLY	- I III. – I CI			
Practica			Credits)	
		redit(4Hrs./Week=4		No. of
Practica Unit			Credits) Contents	No. of Lectures
				No. of Lectures Allotted
	1- 2 Hrs.=1Ci	redit(4Hrs./Week=4	Contents	Lectures
Unit	l- 2 Hrs.=1Ci Introducti	redit(4Hrs./Week=4		Lectures Allotted
Unit	I- 2 Hrs.=1Ci Introducti particulariz	edit(4Hrs./Week=4 on: Numbers rep ation to single pred	Contents presentation on a computing machine with	Lectures Allotted
Unit	I- 2 Hrs.=1Ct Introducti particulariz the Intel 80 chopping e	on: Numbers rep action to single prec family of process rror, Discussion of p	Contents presentation on a computing machine with cision, double precision, quadruple precision and ors. Definitions of numerical rounding error and major sources of error in numerical analysis	Lectures Allotted
Unit	I- 2 Hrs.=1Ct Introducti particulariz the Intel 80 chopping e	on: Numbers rep action to single prec family of process rror, Discussion of p	Contents presentation on a computing machine with cision, double precision, quadruple precision and ors. Definitions of numerical rounding error and	Lectures Allotted
Unit I	I- 2 Hrs.=1Ct Introducti particulariz the Intel 80 chopping e Solution o coding; Me	on: Numbers rep ation to single pred family of process fror, Discussion of f algebraic equation thod of False Posit	Contents bresentation on a computing machine with cision, double precision, quadruple precision and ors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of: Bijection algorithm and its tion and its coding; The Secant algorithm and its	Lectures Allotted 8
Unit I	I- 2 Hrs.=1Ct Introducti particulariz the Intel 8 chopping e Solution o coding; Me coding; Th	redit(4Hrs./Week=4 on: Numbers rep ation to single pred 6 family of process rror, Discussion of 1 f algebraic equati ethod of False Posit e Newton-Raphson	Contents presentation on a computing machine with cision, double precision, quadruple precision and ors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of: Bijection algorithm and its tion and its coding; The Secant algorithm and its algorithm and its coding. Brief discussion of the	Lectures Allotted 8
Unit I	I- 2 Hrs.=1Ct Introducti particulariz the Intel 8 chopping e Solution o coding; Ma coding; Th robustness a	edit(4Hrs./Week=4 on: Numbers rep ation to single pred family of process rror, Discussion of t f algebraic equati ethod of False Posit e Newton-Raphson and relative performa	Contents bresentation on a computing machine with cision, double precision, quadruple precision and ors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of: Bijection algorithm and its tion and its coding; The Secant algorithm and its algorithm and its coding. Brief discussion of the ance of these algorithm. Properties of the fixed point	Lectures Allotted 8
Unit I	I- 2 Hrs.=1Ct Introducti particulariz the Intel 80 chopping e Solution o coding; Me coding; Th robustness a algorithm x	on: Numbers rep ation to single pred family of process rror, Discussion of r f algebraic equation the Newton-Raphson and relative performa- and relative performa- and relative performa-	Contents presentation on a computing machine with cision, double precision, quadruple precision and ors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of: Bijection algorithm and its tion and its coding; The Secant algorithm and its algorithm and its coding. Brief discussion of the ance of these algorithm. Properties of the fixed point n x0. Definition of the Lipshitz condition and the	Lectures Allotted 8
Unit I	I- 2 Hrs.=1Ct Introducti particulariz the Intel 8 chopping e Solution o coding; Me coding; Th robustness a algorithm > notion of a	on: Numbers rep ation to single pred family of process rror, Discussion of 1 f algebraic equati ethod of False Posit e Newton-Raphson and relative performa an+1 = g (xn) given contraction algorith	Contents presentation on a computing machine with cision, double precision, quadruple precision and ors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of: Bijection algorithm and its tion and its coding; The Secant algorithm and its algorithm and its coding. Brief discussion of the ance of these algorithm. Properties of the fixed point in x0. Definition of the Lipshitz condition and the anc Conditions for convergence of $xn+1 = g(xn)$	Lectures Allotted 8
Unit I	I- 2 Hrs.=1Cr Introducti particulariz the Intel 80 chopping e Solution o coding; Ma coding; Th robustness a algorithm > notion of a ,Error estin	redit(4Hrs./Week=4 on: Numbers rep ation to single pred family of process rror, Discussion of the falgebraic equation of falgebraic equation the Newton-Raphson and relative performant xn+1 = g (xn) given contraction algorithm	Contents presentation on a computing machine with cision, double precision, quadruple precision and ors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of: Bijection algorithm and its tion and its coding; The Secant algorithm and its algorithm and its coding. Brief discussion of the ance of these algorithm. Properties of the fixed point n x0. Definition of the Lipshitz condition and the m Conditions for convergence of $xn+1 = g(xn)$ n $xn+1 = g(xn)$,General notion of the order of an	Lectures Allotted 8
Unit I	I- 2 Hrs.=1Cr Introducti particulariz the Intel 80 chopping e Solution o coding; Me coding; Th robustness algorithm x notion of a ,Error estim iterative alg	redit(4Hrs./Week=4 on: Numbers rep ation to single pred 6 family of process rror, Discussion of r f algebraic equation ethod of False Posite e Newton-Raphson and relative performation xn+1 = g (xn) given contraction algorithm gorithm, Aitken acc	Contents presentation on a computing machine with cision, double precision, quadruple precision and ors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of: Bijection algorithm and its tion and its coding; The Secant algorithm and its algorithm and its coding. Brief discussion of the ance of these algorithm. Properties of the fixed point in x0. Definition of the Lipshitz condition and the anc Conditions for convergence of $xn+1 = g(xn)$	Lectures Allotted 8
Unit I II	I- 2 Hrs.=1Cr Introducti particulariz the Intel 8 chopping e Solution o coding; Me coding; Th robustness a algorithm > notion of a ,Error estim iterative alg systems of	redit(4Hrs./Week=4 on: Numbers rep ation to single pred family of process rror, Discussion of 1 f algebraic equati ethod of False Posit e Newton-Raphson and relative performa (n+1 = g (xn) givencontraction algorithmpation for algorithmgorithm, Aitken accalgebraic equations	Contents presentation on a computing machine with cision, double precision, quadruple precision and ors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of: Bijection algorithm and its tion and its coding; The Secant algorithm and its algorithm and its coding. Brief discussion of the ance of these algorithm. Properties of the fixed point in x0. Definition of the Lipshitz condition and the nm Conditions for convergence of $xn+1 = g(xn)$ in $xn+1 = g(xn)$,General notion of the order of an celeration and Steffensen's algorithm, Solution of	Lectures Allotted 8
Unit I	I- 2 Hrs.=1Cr Introducti particulariz the Intel 80 chopping e Solution o coding; Me coding; Th robustness a algorithm > notion of a ,Error estim iterative alg systems of a	redit(4Hrs./Week=4 on: Numbers rep ation to single prec 6 family of process rror, Discussion of r f algebraic equati ethod of False Posit e Newton-Raphson and relative performa (n+1 = g (xn) givencontraction algorithmpation for algorithmgorithm, Aitken accalgebraic equationsInterpolation: Pol	Contents presentation on a computing machine with cision, double precision, quadruple precision and ors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of: Bijection algorithm and its tion and its coding; The Secant algorithm and its algorithm and its coding. Brief discussion of the ance of these algorithm. Properties of the fixed point n x0. Definition of the Lipshitz condition and the nm Conditions for convergence of $xn+1 = g(xn)$ n $xn+1 = g(xn)$,General notion of the order of an celeration and Steffensen's algorithm, Solution of lynomial interpolation. Definition of the Lagrange	Lectures Allotted 8
Unit I II	I- 2 Hrs.=1Cr Introducti particulariz the Intel 80 chopping e Solution o coding; Ma coding; Th robustness algorithm x notion of a ,Error estim iterative alg systems of Numerical interpolatir	redit(4Hrs./Week=4 on: Numbers rep ation to single pred 6 family of process rror, Discussion of r f algebraic equation ethod of False Posite ethod of False Posite e Newton-Raphson and relative performation and relative perfor	Contents presentation on a computing machine with cision, double precision, quadruple precision and ors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of: Bijection algorithm and its tion and its coding; The Secant algorithm and its algorithm and its coding. Brief discussion of the ance of these algorithm. Properties of the fixed point n x0. Definition of the Lipshitz condition and the m Conditions for convergence of $xn+1 = g(xn)$ n $xn+1 = g(xn)$,General notion of the order of an celeration and Steffensen's algorithm, Solution of lynomial interpolation. Definition of the Lagrange erpolation based on the Lagrange interpolating	Lectures Allotted 8
Unit I II	I- 2 Hrs.=1Cr Introducti particulariz the Intel 8 chopping e Solution o coding; Me coding; Th robustness algorithm > notion of a ,Error estim iterative alg systems of Numerical interpolatir polynomial	redit(4Hrs./Week=4 on: Numbers rep ation to single pred family of process rror, Discussion of r f algebraic equati ethod of False Posit e Newton-Raphson and relative performa (n+1 = g (xn) givencontraction algorithmpation for algorithmgorithm, Aitken accalgebraic equationsInterpolation: Polag polynomial, Interpol	Contents presentation on a computing machine with cision, double precision, quadruple precision and ors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of: Bijection algorithm and its its algorithm and its coding; The Secant algorithm and its algorithm and its coding. Brief discussion of the ance of these algorithm. Properties of the fixed point n x0. Definition of the Lipshitz condition and the nm Conditions for convergence of $xn+1 = g(xn)$ n $xn+1 = g(xn)$,General notion of the order of an celeration and Steffensen's algorithm, Solution of lynomial interpolation. Definition of the Lagrange erpolation based on the Lagrange interpolating ation using divided differences, Error analysis	Lectures Allotted 8
Unit I II	I- 2 Hrs.=1Cr Introducti particulariz the Intel 80 chopping e Solution o coding; Me coding; Th robustness a algorithm x notion of a ,Error estim iterative alg systems of a Numerical interpolatir polynomial underlying	redit(4Hrs./Week=4 on: Numbers rep ation to single prec 6 family of process rror, Discussion of r f algebraic equation ethod of False Posite ethod of False Posite ethod of False Posite entraction algorithm and relative performant (n+1 = g (xn) givencontraction algorithmporithm, Aitken accordinginterpolation: Pol-ag polynomial, Inter-polynomial inter-	Contents presentation on a computing machine with cision, double precision, quadruple precision and ors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of: Bijection algorithm and its tion and its coding; The Secant algorithm and its algorithm and its coding. Brief discussion of the ance of these algorithm. Properties of the fixed point n x0. Definition of the Lipshitz condition and the m Conditions for convergence of $xn+1 = g(xn)$ n $xn+1 = g(xn)$,General notion of the order of an celeration and Steffensen's algorithm, Solution of lynomial interpolation. Definition of the Lagrange erpolation based on the Lagrange interpolating ation using divided differences, Error analysis polation based on, Rolle's theorem The	Lectures Allotted 8
Unit I II	I- 2 Hrs.=1Cr Introducti particulariz the Intel 80 chopping e Solution o coding; Ma coding; Th robustness a algorithm > notion of a ,Error estim iterative alg systems of a systems of a numerical interpolatir polynomial underlying Chebyshev	redit(4Hrs./Week=4 on: Numbers rep ation to single pred family of process rror, Discussion of r f algebraic equation that of False Posit e Newton-Raphson and relative performation and relative perfor	Contents presentation on a computing machine with cision, double precision, quadruple precision and ors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of: Bijection algorithm and its its algorithm and its coding; The Secant algorithm and its algorithm and its coding. Brief discussion of the ance of these algorithm. Properties of the fixed point n x0. Definition of the Lipshitz condition and the ance of these algorithm. Properties of the fixed point n x0. Definition of the Lipshitz condition and the ance - Conditions for convergence of $xn+1 = g(xn)$ n $xn+1 = g(xn)$, General notion of the order of an celeration and Steffensen's algorithm, Solution of lynomial interpolation. Definition of the Lagrange erpolation based on the Lagrange interpolating ation using divided differences, Error analysis polation based on, Rolle's theorem The d its optimality, Piecewise linear spline, Subpoint	Lectures Allotted 8
Unit I II	I- 2 Hrs.=1Cr Introducti particulariz the Intel 8 chopping e Solution o coding; Me coding; Th robustness a algorithm x notion of a ,Error estim iterative alg systems of Numerical interpolatir polynomial underlying Chebyshev quadratic s	redit(4Hrs./Week=4 on: Numbers rep ation to single pred family of process rror, Discussion of r f algebraic equation that of False Posit e Newton-Raphson and relative performation and relative perfor	Contents presentation on a computing machine with cision, double precision, quadruple precision and ors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of: Bijection algorithm and its tion and its coding; The Secant algorithm and its algorithm and its coding. Brief discussion of the ance of these algorithm. Properties of the fixed point n x0. Definition of the Lipshitz condition and the m Conditions for convergence of $xn+1 = g(xn)$ n $xn+1 = g(xn)$,General notion of the order of an celeration and Steffensen's algorithm, Solution of lynomial interpolation. Definition of the Lagrange erpolation based on the Lagrange interpolating ation using divided differences, Error analysis polation based on, Rolle's theorem The	Lectures Allotted 8



	Transforming Education S	ystem, Transforming Lives St	ection 2f & 12B
IV	Solution of linear equations: Concept of Gaussian elimination	, the concept of	8
	pivoting and a simple illustration of why pivoting is needed, LU	factorization of	
	matrices with and without partial/full pivoting, The Choles	ki factorization,	
	Matrix inversion Iterative methods, The concept of a matrix no	orm with simple	
	examples, e.g. the Frobenius norm, The Jacobi iteration algorit	hm, The Gauss-	
	Seidel algorithm, The Gauss-Seidel algorithm with over-relaxation	on	
V	Numerical calculation of matrix eigenvalues: Gershgorin's t	heorem with an	8
	example - The Power algorithm, The Inverse Power algorith	nm, The Jacobi	
	transformation, The Householder transformation, Construction	n of the Upper	
	Hessenberg matrix, The QR algorithm		
Text B	ooks:		
1. V.A	A. Patel. Numerical Analysis. Harcourt Brace, College Publishers, 1	994.	
2. W.	Cheney and D. Kincaid. Numerical Mathematics and Computin	ng. Brooks/Cole	Publishing
Con	npany, 2003.	-	-
Referen	ice		
1. Nun	nerical Analysis. 9th ed. R.L. Burden and J.D. Faires: Edition Broc	oks / cole: -73563	-538-0-978
.201	1136		
2. An 1	Introduction to Numerical Analysis. EndreSüli, David F. Mayers	Cambridge : -052	21810264 -
2003	3.0521007941		
	Evaluation/Assessment Methodology		
		Max. 1	Marks 100
1) Clas	s tasks/ Sessional Examination	15	
2) Pres	entations /Seminar		
3) Assi	gnments		
4) Rese	earch Project Report	10	
Sem	inar On Research Project Report		
5) ESE		75	
	Total:	100	
Prerequ	isites for the course: Problem Solving using C		
Course	Learning Outcomes:		
CO1:	Discuss robustness and relative performance of different algorithm	l.	
CO2:	Able to apply interpolation methods for solving the problems num	erically.	
CO3:	Able to calculate the errors and the rates of convergence.		
CO4:	Able to evaluate the relationships between different areas of math	ematics and the c	onnections
	between mathematics and other disciplines.		

CO5: Able to develop numerical algorithms for the solution of the algebraic eigenvalue problem.



IIMTU-NEP IMPLEMENTATION Year- II / Semester –IV

rrogramm	e: Diploma Year: II	
Class:BCA	Semester: IV	
Credits	Subject: Python Programming	
Theory:4Cr		
Course	Title:Python programming	
Code:		
BCA-NEP-		
402		
Course Obj	ectives:	
CO1: Unders	stand and use variables.	
CO2: Work	with common Python data types, like integers, floats, strings as well as	pandas Data
frames.		1
CO3: Use ba	sic flow control including for loops and conditionals.	
CO4: Read d	ata from text files.	
CO5: Obtain	basic summary statistics from data files.	
Nature of I	Paper: Core	
Minimum 2	Passing Marks/Credits:40% Marks	
L:4		
T:0		
P:0(In Hour	rs/Week)	
Theory-1Hr		
	Irs.=1Credit(4Hrs./Week=4Credits)	
Unit	Contents	No. of
	Contents	INO. 01
	Contents	Lectures
	Contents	
	Introduction: Installing Python in Windows/Linux/Mac OS, Using	Lectures
		Lectures Allotted
I	Introduction: Installing Python in Windows/Linux/Mac OS, Using	Lectures Allotted
I	Introduction: Installing Python in Windows/Linux/Mac OS, Using Python interpreter, Execute a Script, Structuring with Indentation, Editors.	Lectures Allotted
Ι	Introduction: Installing Python in Windows/Linux/Mac OS, Using Python interpreter, Execute a Script, Structuring with Indentation, Editors. Data types and Variables: Variables, Variables v/s identifiers, Naming	Lectures Allotted
I	Introduction: Installing Python in Windows/Linux/Mac OS, Using Python interpreter, Execute a Script, Structuring with Indentation, Editors. Data types and Variables: Variables, Variables v/s identifiers, Naming convention of variables, Keywords.	Lectures Allotted
	Introduction: Installing Python in Windows/Linux/Mac OS, Using Python interpreter, Execute a Script, Structuring with Indentation, Editors. Data types and Variables: Variables, Variables v/s identifiers, Naming convention of variables, Keywords. Data Structure: List, Tuples, Sets, Dictionaries	Lectures Allotted 10
I	Introduction: Installing Python in Windows/Linux/Mac OS, Using Python interpreter, Execute a Script, Structuring with Indentation, Editors. Data types and Variables: Variables, Variables v/s identifiers, Naming convention of variables, Keywords. Data Structure: List, Tuples, Sets, Dictionaries Input And Output:Input function, Input with raw input(),Output with	Lectures Allotted 10
	Introduction: Installing Python in Windows/Linux/Mac OS, Using Python interpreter, Execute a Script, Structuring with Indentation, Editors. Data types and Variables: Variables, Variables v/s identifiers, Naming convention of variables, Keywords. Data Structure: List, Tuples, Sets, Dictionaries Input And Output:Input function, Input with raw input(),Output with old string format, Python format function	Lectures Allotted 10
	Introduction: Installing Python in Windows/Linux/Mac OS, Using Python interpreter, Execute a Script, Structuring with Indentation, Editors. Data types and Variables: Variables, Variables v/s identifiers, Naming convention of variables, Keywords. Data Structure: List, Tuples, Sets, Dictionaries Input And Output:Input function, Input with raw input(),Output with old string format, Python format function Control Flow: If/Else Statements, For/while Statements, Range()	Lectures Allotted 10
	Introduction: Installing Python in Windows/Linux/Mac OS, Using Python interpreter, Execute a Script, Structuring with Indentation, Editors. Data types and Variables: Variables, Variables v/s identifiers, Naming convention of variables, Keywords. Data Structure: List, Tuples, Sets, Dictionaries Input And Output:Input function, Input with raw input(),Output with old string format, Python format function Control Flow: If/Else Statements, For/while Statements, Range() function, Break and continue statements, Else clauses on Loops.	Lectures Allotted 10
II	 Introduction: Installing Python in Windows/Linux/Mac OS, Using Python interpreter, Execute a Script, Structuring with Indentation, Editors. Data types and Variables: Variables, Variables v/s identifiers, Naming convention of variables, Keywords. Data Structure: List, Tuples, Sets, Dictionaries Input And Output:Input function, Input with raw input(),Output with old string format, Python format function Control Flow: If/Else Statements, For/while Statements, Range() function, Break and continue statements, Else clauses on Loops. Functions: Defining Function, Default Argument, Keyword Argument, 	Lectures Allotted 10
	Introduction: Installing Python in Windows/Linux/Mac OS, Using Python interpreter, Execute a Script, Structuring with Indentation, Editors. Data types and Variables: Variables, Variables v/s identifiers, Naming convention of variables, Keywords. Data Structure: List, Tuples, Sets, Dictionaries Input And Output:Input function, Input with raw input(),Output with old string format, Python format function Control Flow: If/Else Statements, For/while Statements, Range() function, Break and continue statements, Else clauses on Loops. Functions: Defining Function, Default Argument, Keyword Argument, Arbitrary Arguments List.	Lectures Allotted 10 10
II	Introduction: Installing Python in Windows/Linux/Mac OS, Using Python interpreter, Execute a Script, Structuring with Indentation, Editors. Data types and Variables: Variables, Variables v/s identifiers, Naming convention of variables, Keywords. Data Structure: List, Tuples, Sets, Dictionaries Input And Output:Input function, Input with raw input(),Output with old string format, Python format function Control Flow: If/Else Statements, For/while Statements, Range() function, Break and continue statements, Else clauses on Loops. Functions: Defining Function, Default Argument, Keyword Argument, Arbitrary Arguments List. File Handling: Reading from the file, Writing to the file, Methods of file	Lectures Allotted 10 10
II	 Introduction: Installing Python in Windows/Linux/Mac OS, Using Python interpreter, Execute a Script, Structuring with Indentation, Editors. Data types and Variables: Variables, Variables v/s identifiers, Naming convention of variables, Keywords. Data Structure: List, Tuples, Sets, Dictionaries Input And Output:Input function, Input with raw input(),Output with old string format, Python format function Control Flow: If/Else Statements, For/while Statements, Range() function, Break and continue statements, Else clauses on Loops. Functions: Defining Function, Default Argument, Keyword Argument, Arbitrary Arguments List. File Handling: Reading from the file, Writing to the file, Methods of file objects. 	Lectures Allotted 10
II	 Introduction: Installing Python in Windows/Linux/Mac OS, Using Python interpreter, Execute a Script, Structuring with Indentation, Editors. Data types and Variables: Variables, Variables v/s identifiers, Naming convention of variables, Keywords. Data Structure: List, Tuples, Sets, Dictionaries Input And Output:Input function, Input with raw input(),Output with old string format, Python format function Control Flow: If/Else Statements, For/while Statements, Range() function, Break and continue statements, Else clauses on Loops. Functions: Defining Function, Default Argument, Keyword Argument, Arbitrary Arguments List. File Handling: Reading from the file, Writing to the file, Methods of file objects. Error And Expectation: Syntax Errors, Exceptions, Handling 	Lectures Allotted 10 10
II III	Introduction: Installing Python in Windows/Linux/Mac OS, Using Python interpreter, Execute a Script, Structuring with Indentation, Editors. Data types and Variables: Variables, Variables v/s identifiers, Naming convention of variables, Keywords. Data Structure: List, Tuples, Sets, Dictionaries Input And Output:Input function, Input with raw input(),Output with old string format, Python format function Control Flow: If/Else Statements, For/while Statements, Range() function, Break and continue statements, Else clauses on Loops. Functions: Defining Function, Default Argument, Keyword Argument, Arbitrary Arguments List. File Handling: Reading from the file, Writing to the file, Methods of file objects. Error And Expectation: Syntax Errors, Exceptions, Handling Exceptions (try, except).	Lectures Allotted 10 10 10
II	Introduction:Installing Python in Windows/Linux/Mac OS, Using Python interpreter, Execute a Script, Structuring with Indentation, Editors.Data types and Variables:Variables, Variables v/s identifiers, Naming convention of variables, Keywords.Data Structure:List, Tuples, Sets, DictionariesInput And Output:Input function, Input with raw input(),Output with old string format, Python format functionControl Flow:If/Else Statements, For/while Statements, Range() function, Break and continue statements, Else clauses on Loops.Functions:Defining Function, Default Argument, Keyword Argument, Arbitrary Arguments List.File Handling:Reading from the file, Writing to the file, Methods of file objects.Error And Expectation:Syntax Errors, Exceptions, Handling Exceptions (try, except).Module:Creating Modules, import a module, Import the names,	Lectures Allotted 10 10 10



		Transforming Education System, Transf	orming Lives	Section 2f & 12B		
		Advanced Modules: Regular Expressions, date time - date and t	ime	10		
	V	libraries, Dealing with Excel, GUI, Web Scrapping.				
	V	Advanced Modules: Regular Expressions ϖ date time - date and time				
		libraries. Dealing with Excelt GUIt Web Scrapping				
Те	xt Books					
1.	Python	Cook book Author: By David Beazley and Brian K. Jones				
2.	The Pyt	hon Book: The Ultimate Guide to Coding with Python by Aaron Asadi	i (ed.)			
3.	Function	nal Programming in Python Author: David Mertz				
Re	ference:					
1.	Python-	(Mark Lutz)				
2.	Python '	Training guide (BPB Publications)				
		Evaluation/Assessment Methodology				
			Max.	Marks 100		
1)	Class ta	sks/Sessional Examination		15		
2)	Presenta	ations/Seminar				
3)	Assignm	nents		10		
4)	Researc	h Project Report				
5)	Seminar	On Research Project Report				
6)	ESE			75		
		Total:		100		
P	rerequisit	es for the course: Data Mining				
С	ourse Le	earning Outcomes:				
	CO1:	The course is designed to provide Basic knowledge of Python.				
		Interpret the fundamental Python syntax and semantics and be fluent control flow statements.	in the	use of Python		
	CO3:	Express proficiency in the handling of strings and functions.				
		Identify the commonly used operations involving file systems and reg	ular exp	pressions.		
	CO5:	Articulate the Object-Oriented Programming concepts such as encap and polymorphism as used in Python.	-			



IIMTU-NEP IMPLEMENTATION Year- II / Semester -IV

Progra	amme:UG		Year:II	
Class:		1	Semester:IV	
Credit		Subject: Python Pr	rogramming Lab	
	Theory: 0			
Practi				
	e Code:	Title:Python Prog	ramming Lab	
	NEP-406P			
	e Objectives			
			programming basics and various Operators	s of Python
1 0	mming Lang			
		•	structures like Lists, Tuples, Sets and dictionari	
			lodules and Regular Expressions in Python Bro	gramming.
	e of Paper:			
	num Passing	g Marks/Credits: 50	% Marks	
L:0				
T:0				
	Hours/Week	·		
-	y - 1 Hr. = 1			
		Credit(4Hrs./Week=4	(Credits)	
Unit	Contents			No. of
				Lectures
T	XX7 •	1 1 1	1 .1	Allotted
I	1.0	A	hether a given number is even or odd.	1
II			integers values taken from user.	1
III		thon script to calculate	ate area of circle where radius is taken from	1
	user.			
IV	-	<u> </u>	tent of one file to another file.	1
V			the sum of series: $1 + 1/2 + 1/3$.	1
VI	_		of n natural numbers.	1
VII		gram to find factorial	0	1
VIII			a given number is Armstrong number or not.	1
IX			and computes the prime factors of the integer.	1
Х	-	check whether a give	en number is a palindrome.	1
TextB				
			hon",B.P.B. Publications.	
	ark Summer	field, "Programming	in Python.	
		, , , , , , , , , , , , , , , , , , , ,	- - - - - - - - - -	
3. A (Complete Int	roduction to the Pyth	on Language", Pearson Education.	
3. A G	Complete Internet	-		
3. A Refere 1. Ma	Complete Int e nce: ark Lutz,"Pro	ogramming Python",	D'Reilly Media.	
 A (Reference Material Weiter 	Complete Int ence: ark Lutz,"Pro esley J.Chun	ogramming Python",	D'Reilly Media. mming", Prentice Hall.	



Evaluation/Assessment Methodology			
	Max. Marks:50		
1) Class tasks/ Sessional Examination	25		
2) Presentations /Seminar			
3) Assignments			
4) Research Project Report			
5) ESE	25		
Total:	50		

Course Learning Outcomes:

CO1: Student should be able to understand the basic concepts of scripting and the contributions of scripting language.

CO2: Ability to explore python data structures like Lists, Tuples, Sets and dictionaries.

CO3: Ability to create practical and contemporary applications using Functions, Modules and Regular Expressions.



IIMTU-NEP IMPLEMENTATION Year- II / Semester -IV

Program	me: UG	Year: II	
Class: B	CA	Semester: IV	
Credits		Subject: Software Engineering Lab	
Practical	: 2		
Course (Code:	Title: Software Engineering Lab	
BCA-NE	EP-405P		
Course (Objectives:		
Identify a	ambiguities,	, inconsistencies and incompleteness from a requirements specification	and state
functiona	al and non-fu	unctional requirement	
	of Paper: Co		
Minimu	m Passing N	Marks/Credits: 50% Marks	
L:0			
T:0			
•	ours/Week)		
	1 Hr. = 1 Cr		
		redit(4Hrs./Week=4Credits)	
Unit	Contents		No. of
			Lectures
Ι	Drow the	use area diagram and specify the role of each of the actors. Also	Allotted 2
1		use case diagram and specify the role of each of the actors. Also recondition, post condition and function of each use case	2
II		on of Software Requirement Specification Document, Design	2
11	Document		2
III		he classes. Classify them as weak and strong classes and draw the	2
111	class diag		-
IV	0	on of Software Configuration Management and Risk Management	2
	related do	e e	_
V		usage of any Design phase CASE tool	2
VI		SRS document in line with the IEEE recommended standards.	2
VII	-	est cases for unit testing and integration testing	2
VIII		est cases for various white box and black box testing techniques.	2
IX	Draw the a	activity diagram	2
Х		state chart diagram.	
Reference	ce / Text Bo		
1. RS P	ressman, So	oftware Engineering: A Practitioners Approach, McGraw Hill.	
2. Panka	aj Jalote, So	oftware Engineering, Wiley	
		lamentals of Software Engineering, PHI Publication.	
		nd Yogesh Singh, Software Engineering, New Age International Publ	
	urse is availa	able as Generic Elective then the students of following departments ma	ay opt it.
NTA			

NA



Evaluation/Assessment Methodology	
	Max. Marks:50
1) Class tasks/ Sessional Examination	25
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	
Seminar On Research Project Report	
5) ESE	25
Total:	50
Course Learning Outcomes:	
Student will be able to:	
CO1: Draw a class diagram after identifying classes and association among th	ie
CO2: Graphically represent various UML diagrams, and associations amon	

logical sequence of activities undergoing in a system, and represent them pictorially CO3: Able to use modern engineering tools for specification, design, implementation and testing CO4: Develop test cases for various white box and black box testing techniques.



IIMTU-NEPIMPLEMENTATION Year- III / Semester –V

Progra	amme: De	egree	Year: III	
Class:		C	Semester: V	
Credit	s	Subject: Big Data		
Theory	/:4Cr	v c		
Course	e Code:	Title: Big Data		
BCA-N	NEP-503			
	e Objectiv			
		5 5	Data Analytics concepts and its applications in bus	iness.
			onents of Map Reduce Framework and HDFS.	
		ueries in No SQL envi		
			ap Reduce based distributed processing applicatio	ns.
	<u> </u>		plications using HBASE, Pig etc.	
	_	: Discipline Specific E ng Marks/Credits:40		
L:4	Iuni Fassi	ing marks/Creuits:40	70 Marks	
T:0				
	Hours/We	ek)		
`	-1Hr.=1C	·		
Unit			Contents	No. of
				Lectures
				Allotted
Ι			es of digital data, history of Big Data innovation,	8
		e 1	orm, drivers for Big Data, Big Data architecture	
			ig Data, Big Data technology components, Big	
	-		ons, Big Data features – security, compliance,	
			Data privacy and ethics, Big Data Analytics,	
			stems, intelligent data analysis, nature of data,	
II			alysis vs reporting, modern data analytic tools. framework and basics, how Map Reduce	8
11			ce application, unit tests with MR unit, test data	0
		1 0 1	Map Reduce job run, failures, job scheduling,	
		•	on, Map Reduce types, input formats, output	
			Real-world Map Reduce.	
III		A	ile System): Design of HDFS, HDFS concepts,	8
		A	zes, block sizes and block abstraction in HDFS,	
	data repl	ication, how does HDI	FS store, read, and write files, Java interfaces to	
	HDFS, c	ommand line interface	, Hadoop file system interfaces, data flow, data	
	ingest w	ith Flume and Scoop	, Hadoop archives, Hadoop I/O: Compression,	
			ed data structures. Hadoop Environment: Setting	
			ecification, cluster setup and installation, Hadoop	
		ation, security in Hadoo		
IV	-	•	RN: Hadoop ecosystem components, schedulers,	8
		1 1 1	New Features – Name Node high availability,	
			N, Running MRv1 in YARN.	
	_	Databases: Introductio	on to No SQL Mongo DB: Introduction, data	
	types,			



Transforming Education System,	Transforming Lives Section 2f & 12B
creating, updating and deleing documents, querying, introduction to i	ndexing,
capped collections	-
V Hadoop Eco System Frameworks: Applications on Big Data using	g Pig, Hive 8
and HBase.	
Pig: Introduction to PIG, Execution Modes of Pig, Comparis	on of Pig
withDatabases, Grunt, Pig Latin, User Defined Functions, Data	Processing
operators,	
HBase – Hbase concepts, clients, example, Hbase vs RDBMS, advar	nced usage,
schema design, advance indexing, Zookeeper – how it helps in m	onitoring a
cluster, how to build applications with Zookeeper. IBM Big Da	ta strategy,
introduction to Infosphere, BigInsights and Big Sheets, introduction t	o Big SQL.
Text Book:	·
1. 1. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Bi	g Analytics: Emerging
2. Business Intelligence and Analytic Trends for Today's Businesses", Wiley	·. · · · · ·
3. Big-Data Black Book, DT Editorial Services, Wiley.	
Reference Book:	
1. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons	
2. Pete Warden, "Big Data Glossary", O'Reilly	
Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report/Seminar on Research Project Report	10
5) ESE	75
Total:	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO1: Able to understand the concept of HDFS and map reduce.	
CO2: Able to gather large data from a range of data sources.	
CO3: Able to understand the Hadoop ecosystem components	
CO4: Able to explain the architecture of pig and hive with different opera	ations.
CO5: Able to understand the importance and challenges of big data.	



IIMTU-NEPIMPLEMENTATION Year- III / Semester –V

Semester: V Credits Subject: Data communication network Theory:4Cr Course Code: Title: Data communication network BCA-NEP-503 Course Code: Title: Data communication network COurse Code: Course Objectives: COI: To introduce the various layers of OSI Model. CO3: To introduce UDP and TCP Models. CO4: To identify various application layer protocols. CO5: To demonstrate the TCP/IP and OSI models Nature of Paper: DSE Minimum Passing Marks/Credits:40% Marks I:4 T:0 Profin Hours/Week) Theory:-IHr.=1Credit Practical-2Hrs.=1Credit(4Hrs./Week=4Credits) No. of Lectures Allotted I Data Communications: Components – Direction of Data flow – Networks – 10 10 Components and Categories – Types of Connections – Topologies Protocols and Standards – ISO / OSI model, Example Networks such as ATM, Frame Relay, Transmission modes, Multiplexing, Transmission Media, Switching, Circuit Switched Networks II Data link layer: Introduction, Framing, and Error – Detection and Correction and Correction an torection. Traffic, Congestion Control, work ALOHA, CSMA	Program	nme: Deg	ree	Year: III	
Theory:4Cr Title: Data communication network BCA-NEP-503 Course Objectives: COI: To introduce the various types of computer networks. CO2: To explore the various types of COSI Model. CO3: To introduce UDP and TCP Models. CO4: To identify various application layer protocols. CO3: To introduce UDP and TCP Models. CO4: To identify various application layer protocols. CO3: To introduce UDP and TCP Models. CO5: To demonstrate the TCP/IP and OSI models Nature of Paper: DSE Minimum Passing Marks/Credits:40% Marks L:4 T:0 P:0(In Hours/Weck) Theory-1Hr.=1Credit Practical-2Hrs.=1Credit(4Hrs./Week=4Credits) No. of Lectures Allotted Unit Contents No. of Lectures Allotted I Data Communications: Components – Direction of Data flow – Networks – 10 10 Components and Categories – Types of Connections – Topologies –Protocols and Standards – ISO / OSI model, Example Networks such as ATM, Frame Relay, Transmission modes, Multiplexing, Transmission Media, Switching, Circuit Switched Networks 10 II Data link layer: Introduction, Framing, and Error – Detection and Correction – Parity – LRC – CRC Hamming code, Flow and Error Control, , HDLC, Point to Point Protocols, ALOHA, CSMA/CD, LAN – Ethernet IEEE 802.3, IEEE 802.5 – IEEE 802.11, Random access, Controlled access, Channelization. IIII <t< th=""><th>0</th><th>U</th><th></th><th></th><th></th></t<>	0	U			
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Course Code: BCA-NEP-S03 Title: Data communication network BCA-NEP-S03 Course Objectives: CO: Course Objectives: CO1: To introduce the various layers of OSI Model. CO2: CO2: To explore the various application layer protocols. CO4: To identify various application layer protocols. CO5: To demonstrate the TCP/IP and OSI models Nature of Paper: DSE Minimum Passing Marks/Credits:40% Marks L:4 T:0 P:0(In Hours/Week) Theory-IHr.=1Credit Practical-2Hrs.=1Credit(4Hrs./Week=4Credits) Vinit Contents I Data Communications: Components – Direction of Data flow – Networks – Components and Categories – Types of Connections – Topologies –Protocols and Standards – ISO / OSI model, Example Networks such as ATM, Frame Relay, Transmission modes, Multiplexing, Transmission Media, Switching, Circuit Switched Networks 10 II Data link layer: Introduction, Framing, and Error – Detection and Correction 10 10 - Parity – LRC – CRC Hamming code, Flow and Error Control, , HDLC, Point to Point Protocols. ALOHA, CSMA/CD, LAN – Ethernet IEEE 802.3, IEEE 802.5 – IEEE 802.11, Random access, Controlled access, Channelization. 10 III Transport Layer: Process to Process Delivery, UDP and TCP protocols, Data Traffic, Congestion, Congestion Control, QoS, Integrated Services, 10 IV Network layer: Logical Addressing, Internetworking, Address mapping, ICM	Theory:		0		
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Theory-IHr.=1Credit Practical-2Hrs.=1Credit(4Hrs./Week=4Credits) No. of Lectures Allotted I Data Communications: Components – Direction of Data flow – Networks – Components and Categories – Types of Connections – Topologies –Protocols and Standards – ISO / OSI model, Example Networks such as ATM, Frame Relay, Transmission modes, Multiplexing, Transmission Media, Switching, Circuit Switched Networks 10 II Data link layer: Introduction, Framing, and Error – Detection and Correction – Parity – LRC – CRC Hamming code, Flow and Error Control, , HDLC, Point to Point Protocols. ALOHA, CSMA/CD, LAN – Ethernet IEEE 802.3, IEEE 802.5 – IEEE 802.11, Random access, Controlled access, Channelization. 10 III Transport Layer: Process to Process Delivery, UDP and TCP protocols, Data Traffic, Congestion, Congestion Control, QoS, Integrated Services, 10 IV Network layer: Logical Addressing, Internetworking, Address mapping, ICMP, IGMP, Forwarding, Uni-Cast Routing Protocols, Multicast Routing Protocols. 10 V Application Layer: Domain name space, DNS in internet, electronic mail, SMTP, FTP, WWW, HTTP, SNMP. 10 Text Books: 1. Data Communications and Networking, Behrouz A. Farozan, Fourth Edition TMH, 2006.	T:0				
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Image:		l-2Hrs.=10	Credit(4Hrs./Week=4		
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Components and Categories – Types of Connections – Topologies –Protocols and Standards – ISO / OSI model, Example Networks such as ATM, Frame Relay, Transmission modes, Multiplexing, Transmission Media, Switching, Circuit Switched Networks10IIData link layer: Introduction, Framing, and Error – Detection and Correction Parity – LRC – CRC Hamming code, Flow and Error Control, , HDLC, Point to Point Protocols. ALOHA, CSMA/CD, LAN – Ethernet IEEE 802.3, IEEE 802.5 – IEEE 802.11, Random access, Controlled access, Channelization.10IIITransport Layer: Process to Process Delivery, UDP and TCP protocols, Data Traffic, Congestion, Congestion Control, QoS, Integrated Services,10IVNetwork layer: Logical Addressing, Internetworking, Address mapping, ICMP, IGMP, Forwarding, Uni-Cast Routing Protocols, Multicast Routing Protocols.10VApplication Layer: Domain name space, DNS in internet, electronic mail, SMTP, FTP, WWW, HTTP, SNMP.10Text Books: 1. Data Communications and Networking, Behrouz A. Farozan, Fourth Edition TMH, 2006.					
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Relay, Transmission modes, Multiplexing, Transmission Media, Switching, Circuit Switched Networks 10 II Data link layer: Introduction, Framing, and Error – Detection and Correction – Parity – LRC – CRC Hamming code, Flow and Error Control, , HDLC, Point to Point Protocols. ALOHA, CSMA/CD, LAN – Ethernet IEEE 802.3, IEEE 802.5 – IEEE 802.11, Random access, Controlled access, Channelization. 10 III Transport Layer: Process to Process Delivery, UDP and TCP protocols, Data Traffic, Congestion, Congestion Control, QoS, Integrated Services, 10 IV Network layer: Logical Addressing, Internetworking, Address mapping, ICMP, IGMP, Forwarding, Uni-Cast Routing Protocols, Multicast Routing Protocols. 10 V Application Layer: Domain name space, DNS in internet, electronic mail, SMTP, FTP, WWW, HTTP, SNMP. 10 Text Books: 1. Data Communications and Networking, Behrouz A. Farozan, Fourth Edition TMH, 2006.					
Circuit Switched Networks 10 II Data link layer: Introduction, Framing, and Error – Detection and Correction – Parity – LRC – CRC Hamming code, Flow and Error Control, , HDLC, Point to Point Protocols. ALOHA, CSMA/CD, LAN – Ethernet IEEE 802.3, IEEE 802.5 – IEEE 802.11, Random access, Controlled access, Channelization. 10 III Transport Layer: Process to Process Delivery, UDP and TCP protocols, Data Traffic, Congestion, Congestion Control, QoS, Integrated Services, 10 IV Network layer: Logical Addressing, Internetworking, Address mapping, ICMP, IGMP, Forwarding, Uni-Cast Routing Protocols, Multicast Routing Protocols. 10 V Application Layer: Domain name space, DNS in internet, electronic mail, SMTP, FTP, WWW, HTTP, SNMP. 10 Text Books: 1. Data Communications and Networking, Behrouz A. Farozan, Fourth Edition TMH, 2006.				· · · · · · · · · · · · · · · · · · ·	
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- Parity – LRC – CRC Hamming code, Flow and Error Control, , HDLC, Point to Point Protocols. ALOHA, CSMA/CD, LAN – Ethernet IEEE 802.3, IEEE 802.5 – IEEE 802.11, Random access, Controlled access, Channelization. III Transport Layer: Process to Process Delivery, UDP and TCP protocols, Data Traffic, Congestion, Congestion Control, QoS, Integrated Services, IV Network layer: Logical Addressing, Internetworking, Address mapping, ICMP, IGMP, Forwarding, Uni-Cast Routing Protocols, Multicast Routing Protocols. V Application Layer: Domain name space, DNS in internet, electronic mail, SMTP, FTP, WWW, HTTP, SNMP. Text Books: 1. Data Communications and Networking, Behrouz A. Farozan, Fourth Edition TMH, 2006.					
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Traffic, Congestion, Congestion Control, QoS, Integrated Services, IV Network layer: Logical Addressing, Internetworking, Address mapping, IO ICMP, IGMP, Forwarding, Uni-Cast Routing Protocols, Multicast Routing Protocols. 10 V Application Layer: Domain name space, DNS in internet, electronic mail, SMTP, FTP, WWW, HTTP, SNMP. 10 Text Books: 1. Data Communications and Networking, Behrouz A. Farozan, Fourth Edition TMH, 2006.					
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ICMP, IGMP, Forwarding, Uni-Cast Routing Protocols, Multicast Routing Protocols. V Application Layer: Domain name space, DNS in internet, electronic mail, 10 SMTP, FTP, WWW, HTTP, SNMP. Text Books: 1. Data Communications and Networking, Behrouz A. Farozan, Fourth Edition TMH, 2006.		Traffic, O	Congestion, Congesti	on Control, QoS, Integrated Services,	
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Protocols. Protocols. V Application Layer: Domain name space, DNS in internet, electronic mail, 10 SMTP, FTP, WWW, HTTP, SNMP. 10 Text Books: 1. Data Communications and Networking, Behrouz A. Farozan, Fourth Edition TMH, 2006.	- '			e e in e	10
V Application Layer: Domain name space, DNS in internet, electronic mail, 10 SMTP, FTP, WWW, HTTP, SNMP. 10 Text Books: 1. Data Communications and Networking, Behrouz A. Farozan, Fourth Edition TMH, 2006.			0		
SMTP, FTP, WWW, HTTP, SNMP. Text Books: 1. Data Communications and Networking, Behrouz A. Farozan, Fourth Edition TMH, 2006.	V			name space. DNS in internet, electronic mail	10
Text Books: 1. Data Communications and Networking, Behrouz A. Farozan, Fourth Edition TMH, 2006.	, , , , , , , , , , , , , , , , , , ,				10
1. Data Communications and Networking, Behrouz A. Farozan, Fourth Edition TMH, 2006.	Text Be	,	_ , , , , ,		l
			ications and Network	ing, Behrouz A. Farozan. Fourth Edition TMH. 20	06.
2. 2. Computer Networks, Andrew S Tanenbaum, 4 th Edition. Pearson Education, PHI.					



Reference:

- 1. Data communications and Computer Networks, P.C. Gupta, PHI.
- An Engineering Approach to Computer Networks, S. Keshav, 2ndEdition, Pearson Education.
 Computer Networking: A Top-Down Approach Featuring the Internet. James Kurose& Kei Computer Networking: A Top-Down Approach Featuring the Internet. James Kurose& Keith W. Ross, 3rdEdition, Pearson Education.

Ross, 5 Edition, 1 earson Education.	
Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO1. Students should understand and explore the basics of Computer Net	works and Various
Protocols.	
CO2. Students will be in a position to administrate a network and flow of infor	mation.
CO3. Able to understand the World Wide Web Concepts.	
CO4. Able to understand the concepts of network security	

CO5. Able to secure device from network issues.



IIMTU-NEP IMPLEMENTATION Year- III / Semester -V

Programme: Deg	gree	Year: III	
Class: BCA	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	Semester: V	
Credits	Subject:Web Technol	ogies	
Theory:4Cr			
Course Code:	Title: Web Technolog	jies	
BCA-NEP-502			
Course Objectiv		its alamants and attributes	
•	10	its elements and attributes.	
	1 0 0	and Cascading Style Sheets. avaScript (Client-side programming).	
•	AL documents and Sche		
		nd implement static and dynamic website.	
Nature of Paper		in implement state and dynamic website.	
A	g Marks/Credits: 40%	6 Marks	
L:4			
T:0			
P:0(In Hours/Wee	ek)		
Theory - 1 Hr. = 1			
•	1Credit(4Hrs./Week=40	Credits)	
Unit Conter	nts		No. of
			Lectures
			Allotted
Resour Comm Messag and M	ce Locator(URL unication; Web Serve ge-Response Message; `	bsite, Web Browser, Internet Address, Uniform b), Web Essentials: Clients, Servers, and ers-Apache, IIS, Proxy Server, HTTP Request Web Hosting, TCP/IP Protocol Suite, Installation IIS/XAMPP/LAMP, Browser Architecture and	10
Hyperl		ormatting and Fonts, Commenting Code, Color, ages, Forms, XHTML, Meta Tags, Character ts, Audio andVideo.	10
III Cascad Syntax	ling Style Sheets (CS and Structure, Using C	S): Need for CSS, Introduction to CSS, Basic CSS, Background Images, Colors and Properties, rders and Boxes, Margins, Padding, Lists	10
Elemen Docum DTD, V XML o XSL a	tt Markup, Attribute M ent Type Definitions (Well Formed XML Do locument using a DTE	s, XML Document Structure, XML Markups- larkup, Naming Rules, Components, Comments, DTD)– Internal and External DTD, Developing cuments, Valid XML Documents, Validating an D, XML Schema, Displaying XML Documents, espaces, XML DOM, Extensible Style sheet SLT).	10
Types,	JavaScript Objects, Con ent and Its Associated	ent-Side JavaScript, Server-Side JavaScript, Data ntrol Structures, Function, Operators, Statements, Objects, Events and Event Handlers, JavaScript	10
		", Packt Publishing.	



- 2. Suehring "Java Script Step by Step", Prentice Hall India Learning Private Limited.
- 3. Behrouz A. Forouzan, "Data Communication and Networking", Tata McGraw Hill.

Reference

- 1. A.S.Tanenbaum, "Computer Networks", Pearson Education Asia.
- 2. Uttam Kumar Roy, "Web Technologies", Oxford University Press.
- 3. Raj Kamal, "Internet and Web Technologies", Tata McGraw Hill.

	Evaluation/Assessment Methodology	
		Max. Marks 100
1) Cla	ass tasks/ Sessional Examination	15
2) Pre	esentations /Seminar	
3) As	signments	
4) Re	search Project Report	10
Se	minar On Research Project Report	
5) ES	SE	75
	Total:	100
Prereq	uisites for the course: NIL	
Cours	e Learning Outcomes:	
CO1	Describe and differentiate different Web Extensions and Web Services.	
CO2:	Apply fundamental computer theory to basic programming techniques a to maintain web server services required to host a website.	and fundamental skills
CO3:	Select and apply markup languages for processing, identifying, and pre- in web pages.	senting of information
CO4:	Use scripting languages and web services to transfer data and add inte web pages.	ractive components to
CO5·	Create and manipulate web media objects using editing software	

CO5: Create and manipulate web media objects using editing software.



IIMTU-NEP IMPLEMENTATION Year- III / Semester -V

Progran	nme: De	gree Year: III	
Class: B	CA	Semester: V	
Credits		Subject:Design and analysis of algorithms	
Theory:	4Cr		
Course	Code:	Title: Design and analysis of algorithms	
BCA-NE	EP-501		
Course	Objectiv	es:	
	•	the asymptotic performance of algorithms.	
		gorous correctness proofs for algorithms.	
		portant algorithmic design paradigms and methods of analysis	
		rate a familiarity with major algorithms and data structures.	
		e efficient algorithms in common engineering design situations	
Nature of	-		
	m Passir	ng Marks/Credits: 40% Marks	
L:4			
T:0			
P: 0 (In I			
Theory -			
	1	1 Credit (4Hrs./Week=4Credits)	NI. C
Unit	Conter	Its	No. of
			Lectures
Ι			Allotted 8
1	Introd		0
	U	hms, Analyzing Algorithms, Complexity of Algorithms, Growth of	
	Functio	ons	
II	Algorit	thm Design Techniques	8
	Divide	and Conquer, Greedy Algorithms	
		ic Programming : Dijikstra Algorithm, Warshal Algorithm,	
III	Ť		8
111	Sorting	g and Searching Techniques:	0
	Elemen	tary sorting techniques-Bubble Sort, InsertionSort, Merge Sort,	
	Advanc	ced Sorting techniques - Heap Sort, Quick Sort, Sorting in Linear Time -	
	Bucket	Sort, Radix Sort and Count Sort, Searching Techniques, Comparison of	
	Sorting	Algorithms	
IV	Advan	ced data structures: Basic terminology used with Tree, Binary Trees,	8
	Red bla	ack trees, B- trees	
V	Graph	s:	8
	Graph	Algorithms–Breadth First Search Depth First Search and	
	Graph its App	Algorithms–Breadth First Search, Depth First Search and lications, Minimum Spanning Trees.	



Text Books:

1. T.H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", PHI

Reference

1. Sarabasse& A.V. Gelder, "Computer Algorithm – Introduction to Design and Analysis", Pearson Evaluation/Assessment Methodology

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO 1: Able to Analyze worst-case running times of algorithms using asyr	nptotic analysis.

CO 2: Able to describe the divide-and-conquer paradigm.

CO 3: Able to analyze various searching and sorting algorithms.

CO 4: Able to implement various sorting techniques.

CO 5: Able to explain the major graph algorithms and their analyses.



IIMTU-NEP IMPLEMENTATION Year- III / Semester -V

Programme: Degree		Year:III		
Class:BCA Semester:V				
Credits Subject:ERP				
	Theory:4Cr			
Practica				
Course		RP		
BCA-N				
	Objectives:			
CO1:	: To provide a contemporary and forward-looking on the theory and practice of Enterprise Resource Planning Technology.			
CO2:	D2: To focus on a strong emphasis upon practice of theory in Applications and Practica			
	oriented approach.			
CO3:	To train the stude	nts to develop the basic understanding of how ERF	P enriches the business	
	organizations in a	chieving a multidimensional growth.		
CO4:	To develop a proc	ess driven thinking towards business processes.		
CO5:	1 1	ing the students technological competitive and mal	ke them ready to self-	
	upgrade with the	nigher technical skills.		
Nature	of Paper: DSE			
Minimu	m Passing Marks	/Credits:40% Marks		
L:4				
T:0				
P:0(In H	lours/Week)			
Theory	-1 Hr. = 1 Credit			
Practica	I- 2 Hrs.=1Credit(4	Hrs./Week=4Credits)		
Unit		Contents	No. of	
Ι	T 4 T 4 C 4		Lectures Allotted	
1	Introduction to	FRP: Evolution of ERP: what is ERP? Reaso	Allotted	
1	Growth of ERF	ERP: Evolution of ERP; what is ERP?, Reaso c; Scenario and Justification of ERP in India;. Eva Iodules of ERP;. Advantage of ERP.	Allottedons for the8	
II	Growth of ERF ERP; Various M	; Scenario and Justification of ERP in India;. Eva Iodules of ERP;. Advantage of ERP.	Allotted ons for the 8 duation of	
II	Growth of ERF ERP; Various M An Overview Management In for Make to Or	r; Scenario and Justification of ERP in India;. Eva Iodules of ERP;. Advantage of ERP. of Enterprise: An Overview of Enterprise;. formation; Business Modeling; ERP for Small Busin der Companies;. Business Process Mapping for ER	Allottedons for the aluation ofIntegrated ness;. ERP CP Module	
II	Growth of ERF ERP; Various M An Overview Management In for Make to Or Design;. Hardw ERP and Relate Process Reenging Executive Info	r; Scenario and Justification of ERP in India;. Eva Iodules of ERP;. Advantage of ERP. of Enterprise: An Overview of Enterprise;. formation; Business Modeling; ERP for Small Busin der Companies;. Business Process Mapping for ER are Environment and its Selection for ERP Impleme red Technologies: ERP and Related Technologies; neering (BPR);. Management Information System rmation System (EIS); Decision support System	Allottedons for the aluation ofIntegrated ness;. ERP 2P Module ntation Business m (MIS);.	
	Growth of ERF ERP; Various M An Overview Management In for Make to Or Design;. Hardw ERP and Relat Process Reenge Executive Info Supply Chain M ERP Market: People Soft, JD	 c; Scenario and Justification of ERP in India;. Evaluation of ERP;. Advantage of ERP. doules of ERP;. Advantage of ERP. dof Enterprise: An Overview of Enterprise;. formation; Business Modeling; ERP for Small Busin der Companies;. Business Process Mapping for ER are Environment and its Selection for ERP Impleme and Technologies: ERP and Related Technologies; neering (BPR);. Management Information System (EIS); Decision support System Information System (EIS); Decision support System Information, SAP AG, Baan Company, Oracle Con Edwards World Solutions Co, System Software AAD; A Comparative Assessment and Selection 	Allottedons for the uluation ofIntegrated ness;. ERP P Module ntationBusiness m (MIS);. n (DSS);.orporation, Associates,	



Text Books:			
1. Daniel E.O' Leary, Enterprise Resource Planning Systems, Cambridge University Press, 2002.			
2. Ellen Monk, Bret Wagner, Concepts in Enterprise resource planning, Cengage learning, Third			
edition, 2009.			
Reference			
1. Enterprise Resource Planning – Alexis Leon – Second Edition – TMH			
2. Manufacturing Resource Planning (MRP II) with Introduction to ERP	; SCM; an CRM by Khalid		
Sheikh, Publisher: McGraw-Hill			
Evaluation/Assessment Methodology			
	Max. Marks 100		
1) Class tasks/ Sessional Examination	15		
2) Presentations /Seminar			
3) Assignments			
4) Research Project Report 10			
Seminar On Research Project Report			
5) ESE 75			
Total: 100			
Prerequisites for the course: Problem Solving using C			
Course Learning Outcomes:			
CO1: Make basic use of Enterprise software, and its role in integrating business functions			
CO2: Analyze the strategic options for ERP identification and adoption.			
CO3: Design the ERP implementation strategies.			
CO4: Analyze the strategic options for ERP identification and adoption.			
CO5: Create reengineered business processes for successful ERP implementation.			

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IIMTU-NEP IMPLEMENTATION Year- III / Semester -V

Programm		Year: III			
Class:BCA		Semester:V			
Credits					
Theory: 0		Subject: DESIGN AND ANALYSIS OF ALGORITHM LAB			
Practical: 2					
Course Co					
	ourse Code: Title:DESIGN AND ANALYSIS OF ALGORITHM LAB CA-NEP-504P				
Course O	bjectives				
CO1: Desi	gn algori	thms using divide and conquer, greedy and dynamic programming			
		performance of merge sort and quick sort algorithms using divide	and conquer		
technique.			-		
CO3: Exec	ute sorti	ng algorithms such as sorting, graph related and combinatorial algorith	ım in a high-		
level langu	lage.				
Nature of	Paper: (Core			
		Marks/Credits: 50% Marks			
L:0					
T:0					
P:4(In Hou	ırs/Week)			
Theory - 1	Hr. = 1 (Credit			
Practical-2	2 Hrs.=10	Credit(4Hrs./Week=4Credits)			
Unit	Conten	ts	No. of		
			Lectures		
			Allotted		
Ι	Implem	ent linear searching on a set of elements.	2		
II		given vertex in a weighted connected graph, find shortest paths to	2		
		ertices using Dijkstra's algorithm.			
III	Implem	ent 0/1 Knapsack problem using Dynamic Programming	2		
IV		iven set of elements using the Quick sort method	2		
V		ent a Merge Sort algorithm to sort a given set of elements.	2		
VI		linimum Cost Spanning Tree of a given undirected graph using	2		
		's algorithm.			
VII		ent All-Pairs Shortest Paths Problem using Floyd's algorithm.	2		
VIII	÷	ent N Queen's problem using Back Tracking.	2		
Reference	-		1		
		Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Intr	oduction to		
	hms", PH				
0	,	Evaluation/Assessment Methodology			
			x. Marks:50		
1) Class t	asks/ Ses	sional Examination 25			
/	tations /S				
3) Assign					
, 0	ch Projec	t Report			
	•	search Project Report			
5) ESE		25			
,					



Total: 50

Course Learning Outcomes:

After completing this course, the student will be able to:

CO1: Design an algorithm in a effective manner

CO2: Apply iterative and recursive algorithms. CO3: Design iterative and recursive algorithm.



IIMTU-NEP IMPLEMENTATION Year- III / Semester -V

Program	me: UG	Year: III		
Class: B	CA	Semester: V		
Credits		Subject: Web Technologies lab		
Practical	Practical: 2			
Course (Course Code: Title: Web Technologies lab			
BCA-NE	2P-505P			
	Objectives:			
		web pages using HTML.		
		c web pages using Javascript and XML.		
		rograms for window/web-based applications.		
	f Paper: Co			
	n Passing N	Aarks/Credits: 50% Marks		
L:0				
T:0				
,	ours/Week)			
	1 Hr. = 1 Cr			
		redit(4Hrs./Week=4Credits)		
Unit	Contents			No. of Lectures
				Allotted
Ι		ML/Java scripts to display your CV in navig	-	2
	Institute website, Department Website and Tutorial website for specific			
	subject.		1.11 1	2
Π		ITML program to design an entry form of student		2
TTT		tore at database server like SQL, Oracle or MS Ac		
III		grams using Java script for Web Page to display	/ browsers	2
TN 7	informatio		•	
IV		ava applet to display the Application Program	screen 1.e.	2
N/	calculator			2
V VI		o illustrate JDBC connectivity		$\frac{2}{2}$
V I	-	d implement a simple shopping cart example wi	iun session	2
VII	tracking A	tyle sheet in CSS/ XSL & display the document	in internet	2
V 11	explorer.	tyle sheet in CSS/ ASL & display the document	III IIIterinet	Z
VIII	•	Access Database, Create on ODBC link.		2
	create MS			۷
		ftware Engineering: A Practitioners Approach, Mc	Graw Hill	
 Pankaj Jalote, Software Engineering, Wiley Rajib Mall, Fundamentals of Software Engineering, PHI Publication. 				
•		nd Yogesh Singh, Software Engineering, New Age		l Publishers
7. N.N.	nggai wai a	nu Togesh Shigh, Software Englicering, New Age	mematiolla	u i ubiisiicis.



Evaluation/Assessment Methodology			
		Max. Marks:50	
1) Class tasks/ Sessional Examination	25		
2) Presentations /Seminar			
3) Assignments			
4) Research Project Report			
Seminar On Research Project Report			
5) ESE	25		
Total:	50		
Course Learning Outcomes:			
Student will be able to:			
CO1: Write Java programs for window/web-based applications.			
CO2: Develop static and dynamic web pages using HTML.			
CO3: Design dynamic web page using server site programming.			



IIMTU-NEP IMPLEMENTATION Year- III / Semester -VI

Progra	mmed: Degree	Year: III	
Class:B		Semester: VI	
Credits Subject: Artificial Intelligence			
	Theory:4Cr		
Practica			
Course		Title: Artificial Intelligence	
BCA-N			
	Objectives:		
CO1:	To understand about Artificial Intelligence, AI tasks and AI problem solving technique.		
CO2:		s Propositional logics, predicate Logic	
CO3:	To understand the concepts Semantics Net, Partitions Net, Conceptual Dependencies and Scripts		
CO4:	To understand conce	pts of Prolog and Implement the Prolog Program	
CO5:	To learning concepts	of Expert system and Learning.	
	of Paper: CORE		
	um Passing Marks/Ci	redits: 40% Marks	
L:4			
T:0			
	Hours/Week)		
-	-1 Hr. $= 1$ Credit	$W_{1} = 4C_{1} + 1$	
	l- 2 Hrs.=1Credit(4Hr	Contents	No. of
Unit		Contents	No. of Lectures
			Allotted
Ι	Introduction: Introd	luction to Artificial Intelligence, Task Domains of AI, AI	9
		n formulation, Production systems, Control strategies,	
	Search strategies, Problem characteristics, Production system characteristics,		
	Depth First Search, Breadth First Search, Heuristic Search (Hill Climbing, Best		
	First Search and Prob	blem Reduction).	
II		entation: Approaches, Types and Properties of Knowledge,	9
	Propositional Logic, Properties of Statements, Equivalence Law, Inference		
		redicate Logic, Properties of Wffs, Representation of Facts	
		cate Logic, Conversion to Clausal Forms, Unification and	
TTT		ctive Inference Methods, Rules.	•
III		dge Representation: Semantic Nets, Partitioned Semantic	9
		for Wffs and Predicate Logic, Property Inheritance ructures, Conceptual Dependencies and Scripts	
IV		, Facts, Rules, Variables, Operators, Control Structures,	9
1 V	0	king, Cuts, Recursion, Lists, Input/output and Streams,	7
	•	ntation of All Concepts in Prolog.	
V		ed and Justification of Expert System, Representing and	9
•		tific Knowledge, Knowledge Acquisition, Expert System	,
	• •	gine, Learning Procedure and Case Study of MYCIN.	
	-	ion, Rote Learning, Learning by Taking Advice, Learning	
)))))))))))))))))))))))))))))))))))))))		
	learning.		
	in ProblemSolving,	Learning from Example-Induction, Explanation Based	



Transforming Education	System, Transforming Lives Section 2f & 12B			
Text Books:				
1. Elaine Rich & Kevin Knight, "Artificial Intelligence", Tata McGraw Hill.				
Dan W. Patterson, "Introduction to Artificial Intelligence & Expert Systems", PHI.				
2. S. K. Sarkar, "Discrete Mathematics", S. Chand & Co.				
Referential Books				
1. Stuart J. Russell & Peter Norvig, "Artificial Intelligence-A Modern App	proach", Prentice Hall.			
2. George F. Luger, "Artificial Intelligence-Structures and Strategies for	Complex Problem Solving",			
Pearson Education.				
Evaluation/Assessment Methodology				
	Max. Marks 100			
1) Class tasks/ Sessional Examination	15			
2) Presentations /Seminar				
3) Assignments				
4) Research Project Report 10				
Seminar On Research Project Report				
5) ESE 75				
Total: 100				
Prerequisites for the course: Artificial Intelligence				
Course Learning Outcomes:				
CO 1: Learn about Artificial Intelligence, AI tasks and AI problem solving technique.				
CO 2: Learn study the concepts Propositional logics, predicate Logic.				
CO 3: Learn the concepts Semantics Net, Partitions Net, Conceptual Dependencies and Scripts				
CO 4: Learn concepts of Prolog and Implement the Prolog Program.				
CO 5: Learn concepts of Expert system and Learning.				



IIMTU-NEPIMPLEMENTATION Year- III / Semester –VI

Program	mme:Degree Year: III		
Class:B	CA Semester:VI		
Credits	Subject: Cyber Security		
Theory:4			
	Course Code: Title:Cyber Security		
BCA-NE			
	Objectives:		
	CO1: Understand the various tools and methods used in cybercrime.		
	CO2: Identify risk management processes, risk treatment methods, organization of information security.		
	Classify cyber security solutions and information assurance.		
	Examine software vulnerabilities and security solutions to reduce the risk of explo	oitation.	
CO5: 4	Analyze the cyber security needs of an organization.		
Nature of	of Paper: Core Course		
Minimu	m Passing Marks/Credits:40% Marks (ISE+ESE)		
L:4			
T:0			
	ours/Week)		
•	Hr.=1Credit		
-	-2Hrs.=1Credit(4Hrs./Week=4Credits)		
Unit	Contents	No. of	
		Lectures	
		Allotted	
Ι	Introduction to Ethical Hacking:Key issues plaguing the information	10	
	security world, incident management process, and penetration testing,		
	Footprinting and Reconnaissance: Various types of footprints, footprints		
тт	tools, and countermeasures.	10	
II	Scanning Network: Network scanning techniques and scanning countermeasure.	10	
		10	
III	Enumeration & Vulnerability Analysis: Enumeration techniques and enumeration countermeasure. Vulnerability Analysis using different tools.	10	
IV	System Hacking & Malware Threats: System Hacking Methodology,	10	
	Steganography, Steganalysis attacks and covering tracks. Different types of		
	Trojan, Trojan analysis and Trojan countermeasures, working of viruses,		
	Trojan, Trojan analysis and Trojan countermeasures, working of viruses, Virus analysis, computer worms, malware analysis procedure and		
	Trojan, Trojan analysis and Trojan countermeasures, working of viruses, Virus analysis, computer worms, malware analysis procedure and communication.		
V	Trojan, Trojan analysis and Trojan countermeasures, working of viruses, Virus analysis, computer worms, malware analysis procedure and	10	



Text BOOKS:				
1. 1.K. Kumar," Cyber Laws: Intellectual property & E Comm	herce, Security",1 st Edition,			
Dominant Publisher,2011.				
2. Rodney D. Ryder, "Guide To Cyber Laws", Second Edition, Wadhwa And Company, New				
Delhi, 2007.				
3. Information Security policy & implementation Issues, NIIT, PHI.				
Reference				
1. Vakul Sharma, "Handbook Of Cyber Laws" Macmillan India Ltd, 2 ⁿ				
2. Justice Yatindra Singh, "Cyber Laws", Universal Law Publishing, 1 ^s	^t Edition,New Delhi, 2003.			
Evaluation/Assessment Methodology				
	Max. Marks 100			
1) Class tasks/Sessional Examination	15			
2) Presentations/Seminar				
3) Assignments 10				
4) Research Project Report				
Seminar On Research Project Report				
5) ESE 75				
Total:	100			
Prerequisites for the course :NIL				
Course Learning Outcomes:				
CO1 Able to analyze and evaluate the cyber security needs of an organization.				
CO2 Able to determine and analyze software vulnerabilities and security solutions to reduce the				
risk of exploitation.				
CO3: Able to measure the performance and troubleshoot cyber security systems.				
CO4: Implement cyber security solutions and use of cyber security, information assurance, and				
cyber/computer forensics software/tools.				
CO5. Comprehend and avaauta right management processes right tree	المتعالم معتد المعتم والمحاف مستعسم مست			

Text Books:

CO5: Comprehend and execute risk management processes, risk treatment methods, and key risk and performance indicators



IIMTU-NEP IMPLEMENTATION Year- III / Semester -VI

Programme:Degree			Year:III	
Class:BCA			Semester:VI	
Credits		Subject: Mobile (Computing	
Theory:40				
	rse Code: Title: Mobile Computing			
BCA-NE				
	Objectives:			
		-	s of mobile computing.	
			ta management system.	
			layer protocols and Ad-Hoc networks.	
			and application layer protocols.	
	-	-	ent mobile platforms and application development.	
	f Paper: DS		Marka	
L:4	n rassing M	larks/Credits:40%		
L:4 T:0				
	ours/Week)			
· · · · · · · · · · · · · · · · · · ·	1 Hr. = 1 Cr	edit		
•			Contonta	No of
Unit			Contents	No. of Lectures
				Allotted
Ι	Mobile C	omputing: Issues	in Mobile Computing, Wireless Telephony,	8
1				0
		Digital Cellular Standards, Bluetooth Technology, Wireless Multiple Access Protocols, Channel Allocation in Cellular Systems. Wireless Application		
			RAM technology, Mobile Information device,	
		mputing Application		
II			s: Mobility, Wireless Communication and	8
		0	and Replication Schemes, Basic Concept of	
	•	-	lustering for Mobile Network, Multicluster	
	Architectur	U		
III	Location	Management: Loc	cation Based Services, Automatically Locating	8
	Mobile U	ses, Locating an	nd Organizing Services, Issues and Future	
	Directions,	, Mobile IP, Compa	arison of TCP and Wireless.	
IV	Transactio	on Management: I	Data Dissemination, Cache Consistency, Mobile	8
		-	ile Database Research Directions, Security Fault	
		for Mobile N/W.		
V			Problems with Message Routing in Wireless Ad-	8
			ng scheme based on signal strength, Link state	
		ce Vector routing p	protocols, Ad-hoc on Demand Distance Vector.	
Text Boo				a
	-	•••	naudhary, Kevin Kwiat, Mark Weises,"Mobile	Computing"
	er Academic			C 3 F 1 ''
			Martin-S-Nickious, Thomas Stohe, "Principles	s of Mobile
	Computing", Springer International Edition. 3. Wireless and Mobile Networks Architectures, by Yi-Bing Lin & Imrich Chlamtac, John Wiley &			
		one Networks Arch	nitectures, by Y1-Bing Lin & Imrich Chlamtac, J	onn wiley &
Sons,	2001.			



Reference

- 1. Mobile and Personal Communication systems and services, by Raj Pandya, Prentice Hall of India, 2001.
- 2. Wireless Web Development, Ray Rischpater, Springer Publishing, 2000.

Evaluation/Assessment Methodology		
	Max. Marks 100	
1) Class tasks/ Sessional Examination	15	
2) Presentations /Seminar		
3) Assignments		
4) Research Project Report	10	
Seminar On Research Project Report		
5) ESE	75	
Total:	100	
Prerequisites for the course: <i>Problem Solving using C</i>		
Course Learning Outcomes:		
CO1: Understand about mobile communication with their different routing algorithms.		
CO2: Apply different data backup schemes used in mobile network to store	the data.	
CO3: Able to explain about location management that is much important for mobile network.		
CO4: Build the knowledge of how transactions are done through mobile, different security issues		
while mobile transaction.		
CO5: Appraise different routing protocols used for routing the path like AD	DV, DSR, FSR etc.	



IIMTU-NEP IMPLEMENTATION Year- III / Semester -VI

Programme:Degree Class:BCA		ree	Year:III Semester: VI	
		Subject Deal Time O		
	5			
Theory Course				
	se Code: Title:Real Time System			
	NEP-603			
	e Objectiv			
CO1:	•	the basic of tasks and s	e	
CO2:		tand programming lan		
CO3:		e real time communica		
CO4:			s and reliability models for Hardware Redundancy.	
CO5:		tand clock synchroniza	ation.	
	e of Paper:			
	um Passin	ng Marks/Credits:40%	6 Marks	
L:4				
T:0	/	• \		
	Hours/Wee	·		
Theory	r - 1 Hr. = 1	Credit		
Unit			Contents	No. of
				Lecture
				Allotted
Ι	INTROD	UCTION TO TASK	SCHEDULING:	8
	Introducti	on - Issues in Real Tin	ne Computing, Structure of a Real Time System,	
	Task class	ses, Performance Meas	ures for Real time Systems, Task Assignment and	
	Schedulin	g – Classical uniproc	essor scheduling algorithms, RM algorithm with	
	different of	cases.		
II	UNI ANI) MULTI PROCESS	OR SCHEDULING:	8
	Uniproces	ssor scheduling of IRI	S tasks, Task assignment, Utilization balancing –	
	Next fit-	Binpacking- Myopic o	ff-line - Focused addressing and bidding- Buddy	
			ling Aperiodic scheduling - Spring algorithm.	
III		IME COMMUNICAT		8
			PB CSMA- Deterministic collision resolution	
	protocol-	DCR for multipa	acket messages- dynamic planning based-	
			nd aperiodic messages.	
IV		IME DATABASES:		8
			Vs General purpose databases, Main Memory	
			s, Transaction Aborts, Concurrency control issues,	
		-	Aaintaining Serialization Consistency, Databases	
		Real Time System.	,	
V		IME MODELING AN	ND CASE STUDIES:	8
			al-time modelling, Air traffic controller system –	0
		ed air defense system.		
Tevt I	Books:	a an actende bybtenn.		
		u "Real-time systems"	, 1st Edition, Prentice Hall, 2000.	
		-	System Design and Analysis", 3rd Edition, Johr	Wiley
	mps A. Le	apraine, real-rine	ystem Design and Analysis, sid Edition, join	i willey (



3. C. Siva Ram Murthy, G. Manimaran, "Resource management in real-time systems and networks", PHI, 2009.

Reference

- 1. C.M. Krishna, Kang G. Shin, "Real Time Systems", Tata McGraw Hil, 2010.
- 2. Giorgio C. Buttazzo , "Hard real-time computing systems: predictable scheduling algorithms and applications", Springer, 2008.

Evaluation/Assessment Methodology		
	Max. Marks 100	
1) Class tasks/ Sessional Examination	15	
2) Presentations /Seminar		
3) Assignments		
4) Research Project Report	10	
Seminar On Research Project Report		
5) ESE	75	
Total:	100	
Prerequisites for the course: NIL		
Course Learning Outcomes:		
CO1: Understand the features and structures of practical Operating System implementations.		
CO2: Acquire practical knowledge Real Time Operating Systems used in embedded system.		
CO3: Understand the use of multitasking techniques in Real Time Systems		
CO4: Compare different scheduling algorithms and the schedule ability criteria.		

CO5: Analyze real time systems with regard to keeping time and resource restrictions.



IIMTU-NEP IMPLEMENTATION Year- III / Semester -VI

Progra	mme:Deg	oree	Year:III	
Class:BCA		5	Semester:VI	
-	Credits Subject:E-Commerce			
Theory	4Cr			
	urse Code: Title:E-Commerce			
BCA-N	EP-603			
Course	Objectiv	/es:		
CO1:	Impart	the students with kn	nowledge and understanding of contemporary t	rendsin e-
CO2:	commer	ce.		
CO3:	Explain	electronic system and I	nternet.	
CO4:	Describe	e the use of e-commerce	e security.	
CO5:	To prov	ide adequate knowledge	e and understanding about E-Com practices to the st	udents.
	Understa	and the usage of planning	ng and marketing for e-commerce.	
Nature	of Paper	:: DSE		
		ng Marks/Credits:409	% Marks	
L:4				
T:0				
P:0(In I	Hours/We	eek)		
Theory	- 1 Hr. =	1 Credit		
Unit			Contents	No. of
				Lectures
				Allotted
Ι			c commerce: What is E-Commerce (Introduction	8
			s E-Commerce. Goals of E-Commerce, Technical	
	-		, Functions of E-Commerce, Advantages and	
		6	e, Scope of E-Commerce, Electronic Commerce	
			merce and Electronic Business(C2C)(C2G;G2G,	
		2P, B2A, P2P, B2A, C2		
II			volution of Internet, Domain Names and Internet	8
	0		il, .gov, .net etc.), Types of Network, Internet	
			Web, Internet & Extranet, Role of Internet in B2B	
		-	bsite, Cost, Time, Reach, Registering a Domain	
			email, Barter, Exchange, Shopping Bots	
III		•	Fransaction, Computer Monitoring, Privacy on	8
			acy, Computer Crime(Laws, Types of Crimes),	
		1	System, Software Packages for privacy, Hacking,	
	-	· 1	ads, Virus problem, virus protection, Encryption	
		• •	ryptography, DES, Public Key Encryption, RSA,	
TX 7			on, Firewall, Digital Signature.	0
IV		-	Introduction, Concepts of EDI and Limitation,	8
			ntages of EDI, EDI model, Electronic Payment	
			of Electronic Payment System, Payment Types,	
	Value Exchange System, Credit Card System, Electronic Fund Transfer,			
	-	· · ·	t Cash, Electronic Cash	0
V			merce: Planning Electronic Commerce initiates,	8
	0	5	strategies, Measuring cost objectives, Comparing	
	bonotito	to Costs Strategies for	developing electronic commerce web sites.	



Internet Marketing: The PROS and CONS of online shoppi	ng The cons of			
Internet Marketing; The PROS and CONS of online shopping, The cons of online chapting, Justify on Internet business. Internet marketing techniques, The				
online shopping. Justify an Internet business, Internet marketing techniques, The				
E-cycle of Internet marketing, Personalization e-commerce.				
Text Books:				
1. G.S.V.Murthy, E-Commerce Concepts, Models, Strategies- :- Himalaya Publishing House, 2011.				
2. Kamlesh K Bajaj and Debjani Nag, E- Commerce, 2005.				
Reference				
1. Gray P. Schneider, Electronic commerce, International Student Edition	n, 2011.			
2. E-Commerce, Fundamentals and Applications, Wiley Student Edition.	,			
Evaluation/Assessment Methodology				
	Max. Marks 100			
1) Class tasks/ Sessional Examination	15			
2) Presentations /Seminar				
3) Assignments				
4) Research Project Report	10			
Seminar On Research Project Report				
5) ESE 75				
Total:	100			
Prerequisites for the course: Problem Solving using C	1			
Course Learning Outcomes:				
CO1: Identify and explain fundamental web site tools including desig	n tools, programming tools,			
and data processing tools.				
CO2: Apply the solutions on finding major electronic payment issues an	d options.			
security threats.				
CO4: Communicate effectively in ways appropriate to the discipline, au	dience and purpose			
CO5: Implement the corrective measures to management issues und				
including organizational structure, strategic planning, goal setting.				
including organizational subcture, strategic plaining, goal setting.				



IIMTU-NEP IMPLEMENTATION Year- III / Semester -VI

Programme: UG		Year: III		
Class: BCA		Semester:VI		
		al intelligence lab		
Practical: 2				
Course Code: Title:Artificial intelligence lab				
BCA-NEP-606P				
Course Objectives:				
• •	bly standard practic	ces and methodologies in softwa	re developme	nt and project
management.				
11.4	U	of artificial intelligence.		
CO3: Understand the	<u>+</u>	ial intelligence.		
Nature of Paper: C				
Minimum Passing	Aarks/Credits: 50	% Marks		
L:0				
T:0				
P:4(In Hours/Week)	1 •.			
Theory - 1 Hr. = 1 C				
Practical- 2 Hrs.=1C	redit(4Hrs./Week=4	4Credits)		
Unit Contents				No. of
				Lectures
				Allotted
	* * *	implement simple facts and Querio	es	2
*	<u> </u>	implement simple arithmetic		2
	Write a program in prolog to solve Monkey banana problem		2	
		solve Tower of Hanoi		2
-	0 1 0	solve 8 Puzzle problems		2
	0 1 0	solve 4-Queens problem		2
		solve Traveling salesman problem	l.	2
		r Water jug problem		2
Reference / Text Bo				
		Artificial Intelligence", Tata		ll. Dan W.
Patterson, "Introd	uction to Artificial	Intelligence & Expert Systems", Pl	HI.	
	Evaluat	tion/Assessment Methodology		
			1	ax. Marks:50
/	ional Examination		25	
2) Presentations /Se	minar			
3) Assignments				
4) Research Project Report/Seminar On Research Project Report				
5) ESE 25				
		Tot	al: 50	
Course Learning O				
Student will be able				
CO1: To understand the concept of Artificial intelligence.				
CO2: To understand the design principles of pattern recognition with estimation and apply				
classification technic				
CO3: To apply know	ledge representatio	n and reasoning techniques.		



IIMTU-NEP IMPLEMENTATION Year- III / Semester -VI

Progra	mme:UG	Yea	r: III	
Class:BCA			nester:VI	
Credits		Subject:Cyber Se	ecurity Lab	
Practical: 2				
Course	e Code:	Title:Cyber Secu	rity Lab	
BCA-N	SCA-NEP-605P			
	e Objectives:			
			ecurity concepts learned in theory.	
		0	of security tools and technologies used in the f	ield.
			ons in the field of cyber security.	
	7	e latest trends, three	ats, and advancements in cyber security.	
	of Paper: Core		_	
	um Passing Marks	Credits: 50% Ma	arks	
L:0				
T:0	TT /TT7 1 \			
`	Hours/Week)			
	-1 Hr. $= 1$ Credit			
	Practical- 2 Hrs.=1Credit(4Hrs./Week=2Credits)			
Unit				
			Jontents	No. of
			Contents	Lectures
I	Checklist for repo			Lectures Allotted
I		rting cybercrime at	Cybercrime Police Station.	Lectures Allotted 2
II	Checklist for repo	rting cybercrime at rting cybercrime or	Cybercrime Police Station. lline.	Lectures Allotted 2 2
II III	Checklist for repo Basic checklist, p	rting cybercrime at rting cybercrime or ivacy and security	Cybercrime Police Station.	Lectures Allotted 2
II	Checklist for repo Basic checklist, p Checklist for secu	rting cybercrime at rting cybercrime or vivacy and security re net banking.	Cybercrime Police Station. lline. settings for popular social media platforms.	Lectures Allotted 2 2 2 2
II III IV	Checklist for repo Basic checklist, p Checklist for secu Setting and config	rting cybercrime at rting cybercrime or vivacy and security re net banking. guring two factor au	Cybercrime Police Station. nline. settings for popular social media platforms.	Lectures Allotted 2 2 2 2 2 2
II III IV V	Checklist for repo Basic checklist, p Checklist for secu Setting and config Installation and co	rting cybercrime at rting cybercrime or rivacy and security re net banking. guring two factor au onfiguration of com	Cybercrime Police Station. nline. settings for popular social media platforms. thentications in the Mobile phone. puter Anti-virus.	Lectures Allotted 2 2 2 2 2 2 2 2
II III IV V VI	Checklist for repo Basic checklist, p Checklist for secu Setting and config Installation and co Wi-Fi security ma	rting cybercrime at rting cybercrime or ivacy and security re net banking. guring two factor au onfiguration of com nagement in comp	Cybercrime Police Station. nline. settings for popular social media platforms. thentications in the Mobile phone. puter Anti-virus.	Lectures Allotted 2 2 2 2 2 2 2 2 2 2
II III IV V VI VII VIII	Checklist for repo Basic checklist, p Checklist for secu Setting and config Installation and co Wi-Fi security ma	rting cybercrime at rting cybercrime or ivacy and security re net banking. guring two factor au onfiguration of com nagement in comp	Cybercrime Police Station. nline. settings for popular social media platforms. thentications in the Mobile phone. puter Anti-virus. uter and mobile.	Lectures Allotted 2 2 2 2 2 2 2 2 2 2 2 2 2
II IV V VI VII VII Refere	Checklist for repo Basic checklist, p Checklist for secu Setting and config Installation and co Wi-Fi security ma Setting and config nce / Text Books:	rting cybercrime at rting cybercrime or ivacy and security re net banking. guring two factor au onfiguration of com nagement in compo- guring two factor au	Cybercrime Police Station. nline. settings for popular social media platforms. thentications in the Mobile phone. puter Anti-virus. uter and mobile.	Lectures Allotted 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
II III IV V VI VII VIII Refere 1. Cyt	Checklist for repo Basic checklist, p Checklist for secu Setting and config Installation and co Wi-Fi security ma Setting and config nce / Text Books: per Crime Impact in	rting cybercrime at rting cybercrime or ivacy and security re net banking. guring two factor au onfiguration of com nagement in compo- guring two factor au the New Millenniu	Cybercrime Police Station. nline. settings for popular social media platforms. thentications in the Mobile phone. puter Anti-virus. uter and mobile. thentications in the Mobile phone.	Lectures Allotted 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
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If the course is available as Generic Elective then the students of following departments may opt it. NA



Evaluation/Assessment Methodology		
	Max. Marks:50	
1) Class tasks/ Sessional Examination	25	
2) Presentations /Seminar		
3) Assignments		
4) Research Project Report		
Seminar On Research Project Report		
5) ESE	25	
Total:	50	

Course Learning Outcomes:

Student will be able to:

- CO1: After completion of this module, students would be able to understand the concept of Cyber security and issues and challenges associated with it.
- CO2: Students, at the end of this module, should be able to understand the cybercrimes, their nature, legal remedies and as to how report the crimes through available platforms and procedures.
- CO3: On completion of this module, students should be able to appreciate various privacy and security concerns on online social media and understand the reporting procedure of inappropriate content, underlying legal aspects and best practices for the use of social media platforms.
- CO4: After the completion of this module, students would be able to understand the basic concepts related to E-Commerce and digital payments. They will become familiar with various digital payment modes and related cyber security aspects, RBI guidelines and preventive measures against digital payment frauds.
- CO5: Students, after completion of this module will be able to understand the basic security aspects related to Computer and Mobiles. They will be able to use basic tools and technologies to protect their devices.



School of Computer Science & Applications ACADEMIC HAND BOOK



Ordinance & Academic Regulations BCA (Cloud and Cyber Security)

Academic Hand Book (School of Computer Sciences & Application)



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1. **PREAMBLE**

As the technological enhancement and availability of technology to every person of world a huge demand of computer skilled professional is ample. In this world of opportunities, impact of higher education is so inevitable for getting desired guidance to secure, right kind of employment. It is compulsory to pursue higher related- education in the best institutes. In this direction major reforms are to opt Learning Outcomes-based Curriculum Framework (LOCF), specially, in the undergraduate education (UG) program, that ensure student centric, interactive and outcome-oriented goals, objectives and skill enhancement to acquire. LOCF along with National Education Policy (NEP) in this regard ensure uniform education fabric of standard and content delivery education all over the nation. This syllabus development is a step to ensure development of the undergraduates for both, academia and employability. Latest technical trends, industry standards, market needs, and interests of students, future expectations the need has been taken into consideration while developing the syllabus.

The LOC Finculcation is to build up a comprehensive course structure with detailed syllabus. This is an effort to develop a student centric framework where they are expected to have a concrete understanding of fundamentals of computer science along with the latest trends and techniques like Artificial Intelligence, Internet of Things (IoT), Machine Learning (ML) with advanced skill sets that include Mobile Application environment, Object Oriented Programming (OOPs) among many courses. Each course aims to present learning targets and objectives, and thus provide learning and teaching strategies, assessment and resources. The students shall be equipped with the latest trends in computer science, after completion of the programme

With this an education temple of nation should ensure an environment, which should be bias free, irrespective of cast, religion, races, sex difference and easily available to youths of the nation. The human value, ethics and environmental teaching is also introduced with this.

2. DEFINITIONSANDNOMENCLATURE

In these Regulations, unless the context otherwise requires:

- 1. "Programme" means Degree Programme like Bachelor of Computer Application (BCA). Hence further BCA and BCA (Cloud and Cyber Security) will call BCA in this document.
- 2. "GPA" means Grade Point Average.
- 3. "Course" means a theory or practical subjects that are normally studied in a semester.
- 4. "VC, Vice-Chancellor of IIMT-University" means the Head of the University.
- 5. "Registrar" is the Head of all Academic and General Administration of the University.
- 6. "Dean" means the authority of the school who is responsible for all academic activities of various programmes and implementation of relevant rules of these Regulations pertaining to the Academic Programmes.



- 7. "COE, Controller of Examinations" means the authority of the University who is responsible for all activities relate do the University Examinations, publication of results, award of grade sheets and degrees.
- 8. "Dean Student Welfare" is responsible for all student related activities including student discipline, extra and co–curricular activities, attendance and meetings with class representatives, Student Council and parent–teacher meeting.
- 9. "HoD" means the Head of the Department concerned.
- 10. "University" means IIMT-University, Meerut.
- 11. "TCH" means Total Contact Hours–refers to the teaching–learning periods.
- 12. "DEC" means Department Exam Committee.
- 13. "BoS" means Board of Studies.
- 14. "ACM" means Academic Council Meeting the highest authoritative body for approval for all Academic Policies.
- 15. "Class Coordinator" is a faculty of the class who takes care of the attendance, academic performance, and the general conduct of the students of that class.
- 16. "IA" is Internal Assessment which is assessed for every student for every course during the semester.
- 17. "ESE" is End Semester Examination conducted by the University at the End of the Semester for all the courses of that semester.
- 18. "UGC" means University Grants Commission.
- 19. "MHRD" means Ministry of Human Resource Development, Govt. of India.
- 20. "AICTE" means All India Council of Technical Education.
- 21. "HEI" means Higher Education Institutions.
- 22. "PRN" means Permanent Registration Number.
- 23. "CGPA" means Cumulative GPA.
- 24. "SGPA" means Semester GPA.
- 25. "NC" means Non-Credit.

3. VISION AND MISSION OF THE SCHOOL

VISION

To achieve heights in computer education domain by creating appropriate environment for students, faculties and staff with availability of latest technological infrastructure.

MISSION

- 1. To dissipate appropriate all types of practical and theoretical computer science knowledge to our young students.
- 2. Inculcate professional efficiency in the students for brighter career opportunity as per industry latest requirement.
- 3. To provide learning environment for students with our reputed academics partner in the field of computer science.
- 4. To prepare our student as an IT professional with full of ethics and human values.

4. **PROGRAM EDUCATIONAL OBJECTIVES (PEO)**

PEO1: The graduates' programs are designed to produce skill graduates who will be competent professionals in academics, industry and organizations of government and private sector.



- **PEO2:** The pass out graduates will be able to handle the fast-changing world requirements and will become effective professionals.
- **PEO3:** The successful Graduates will be a good team leader and will be able to lead the team to find optimal solutions and achieve expertise in their field or become entrepreneurs and play the leading roles in all types of organizations.

5. **PROGRAM OUTCOMES (PO'S)**

- **PO1**: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **PO2:** Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO3:** Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **PO4:** Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **PO5:** Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools prediction and modeling to complex engineering activities with an understanding of the limitations.
- **PO6:** The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- **PO7:** Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and the need for sustainable development.
- **PO8:** Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **PO9:** Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **PO10:** Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and receive clear instructions.
- **PO11:** Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in team, to manage projects and in multidisciplinary environments.
- **PO12:** Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

6. **PROGRAM SPECIFIC OUTCOMES (PSO'S)**

PSO1: The graduates are proficient in fundamental principles and methods of Computer Science,



Mathematical and Scientific reasoning and are able to:

• Apply fundamental concepts of integration, differentiation, vector calculus, probability & statistics, and discrete mathematics.

• Design, create & evaluate algorithms appropriate to specific problems.

PSO2: The graduates have understanding for:

- Demonstrate capability for computers, computer network and server environments and there troubleshooting.
- Capacity to handle cloud computing environment and solutions.
- Well defined knowledge for solving problems of security and threats in information knowledge domain.

7. ADMISSION

Hence further BCA and BCA (Cloud and Cyber Security) will be called BCA in this document. The admission policy and procedure shall be decided from time to time by the University based on the guidelines issued by the UGC/ Ministry of Education, Government of India. Seats are also made available for Non-Resident Indians and foreign nationals, who satisfy the admission eligibility norms of the University as per the UGC Norms.

8. ELIGIBILITYIN ALL YEARS AS PER NEP (ENTRY)

- **8.1** Candidate should have passed "10+2" exam (recognized board) in any stream with at least 40% in aggregate.
- 8.2 Admission will be based on academic record.
- **8.3** The Academic Council shall have power to amend or repeal the eligibility criteria laid down at clause 8.1& 8.2, if required.

9. CURRICULUM

The curriculum for Bachelor of Computer ApplicationProgramme is designed to have minimum and maximum credits as per the scheme of 120-160 credits that are distributed across six semesters of study for the award of degree.

10. MEDIUM OF INSTRUCTION

The medium of instruction is ENGLISH for all courses, examinations, seminar presentations and projectreports.

11. CHOICE BASED CREDIT SYSTEM (CBCS)/ LOCF/ OBE

- **11.1** The three-year curriculum has been divided into six semesters. Semester Ist to VIth shall include lectures, tutorials, practical, seminars and project work as defined in the scheme of instruction and examination issued by the University from time to time.
- **11.2** The curriculum will be also including such other curricular, co-curricular and extracurricular activities as may be prescribed by the University from time to time. Credit System BCA programme will have a curriculum in which every course will be assigned certain credits reflecting its weight and contact periods per week, as given below:



Lecture period (L) per week
 Tutorial period (T) per week
 Practical period (P) per week

= 1 Credit = 1 Credit = 0.5 Credit

In addition to theory and laboratory courses there may be other courses such as seminar, project etc., which will be assigned credits as per their contribution in the programme without regard to contact periods.

11.3 Minimum Credit Requirements

The minimum credit required for award of a BCA degree is 120. This is normally divided into theory courses, tutorials, laboratory courses, seminars and projects in duration of six semesters. The credits are distributed semester wise as shown in the structure and syllabus manual of the programme. Courses generally progress in sequences, building competencies and their positioning indicates certain academic maturity on the part of the learners. Learners are expected to follow the semester wise schedule of courses given in the syllabus manual of the programme.

11.4 Course Categories

Under CBCS, the degree programme will consist of the following categories of courses as per following table:

S. No.	Category	
1.	Core Course (Theory)-CC	
2.	Core Course (Practical)-CC(P)	
3.	Discipline Specific Elective (Theory)- DSE	As non Format 1 & 2 of CDCS
4.	Generic Elective (Theory)-GE	As per Format 1 & 2 of CBCS
5.	Ability Enhancement Compulsory Courses-AECC	
6.	Skill Enhancement Courses-SEC	
7.	Research Project (RP)	

Table 11.4 - Distribution of Credits (Evaluation Scheme)

11.5 Curriculum Structure

The curriculum for BCA will contain a listing of all courses, with each course having a course category, course number, course title, number of contact periods per week, number of credits assigned, and the marks assigned to various components of evaluation.

11.6 Approval of the Curriculum

The curriculum for BCA programme will be prepared by the department concerned and will be approved by the Board of Studies of the department. The Academic Council for final approval and then the curriculum will be implemented. Same procedure shall be used for any modification in the curriculum.



12. REGISTRATION FOR A COURSE IN A SEMESTER

A student will be eligible for registration of courses only if he/she satisfies the regulation (progression), and has cleared all dues to the University, Hostel and Library up to the end of the previous semester if student is not debarred from enrolment on disciplinary grounds.

The university follows a flexible Choice Based Credit System and slot-based table. Accordingly, the students shall be given the option for selecting their courses, credits, teachers, slots and create their timetable. The student is given the option of selecting the number of credits to undergo in a semester, subject to the curriculum requirements.

Except for the first-year courses, registration for a semester will be done during a specified week before the start of the semester as per the academic calendar.

Late registration /enrolment will be permitted by the Dean of the School for genuine cases, on recommendation by the Head of the respective department, with a late fee as decided from time to time.

The student shall make the choice of course in consultation with the Class Coordinator and as stipulated from time to time.

Students shall have to pay additional fee as prescribed, for registering in certain elective courses under Generic Electives courses offered by certain specific departments and for higher level Foreign Languages, as decided from time to time.

13. ATTENDENCE

The faculty handling a course must finalize the attendance, three calendar days before the last instructional day of the course and submit to the HoD through the class teacher.

13.1 Condonation of Medical Cases

- a. A student with less than 75% attendance (Total Contact Hours -"TCH") in any course, will not be permitted to appear for the end-semester examination in that course, irrespective of the reason for the shortfall of the attendance. The student is however permitted to avail Academic Leave up to 10% for attending academic related activities like, Industrial Visits, Seminars, Conferences, Competitions etc., with the prior approval of the HoD. After the event, the student should submit the relevant documents for proof to the HoD for approval of the Academic Leave.
- b. The remaining 25% allowance in attendance is given to account for activities under NCC / NSS / Cultural / Sports/ Minor Medical exigencies etc.
- c. Students under "CO (Carry Over)" category in any course shall attend, the immediately following Summer / Winter course. The detailed schedule of the Summer / Winter courses offered in every semester will be announced during the end of that semester. The students who have obtained "CO (Carry Over)" has to select their appropriate slots and courses, optimally to attend the courses.



13.2 Additional Condonation

Additional Condonation may be considered in rare and genuine cases which includes, approved leave for attending select NCC / Sports Camps, cases requiring prolonged medical treatment and critical illness involving hospitalization. For such select NCC / Sports Camps prior permission for leave shall be obtained by the respective Dean / Director of sports from the designated authority, before deputing the students.

For medical cases, submission of complete medical history and records with prior information from the parent / guardian to Dean (Students Welfare) DSW is mandatory. The assessment of such cases will be done by the attendance sub – committee on the merit of the case and put-up recommendations to the Vice – Chancellor. Such condonation is permitted only twice for a student in the entire duration of the programme.

The Vice-Chancellor, based on the recommendation of the attendance sub-committee may then give condonation of attendance, only if the Vice-Chancellor deems it fit and deserving. But in any case, the condonation cannot exceed 10%.

14. ASSESMENT PROCEDURE

- 14.1 Internal Assessment (IA) 25 Marks & External Assessment (EA) 75 Marks
- 14.2 Practical Assessment (as per format 1 and 2)
- **15. RESEARCH PROJECT/SEMESTER PROJECT ASSESMENT CRITERIA** The general guidelines for assessment of Project are given in Table 15.1

S. No.	Review / Examination scheme	Broad Guidelines	Weightage
1	First Review	Concept	10%
2	Second Review	Design	10%
3	Third Review	Experiment/Analysis	20%
4	Final Review/ESM	Project report and Viva – Voce, Results and Conclusion	60%

Table15.1: Assessment pattern for Research Project / Semester Project

16. INTERNSHIP – RESEARCH/INDUTRIAL INTERNSHIP

A student has to compulsorily attend summer internship at the end of 4th semester for a minimum period of 30 days. In lieu of Summer-Winter internship, the student is permitted to register for undertaking project work under a faculty of the University and carry out the project for minimum period of 30 days. In both the cases, the internship report in the prescribed format duly certified by the faculty in-charge shall be submitted to the HOD. The evaluation will be done through presentation and viva. The course will have a weight age as defined in the respective curriculum.



For the final year project and viva-voce end semester examination, the student shall submit a project report in the prescribed format issued by the University. The reviews will be conducted by a committee constituted by the HOD. The end semester assessment will be based on the project report and a viva on the project conducted by a committee constituted by controller of examination. This may include an external expert.

17. FOR NON-CGPA COURSES/AUDIT COURSES

The Assessment will be done based on the respective assessment as per rubrics issued by the HOD.

A student securing less than the minimum specified internal assessment marks in any course will not be permitted to appear for the end-semester examination in that course and will be graded under "CO (Carry Over)" category for that course. This will be denoted in the grade sheet as "CO (Carry Over)", till the course is successfully completed in the subsequent semester(s).

18. CREDIT WEIGHTAGE

Credits are the weightage, assigned to the courses based on the following general pattern: One Hour 1 credits Two Hour Practical 0.5 credits

19. MAXIMUM DURATION OF THE PROGRAMME/ PROMOTION POLICY

A student may complete the programme at a slower pace than the regular pace, but in any case, in not more than **N+2 years**.

A student completing the degree programmes in the extended period will not be eligible for university ranking.

20. MAXIMUM GAPS BETWEEN SEMESTER/YEAR

A student may be permitted by the Vice-Chancellor to withdraw from the entire programme for a maximum of two semesters for reasons of ill health, start – up venture or other valid reasons as recommended by a committee consisting of Head of Department, Dean of School, and Dean (Student Welfare).

21. CREDIT SYSTEM & GRADING CGPA/SGPA Introduction

IIMT University implemented the UGC guidelines to implement of the choice-based credit system with a view to offer student's choice of courses within a programme with a flexibility to complete the programme by earning credits at a pace decided by the students themselves. The system allowed students to choose inter-disciplinary, intra-disciplinary courses according to their learning needs, interest and aptitude. It was considered as a cafeteria approach and was expected to provide mobility to students.

21.1 Credit System

As per the current credit system practiced in institutions needs comprehensive reforms as they offer very little flexibility, choice and are less learner centric. Degrees offered today are more self-contained focusing on a specialization area and depend a lot on knowledge



available with the faculty from the department only. Though the most requisite credit system does exist, wherein students are given a wide choice and flexibility, these exist as small islands in the vast ocean of thousands of educational institutes in India. In such institutions, the curriculum is frequently designed which is learner centric and offering a wide specialization area for students to pick and choose courses from.

The institutions shall make attempts wherein the design of the credit system and the teaching and evaluation modes shall be the responsibility of individual course teachers. The students should have the freedom to opt for courses from other specializations and not just from their core specialization. For this there has to be stronger collaborations between departments of the University and outside.

21.2 Grading system

Most institutions follow the absolute grading system which is a simple procedure wherein the marks obtained by students correspond to a specific grade and grade point. It reflects the individual performance in a particular subject without any reference to the group/class. The absolute grading system has limitations and may be susceptible to some inconsistencies.

The relative grading system on the other hand provides relative performance of a student to a group/class wherein the student is ranked in a group/class on basis of relative level of achievement. In this system decisions are made in advance by the faculty members as to what proportion of students would be awarded a particular grade on the basis of their relative performance and which is done by assigning grades on basis of a normal curve. This facilitates comparative performance and eliminates negative effect of pass or fail.

Relative grading system may be used if the number of students registered for the course is at least 30. For a class of smaller size, an absolute grading scheme may be used. The statistical method may be used with adjustments to calculate the mean (M), median (Md) and standard deviation (SD) of the total marks (TM) obtained by the students registered for the course. If the mean and median coincide, the mean may be used for further computations, otherwise the median may be used. If suppose the mean is used, then the letter grades may be awarded based on the ranges specified in table below: A grading system as shown in given table-

Letter Grade	Range
A+	TM>M+1.75SD
А	$M+1.25 SD \leq TM < M+1.75SD$
B+	M+0.75 SD \leq TM $<$ M+1.25SD
В	$M+0.25 \text{ SD} \le TM \le M+0.75 \text{ SD}$
C+	$M-0.25 \text{ SD} \le TM \le M-0.25 \text{ SD}$
С	$M-0.75 \text{ SD} \le TM \le M-0.25 \text{ SD}$
D+	$M-1.25 \text{ SD} \le TM \le M-0.75 \text{ SD}$
D	$M-1.75 \text{ SD} \le TM \le M-1.25 \text{ SD}$

 Table 21.2: Grading system



E+	$M-2.0 \text{ SD} \le TM \le M-1.75 \text{ SD}$
E	$M-2.25 \text{ SD} \le TM \le M-2.0 \text{ SD}$
F	M-2.25 SD > TM
	Carry Over (Summer / Winter) due to Attendance deficiency (between 40%)
CO	and 75%)and/or
	I. Lack of minimum IA marks as specified in clause 10.0 Table 3.
RA	Repeat the course due to (i) Lack of minimum attendance (below 40%) in
KA	regular course.
	DETAINED "RC" or "RA" or both in all registered theory courses of a
	semester. The student is detained and has to repeat the entire semester.
	Clause 12.3

Letter grades may be improved based on the following scheme: Use the table above to determine grade boundaries. Look for natural gaps in the neighborhood of grade boundaries. Choose the largest gap in the neighborhood and make this as the grade boundary.

An 'E', 'E+' and 'F' grade may not be a purely relative grade. These may be assigned on the following basis:

- A minimum, say 30/100, may be set as pass marks for the course. A fail grade may then be awarded only if the Total Marks for the course are less than 30. Otherwise, the students may be awarded the Just Pass Grade D.
- A fail grade may be awarded to students whose marks are below the prescribed minimum even if the table above leads to a pass grade. Similarly, a lower limit may be set for the A grade also, for instance greater than or equal to 86. Students not achieving the prescribed minimum may be awarded a lower letter grade even if the table above indicates otherwise. A pass grade may be made mandatory for both internal as well as external examinations in the case of a separate internal and external assessment,
- a. Internal and External marks may be summed up with appropriate weightage to compute a total out of 100 marks. The letter grade may be assigned on this computed total.
- b. Internal and external marks may be graded separately and then the assigned grade points may be used, with appropriate weightage, to compute a final grade point and letter grade.

Grading in the case of Re-evaluations, Retests and Remedial Examinations may be based on the following guidelines:

- a. The ranges of marks once computed for awarding letter grades the first time, called the First Distribution (FD), will not be modified.
- b. If a re-evaluation leads to a change in marks, then FD will be used to award an appropriate letter grade.
- c. A retest may be permitted, if
- i. A student gets a letter grade of E+ or E. In this case, irrespective of the marks obtained, at most D grade may be awarded.
- ii. A student is unable to complete course requirements because of certified illness or tragedy. In this case FD will be used to award an appropriate letter grade.

The use of relative grading system may be recommended in autonomous institutions,



institutes of national importance and institutions with high ranking. The results of the relative grading system may be shared by such institutions later with other interested institutions to implement the same.

21.3 GPA and CGPA

GPA is the ratio of the sum of the product of the number of credits Ci of course "i "and the grade points Pi earned for that course taken over all courses "i" registered and successfully completed by the student to the sum of Ci for all "i". That is,

$$GPA = \frac{\sum_{i}^{\sum C_{i} P_{i}}}{\sum_{i}^{\sum C_{i}}}$$

CGPA will be calculated in a similar manner, in any semester, considering all the courses enrolled from the first semester onwards.

- **21.2** The Grade card will not include the computation of GPA and CGPA for courses with letter grade CO, RC and U until those grades are converted to the regular grades.
- **21.3** A course successfully completed cannot be repeated.

Grade Sheet

Letter grade

Based on the performance, each student is awarded a final letter grade at the end of the semester in each course. The letter grades and corresponding grade points are given in Table 8.

A student is considered to have completed a course successfully and earned credits if he/she secures a letter grade other than F, CO, RA in that course.

After results are declared, grade sheet will be issued to each student which will contain the following details:

- a. Program and discipline for which the student has enrolled.
- b. Semester of registration.
- c. The course code, name of the course, category of course and the credits for each course registered in that semester
- d. The letter grade obtained in each course
- e. Semester Grade Point Average (GPA)
- f. The total number of credits earned by the student up to the end of that semester in each of the course categories.
- g. The Cumulative Grade Point Average (CGPA) of all the courses taken from the first semester.
- h. Credits earned under Non CGPA courses.



22. CLAS/DIVISION

- **22.1**Classification is based on CGPA and is as follows:
 $CGPA \ge 8.0$
 $6.5 \le CGPA < 8.0$
 $5.0 \le CGPA < 6.5$ First Class
 First Class
 First Class
- **22.2** (i) Further, the award of 'First class with distinction' is subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses in his/her first appearance with effect from II semester, within the minimum duration of the programme.
 - (ii) The award of 'First Class is further subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses within 3 years for Bachelor of Computer Application.
 - (iii) The period of authorized break of the programme (vide clause 11.0) will not be counted for the purpose of the above classification.

23. TRANFER OF CREDITS/ACEDIMIC CREDIT BANK

- **23.1** "Credit-transfer" means the mechanism by which the eligible HEIs registered with ABC are able to receive or provide prescribed 'credits' to individual registered ABC account in adherence to the UGC credit norms for the 'course/s' registered by the desirous students in any eligible higher education institution within India
- **23.2** Within the broad framework of these regulations, the Academic Council, based on the recommendation of the Credit Transfer Committee so constituted may permit students to transfer part of the credit earned in other approved Universities of repute & status in the India or abroad.
- **23.3** The Academic Council may also approve admission of students who have completed a portion of course work in another approved Institute of repute under Multiple entry & Exit system, based on the recommendation of the credit transfer committee on a case-to-case basis.
- **23.4** Students who have completed coursework, at least first year, at some university other than the university to which transfer is to be sought, may request for transfer of admission to this university. A student may be granted admission only through an admission process that will follow the same policy as for fresh admissions. However, a uniform credit system must be followed by all universities to effect transfer of credits.
- **23.5** Credit Transfer request can be submitted only after the student has been admitted in the concerned program and the following conditions are met:

University Grants Commission initiated the concept of National Academic Credit Bank (NAC-Bank) which will be a digital / virtual / online entity to be established and managed by UGC. The main objective of the NAC-Bank would be to facilitate student mobility across the education system wherein the credits can be accumulated and be used



at alter point of time for the requirements of partial fulfillment of a degree program.

- i. The course work has been completed at a UGC approved and accredited University through fulltime formal learning mode.
- ii. The university accreditation grade/ ranking is not lower than that of the university to which the transfer is sought.
- iii. The courses prescribe to the common minimum syllabus under UGC CBCS system.
- iv. The letter grade obtained in the courses is "B" or better.
- v. The number of credits to be transferred does not exceed the prescribed limit.
- vi. The program in question must have a similar credit system, in particular, modular or semester and the same numeric and letter grading system along with common meaning of the term "credit" in numerical terms.

The aspect of shelf life of courses needs to be considered while accepting credits as obsolescence of knowledge of certain field in terms of its current relevance needs to be investigated. The time elapsed between successful completion of certain courses of the program and the admission to which program transfer is sought needs to be considered. The maximum number of credit points that may be considered under a credit transfer needs to be specified. Contextual variables such as teaching-learning approach adopted, learning facilities offered, use of evaluation modes may also be considered while preparing the credit transfer policy.

Moderation

Moderation of assessment is an organized procedure which ensures use of valid assessment material and consistent application of criteria, to provide fair academic judgment and reliable outcome in the form of marks or grades. It assures appropriate designing and implementation of assessment activities along with generation of valid and reliable results.

Integration of moderation process with assessment system is imperative for the development of academic quality in higher educational institutions as :

- It addresses any difference in individual judgments of different evaluators.
- It ensures that all achievements in the form of marks and grades across courses reflect achievement of same level of standard.
- It is also carried out to develop a common understanding of the standards and criteria and to recognize performance which demonstrates that standard or fulfils those criteria.

Moderation may be conducted in case there are large number of fail grades or high grades, or when large numbers of students who have received the same grade or clustering of students on letter grades, or when there are discrepancies between grades allocated to individual students in different courses, or to find out the difficulty level of the question paper or whether the assessments modes used cover the entire syllabus or not.

Applicability

Moderation will be made applicable to both external and internal modes of assessment. All programs and courses will indicate, as part of their statements on assessment, arrangements for the moderation of assessed work. This can be done through formulation



of a moderation policy and implemented across all programs and courses of instruction and delivery. The time frame for the moderation will be linked with the time frame for assessment.

In the event moderation is triggered, an evaluation will begin with a discussion on the following (though not exhaustive) lines:

- a. What are the rubrics used for each of the different types of assessment in the course? Is a standardized/ prescribed rubric used or has the instructor developed his/ her own rubric. If the instructor is using a personally framed rubric, or if there is no identified rubric, then how does the assessment map to learning outcomes?
- b. The difficulty level of the questions included in the assessments, i.e., is the difficulty level on the extremes, very easy or very hard.
- c. The manner of awarding marks, i.e., has the correction been at the extremes, liberal or tough.

Each department will establish a committee and designate roles and responsibilities at different levels for smooth working of the moderation process. In order to maintain neutrality, it will be ensured that moderator should not be the assessor. Staff members will be trained professionally in assessment techniques and moderation procedures. All assessment material produced by learner including examination sheets, assignments, project reports, research reports etc. will be examined.

Institutions will be encouraged to make the moderation process online. In this system, assessment plans, moderation plans, assessment tools, samples of which may be submitted online. Moderation reports will be generated online so that progress can be tracked and submitted to the COE after the approval of Dean and HOD. The moderation will not be restricted to just assessment but also include moderation of content and assessment design.

24. CHANGE OF DISCIPILINE

"Academic Flexibility" is the provision for innovative and interchangeable curricular structures to enable creative combinations of Courses/Programmes in Disciplines of study leading to Degree/Diploma/PG Diploma/Certificate of Study offering multiple entry and multiple exit facilities in tune with National Education Policy-2020, while removing the rigid curricular boundaries and creating new possibilities of life-long learning.

25. USE OF TECNOLOGICAL INTERVENTIONS

With the proliferation of different types of access devices, especially mobile access devices, technology has the potential to augment traditional classroom practices and revolutionize learning and evaluation methods. Technology, in fact can be an important driver to enable lifelong learning. Learning and engagement of students is facilitated by use of technology through several modes such as synchronous learning, semi-synchronous learning, blended learning, collaborative learning, flipped classroom etc. MOOC's, especially provided through SWAYAM, are a window of opportunity for lifelong learning and are offered through technology-based platforms. Learning management systems (LMS) may be used by institutions to integrate the entire teaching, learning and evaluation process. The Learning Management System may be used by institutions to deliver academic content in blended form and to assess learning through



thesis, assignments etc. Open-source learning management systems such as *Moodle*, *Edmodo* may be used for posting content in the form of videos, audios, e-learning modules, live class sessions etc. Use of plagiarism detection software will be highly recommended to check originality of the content.

In the conduct of examinations, universities face tremendous challenges such as need for trained manpower, distribution of question paper without delays and errors, delays in evaluation of answer scripts, lack of infrastructure to conduct examinations at a large scale, non-availability of faculty members for assessment, security issues faced during paper setting and paper distribution, tampering of certificates and answer scripts etc.

For a typical examination department of an institution will be an autonomous body right from registration of student to convocation through an integrated system. In fact, steps must be taken to implement a complete examination management system that considers the complete life cycle of examination process. The use of technology will reduce dependency on human intervention and be error free. The following functions will be automated:

- i. Registration of students and generating unique PRN,
- ii. Filling up of examination form,
- iii. Generation of seat numbers and admit cards/hall tickets,
- iv. Preparation of list of paper setter,
- v. Use of question bank system to draw question sets, question paper generation,
- vi. Online distribution of question papers on the day of examination with system of encryption,
- vii. Barcode system for answer books (this will eliminate issues related to errors, avoid malpractices etc.),
- viii. Digitization of answer scripts and onscreen evaluation of answer sheets,
- ix. Tracking of student's performance,
- x. Marks submission through online software,
- xi. Viewing of result through online system,
- xii. Online verification and revaluation system,
- xiii. Digitization of certificates and marksheets (to avoid tampering and easy retrieval),
- xiv. Certificate authentication system,
- xv. Submission of various other applications through online system.

The above will lead to conduct of functions of the examination system in an efficient and transparent manner and timely availability of information to students.

26. STUDENT DESCIPILINE

Every student is required to observe utmost discipline and decorum both inside and outside the campus and not to indulge in any activity which may affect adversely the prestige reputation of the University and School.

27. STUDENT WELFARE

Any act of indiscipline of a student reported to the Dean (Students Welfare) and Head of the Department will be referred to a Discipline Committee constituted for the purpose. The Committee will enquire into the charges and decide on a suitable punishment if the



charges are sub stantiated. The committee will also authorize the Dean (Students Welfare) to recommend to the Vice-Chancellor for the implementation of the decision. The student concerned may appeal to the Vice-Chancellor, whose decision will be the final.

28. RAGGING

Ragging in any form is a criminal and non-bail able offence in our country. The current State

andCentrallegisolationsprovidestringentpunishmentsincludingimprisonment.Oncetheinvo lvementofastudent(s) is established in ragging, offending fellow students/staff, harassment of any nature to the fellow students/staff etc. the student(s) will be liable to be dismissed from the University, as per the laid down procedures of the UGC / Govt. /Institute. Every senior student at the University, along with their parent, shall give an undertaking every year in this regard and the same should be submitted at the time of Registration.

29. POWER TO MODIFY

Not with standing all that has been stated above, the Academic Council is vested with powers to modify any or all the above regulations from time to time, if required, subject to the approval by the Board of Studies and final approval by Vice-Chancellor.

30. EXIT POINT

Exit point will be governed as per format 1 and format 2.

31. NC/CREDIT COURSE

For non-credit courses 'Satisfactory' or 'Unsatisfactory' shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.



Evaluation Scheme

BCA (CLOUD COMPUTING AND CYBER SECURITY)

Academic Hand Book (School of Computer Sciences & Application)



S.				Evaluation Scheme														
s. No.	Subject Code	Subject Name	Course Type	-	Periods		Periods		Periods		Periods		Periods		Internal Marks	External Marks	Total Marks	Credits
1	BCA-NEP-101	Problem Solving using C	C1	4	0	0	25	75	100	4								
2	BCA-NEP-111	SPT-I (Introduction to Cloud)	C2	4	0	0	25	75	100	4								
3	BCA-NEP-104	 Mathematics-I Discrete Mathematics 	DSE	4	0	0	25	75	100	4								
4	NHU-111	English Communication	AECC	3	0	0	15	35	50	3								
5	BCA-NEP-105P	Problem Solving using C Lab	CORE LAB 1	0	0	4	25	25	50	2								
6	BCA-NEP-112P	SPT-I (Introduction to Cloud Lab)	CORE LAB 2	0	0	4	25	25	50	2								
		Grand Total		15	0	8	140	310	450	19								
		2 - Core Course 2, DSE – Discipline Spec e, RP – Research Project	cific Elective, AECC	– Abil	ity Enh	anceme	ent Compulso	ry Course, GE –	- Generic Ele	ctive, SEC-								
		, P- Practical (Labs), NC- Non Credit Co	urse															



		BCA (CLOUD C	COMPUTING AND	CYB	ER S	ECURI	TY)					
		× ×	Semester - II				,					
S.				Evaluation Scheme								
S. No.	Subject Code	Subject Name	Course Type		Perio	ds	Internal Marks	External Marks	Total Marks	Credits		
1	BCA-NEP-201	Data Structure and Algorithms using C	C1	4	0	0	25	75	100	4		
2	BCA-NEP-211	SPT-II (Linux & Administration)	C2	4	0	0	25	75	100	4		
3	BCA-NEP-204	 Mathematics-II Optimization Techniques 	DSE	4	0	0	25	75	100	4		
4	*Code will be decided by parent department	GE-I (To be opted by the students as per the given electives in the list attached)	GE (Mandatory)	4	0	0	25	75	100	4		
5	NHU-112	Environmental & Ecology	AECC	3	0	0	15	35	50	3		
6	BCA-NEP-205P	Data Structure and Algorithms using C Lab	CORE LAB 1	0	0	4	25	25	50	2		
7	BCA-NEP-212P	SPT-II (Linux & Administration Lab)	CORE LAB 2	0	0	4	25	25	50	2		
8	BCA-NEP-207P	MOOC/NPTEL	SEC	4	0	0	50	0	50	4		
		Grand Total		23	0	8	215	385	600	27		
Skill l	Enhancement Cours	 2 - Core Course 2, DSE – Discipline Specif e, RP – Research Project , P- Practical (Labs), NC- Non Credit Cour 		Abili	ty Enl	nancem	ent Compulso	ry Course, Gl	E – Generic E	lective, SEC-		



		BCA (CLOUD C	OMPUTING AND Semester - III		ER S	ECUF	RITY)				
S.				Evaluation Scheme							
S. No.	Subject Code	Subject Name	Course Type		Periods		Internal Marks	External Marks	Total Marks	Credits	
1	BCA-NEP-301	OOPS using JAVA	C1	4	0	0	25	75	100	4	
2	BCA-NEP-311	SPT-III (Advanced Cloud Security)	C2	4	0	0	25	75	100	4	
3	BCA-NEP-304	 Computer System Architecture Data Analytics 	DSE	4	0	0	25	75	100	4	
4	BCA-NEP-303	Communication Skill & Personality Development	AECC	3	0	0	15	35	50	3	
5	BCA-NEP-305P	OOPS using JAVA Lab	CORE LAB 1	0	0	4	25	25	50	2	
6	BCA-NEP-312P	SPT-III (Advanced Cloud Security Lab)	CORE LAB 2	0	0	4	25	25	50	2	
		Grand Total		1 5	0	8	140	310	450	19	
C1	- Core Course 1, C2	2 - Core Course 2, DSE – Discipline Specif	ic Elective, AECC -	Abil	ity En	hance	ment Compu	lsory Course	e, GE – Gene	eric Elective, SEC-	
Skill I	Enhancement Cours	e, RP – Research Project					-	-			
L- 1	Lecture, T- tutorials	, P- Practical (Labs), NC- Non Credit Cour	se								
NOTE	E: STUDENT CAN	TAKE NCC (GENCC-101) AS A GENER	AL ELECTIVE/OP	TION	IAL C	OUR	SE AND CE	RTIFICATE	WILL BE H	PROVIDED	
AFTE	R COMPLETION	OF NCC COURSE.									



		BCA (CLOUD C	OMPUTING AND Semester - IV	CYBE	R SEC	CURIT	TY)							
C				Evaluation Scheme										
S. No.	Subject Code	Subject Name	Course Type	J	Periods		Periods		Periods		Internal Marks	External Marks	Total Marks	Credits
1	BCA-NEP-401	Software Engineering	C1	4	0	0	25	75	100	4				
2	BCA-NEP-411	SPT-IV	C2	4	0	0	25	75	100	4				
3	BCA-NEP-404	 Data Mining Numerical Analysis 	DSE	4	0	0	25	75	100	4				
4	*Code will be decided by parent department	GE-II(To be opted by the students as per the given electives in the list attached)	GE-II (Mandatory)	4	0	0	25	75	100	4				
5	UVE-401	Human Values and Professional Ethics	AECC	3	0	0	15	35	50	3				
6	BCA-NEP-405P	Software Engineering Lab	CORE LAB 1	0	0	4	25	25	50	2				
7	BCA-NEP-412P	SPT-IV Lab	CORE LAB 2	0	0	4	25	0	50	2				
8	BCA-NEP-407P	MOOC/NPTEL	SEC	4	0	0	50	0	50	4				
		Grand Total		23	0	8	215	360	600	27				
Skill l	Enhancement Cours	2 - Core Course 2, DSE – Discipline Specif e, RP – Research Project s, P- Practical (Labs), NC- Non-Credit Cour		Ability	y Enhai	nceme	nt Compulso	ry Course, GE	E – Generic I	Elective, SEC-				



		BCA (CLOUD C	OMPUTING AND Semester - V	CYBI	ER SE	CURI	ГҮ)				
S.				Evaluation Scheme							
S. No.	Subject Code	Subject Name	Course Type	Periods		Internal Marks	External Marks	Total Marks	Credits		
1	BCA-NEP-511	SPT-V	C1	4	0	0	25	75	100	4	
2	BCA-NEP-513	SPT-VI	C2	4	0	0	25	75	100	4	
3	BCA-NEP-503	 Data Communication Network ERP Big Data 	DSE	4	0	0	25	75	100	4	
4	RP-I AUDIT	Research Project-I [@]	AUDIT	0	0	0	50	0	50	NC	
5	BCA-NEP-IP-I	Internship	Industrial Internship (Mandatory)	0	0	10	50	0	50	5	
6	BCA-NEP-512P	SPT-V Lab	CORE LAB 1	0	0	4	25	25	50	2	
7	BCA-NEP-514P	SPT-VI Lab	CORE LAB 2	0	0	4	25	25	50	2	
		Grand Total		12	0	18	225	275	500	21	
Skill I	Enhancement Cours	2 - Core Course 2, DSE – Discipline Specif se, RP – Research Project		- Abilit	y Enha	inceme	ent Compuls	ory Course, C	BE – Generic	Elective, SEC-	
-	· · · · · · · · · · · · · · · · · · ·	s, P- Practical (Labs), NC- Non-Credit Cour									
NOTE	E: @RESEARCH P	ROJECT – I is a Noncredit courses (Audit	Courses) and Stud	ent nee	eds to c	lualify	it but the ma	arks will not l	be added in to	otal marks	



		BCA (CLOUD C	COMPUTING AND Semester - VI		ER SE	CURI	Г Y)					
S.				Evaluation Scheme								
5. No.	Subject Code	Subject Name	Course Type	Periods		Periods		Periods		External Marks	Total Marks	Credits
1	BCA-NEP-611	SPT-VII	C1	4	0	0	25	75	100	4		
2	BCA-NEP-613	SPT-VIII	C2	4	0	0	25	75	100	4		
3	BCA-NEP-603	 Mobile Computing E-Commerce Real Time System 	DSE	4	0	0	25	75	100	4		
4	BCA-NEP-IP-II	Industrial Project	Minor Industrial Project	0	0	10	100	0	100	5		
5	BCA-NEP-612P	SPT-VII Lab	CORE LAB 1	0	0	4	25	25	50	2		
6	BCA-NEP-614P	SPT-VIII Lab	CORE LAB 2	0	0	4	25	25	50	2		
7	*Code will be decided by parent department	GE-III(To be opted by the students as per the given electives in the list attached)	GE- III(Mandatory)	4	0	0	25	75	100	4		
8	BCA-NEP-607P	MOOC/NPTEL	SEC	4	0	0	50	0	50	4		
9	RP-II AUDIT	Research Project-II [@]	AUDIT	0	0	0	50	0	50	NC		
		Grand Total		20	0	18	350	350	700	29		
Skill H	Enhancement Cours	 2 - Core Course 2, DSE – Discipline Specif e, RP – Research Project , P- Practical (Labs), NC- Non-Credit Course 		Ability	y Enha	nceme	nt Compulso	ry Course, GI	E – Generic Ele	ective, SEC-		
		PROJECT – II is a Noncredit courses (Aud		dent ne	eds to	qualify	it but the	marks will no	t be added in t	otal marks		



Academic Hand Book (School of Computer Sciences & Application)



IIMTU-NEP IMPLEMENTATION CBCS: Statement of Credit Distribution

-	BCA [C] EARS	LOUD A	COMPUTER SCINECE A ND CYBER SECURITY]	ND APPLICATIONS				redit Range: 120 - ted by CBCS Com		
Minimum Credit Score Requiredfor Certificate (40)	First year	Semester	Core Course/ Foundation Course	Ability Enhancement Compulsory Course (AECC)	Skill Enhancement Course (SEC)	Discipline Spec Elective (DSE)	cific	Generic Elective (GE) (From other Faculty)	Research Project (RP)	Prerequisite
CERTIFICATE	First Year Credit (46)	Ι	Problem Solving using C (Th. 4 Cr. + P 2Cr.) SPT-I (Introduction to Cloud) (Th. 4 Cr.+ P 2Cr.)	English Communication (Th. 3 Cr.)		 Mathematics I Discrete Mathematics (Th. 4 Cr.) 				
		П	Data Structure Algorithms using C (Th. 4 Cr. + P 2Cr.) SPT-II (Linux and Administration) (Th. 4 Cr. + P 2Cr.)	Environment &Ecology (Th. 3 Cr.)	MOOCS /NPTEL 4 Cr.	 Mathemati Optimizati Technique (Th. 4 Cr.) 	ion	GE-I (Mandatory) 4 Cr.		Problem Solving using C Mathematics I

Note: - Students can take NCC (GENCC-101) as a General Elective/Optional course and certificate will be provided after competition of NCC Course.



College/School:SCHOOL OF COMPUTER SCINECE AND APPLICATIONSCredit Range: 120 - 160Programme: BCA [CLOUD AND CYBER SECURITY](Suggested by CBCS Committee)Duration: 3 YEARSProvision to change the stream onwardsAnnual/Semester – SEMESTERProvision to change the stream onwards

Minimum Credit Score Requiredfor Diploma (80)	Second year	Semester	Core Course/ Foundation Course	Ability Enhancement Compulsory Course (AECC)	Skill Enhancement Course (SEC)	Discipline Specific Elective (DSE)	Generic Elective (GE) (From other Faculty)	Research Project (RP)	Prerequisite
DIPLOMA	Second Year Credit (46)	Ш	OOPS using JAVA (Th. 4 Cr.+ P 2Cr.) SPT-III (Advanced Cloud Security) (Th. 4 Cr.+ P 2Cr.)	Communication Skill & Personality Development (Th. 3 Cr.)		 Computer System Architecture Data Analytics (Th. 4 Cr.) 			
		IV	Software Engineering (Th. 4 Cr. + P 2Cr.) SPT-IV (Th. 4 Cr. + P 2Cr.)	Human Values and Professional Ethics (Th. 3 Cr.)	MOOCS/NPTEL 4 Cr.	 Data Mining Numerical Analysis (Th. 4 Cr.) 	GE-II (Mandatory) 4 Cr.		

Note: - Students can take NCC (GENCC-101) as a General Elective/Optional course and certificate will be provided after competition of NCC Course.



College/School:SCHOOL OF COMPUTER SCINECE AND APPLICATIONS Programme: BCA [CLOUD AND CYBER SECURITY] Duration: 3 YEARS Annual/Semester - SEMESTER

Credit Range: 120 - 160 (Suggested by CBCS Committee) Provision to change the Core Papers (Main Subject)

Minimum Credit Score Required For Degree (120)	year	Semester	Core Course/ Foundation Course	Ability Enhancement Compulsory Course (AECC)	Skill Enhancement Course (SEC)	Discipline Specific Elective (DSE)	Generic Elective (GE) (From other Faculty)	Research Project (RP) /Industrial Internship /Industrial Project	Prerequisite
DEGREE	Third Year Credit (50)	v	SPT-V (Th. 4 Cr.+ P 2Cr.) SPT-VI (Th. 4 Cr.+ P 2Cr.)			 Data Communication Network ERP BIG Data (Th. 4 Cr.) 		RP-I (AUDIT) Non-Credit Research Project-I Internship (5 Cr.)	
		VI	SPT-VII (Th. 4 Cr. + P 2 Cr.) SPT-VIII (Th. 4 Cr. + P 2 Cr.)		MOOCS/NPTEL 4 Cr.	 Mobile Computing E-Commerce Real Time System (Th. 4 Cr.) 	GE-III (Mandatory) 4 Cr.	RP-II (AUDIT) Non-Credit Research Project-II Industrial Project (5 Cr.)	



Academic Hand Book (School of Computer Sciences & Application)



Program	Year	Semester (15	Paper	Credit	Periods per	Periods (Hours) per Semester	Paper Title	Unit (Periods	Prerequisite	Elective (For other faculty)
		weeks)			Week			per		
								semester		
			i) C1 (Th. 4 Cr.	4	4	45	Problem Solving	5		
			+	2	4	10	using C	5		
		$\overline{}$	P 2 Cr.)	3	3	40	Problem Solving			
		C	ii) AECC-I	4	4	45	using C lab	5		
		6	iii) DSE-I				English			
		I ()					Communication			
							1. Mathematics-I			
		ER					2. Discrete			
		TS					Mathematics			
[T]		SEMESTER - I (19 Cr.)	ii) C2 (Th.4 Cr.	4	4	45	[@] SPT – I	5		
S	$\widehat{}$	EN	+	2	4	10	[@] SPT - I Lab			
5	C	\mathbf{v}	P 2 Cr)							
CERTIFICATE COURSE	FIRST YEAR (46 Cr.)		Note: - Students of NCC Course.	can take N	NCC (GEN	CC-101) as a Gener	al Elective/Optional cour	se and certifi	cate will be pr	ovided after competition of
II	IV		i) C3 (Th. 4 Cr.	4	4	45	Data Structure	5		
C	YE		+	2	4	10	Algorithms using C			
E	L		P 2 Cr.)	3	3	40	Data Structure	5		
E	RS	SEMESTER – II (27 Cr.)	ii) AECC-II	4	4	40	Algorithms using C	5		
E	F	7 C	iii) SEC-I & II	4	4	45	Lab Environment &	5		
0		<u>(</u> 2	iv) DSE-II				Ecology			
		II		4	4	45	MOOCS (NPTEL)	5		
		\sim	v) GE-I				1. Mathematics-II			
		E					2. Optimization			
		S					Techniques			
		ME					#To be selected from			
		E					other School			
			ii) C4 (Th.4Cr.	4	4	45	[@] SPT – II	5		
			+	2	4	10	[@] SPT - II Lab			
			P 2 Cr.)							

IIMTU-NEP Implementation: BCA (Cloud and Cyber Security)



Programme Outcome:

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools prediction and modeling to complex engineering activities with an understanding of the limitations.

Programme Specific Outcome:

PSO1: The graduates are proficient in fundamental principles and methods of Computer Science, Mathematical and Scientific reasoning and are able to:

• Apply fundamental concepts of integration, differentiation, vector calculus, probability & statistics, and discrete mathematics.

• Design, create & evaluate algorithms appropriate to specific problems. PSO2: The graduates have understanding for:

• Demonstrate capability for computers, computer network and server environments and there troubleshooting.

• Capacity to handle cloud computing environment and solutions.

• Well defined knowledge for solving problems of security and threats in information knowledge domain.

Programme	Year	Semester (15 weeks)	Paper	Credit	Periods per Week	Periods (Hours) per Semester	Paper Title	Unit (Periods per semester)	Prerequisite	Elective (For other faculty)
			i) C5 (Th. 4 Cr.	4	4	45	OOPS using Java	5		
			+	2	4	10	OOPS using Java			
	$\widehat{\cdot}$	Cr.)	P 2 Cr.)	3	3	40	Lab	5		
SE	Cr.)		ii) AECC-III				Communication			
COURSE	(46	(19		4	4	45	Skill & Personality	5		
0		II	iii) DSE-III				Development			
•	YEAR	I-					1. Computer			
MA	X	ER					System			
DIPLOMA	P	SEMESTER					Architecture			
Id	õ	Ē					2. Data Analytics			
DI	SECOND	EM	i) C6 (Th. 4 Cr.	4	4	45	[@] SPT – III	5		
	\mathbf{S}	S	+ P 2	2	4	10	[@] SPT - III Lab			
			Cr.)							
			Note:- Students	can take	NCC (GEN	ICC-101) as	a General Elective/Op	otional course and	certificate will be p	rovided after competition of



							CHARLES AN ESSAN D
					NCC Cou	urse.	
	i) C7 (Th. 4 Cr.	4	4	45	Software	5	
	+	2	4	10	Engineering		
$\widehat{\cdot}$	P 2 Cr.)	3	3	40	Software	5	
Cr.)	ii) AECC-IV	4	4	40	Engineering Lab	5	
(27	iii) SEC-III &	4	4	45	Human values and	5	
Ň	IV				Professional Ethics		
T	iv) DSE-IV	4	4	45	MOOCS (NPTEL)	5	
R					1. Data Mining		
SEMESTER	v) GE-II				2. Numerical		
E					Analysis		
M					#To be opted from		
S					other School		
	ii) C8 (Th. 4 Cr.	4	4	45	[@] SPT – IV	5	
	+ P 2 Cr.)	2	4	10	[@] SPT - IV Lab		

Programme	Year	Semester (15 weeks)	Paper	Credit	Periods per Week	Periods (Hours) per Semester	Paper Title	Unit (Periods per semester)	Prerequisite	Elective (For other faculty)
COURSE	YEAR (50 Cr.)	(21 Cr.)	i) C9 (Th. 4 Cr. + P 2 Cr.) ii) DSE-V	4 2 4	4 4 4	45 10 45	[@] SPT – V [@] SPT - V Lab 1. Data Communication Network 2. ERP 3. BIG Data	5 5		
DEGREE	THIRD YE	SEMESTER -V (ii) C10 (Th. 4 Cr. + P 2 Cr.) iii) Research Project	4 2 NC 5	4 4 5	45 10 10	[@] SPT – VI [@] SPT - VI Lab Internship	5		
		SEM	iv) Internship (Mandatory)	5	5	10	memsnip			



							This and the state of the state of the state of the state
	i) C11 (Th. 4	4	4	45	[@] SPT – VII	5	
	Cr. +	2	4	10	[@] SPT - VII Lab		
	P 2 Cr.)	4	4	40	MOOCS (NPTEL)	5	
	ii) SEC-V & VI	4	4	45	1.Mobile		
	iii) DSE-VI				Computing	5	
Cr.)	,				2. E-Commerce		
(29		4	4	45	3. Real Time	5	
	iv) GE-III				System		
	<i>,</i>				#To be opted from		
X					other School		
SEMESTER	ii) C12 (Th. 4	4	4	45	[@] SPT – VIII	5	
ES	Cr. + P	2	4	10	[@] SPT - VIII Lab	_	
	2Cr.)						
SE	iii) Research	NC					
	Project	5	5	10	Industrial Project		
	iv) Industrial	-	-				
	Project						
	(Mandatory)						

Annexure -2

List of SPT Subjects -

- 1. Introduction to Cloud
- 2. Linux and Administration
- 3. Advanced Cloud Security
- 4. Advanced Cloud



Academic Hand Book (School of Computer Sciences & Application)



0	nme: Certificate Year: I	
	CA(C& CS) Semester: I	
Credits	Subject: Introduction to Cloud (SPT-I)	
Theory:	•	
Course	Code: Title: Introduction to Cloud	
BCA-NE	EP-111	
Course	Objectives:	
	Explain the core concepts of the cloud computing paradigm: how and why this par- came about, the characteristics, advantages and challenges brought about by t	
n	nodels and services in cloud computing.	
	Apply the fundamental concepts in datacentres to understand the trade-offs efficiency and cost.	in power,
	dentify resource management fundamentals, i.e., resource abstraction, sharing and	sandboxing
	and outline their role in managing infrastructure in cloud computing.	sanaooning
	Analyze various cloud programming models.	
	Apply the models to solve problems on the cloud.	
	of Paper: Core	
	m Passing Marks/Credits: 40% Marks	
L:4	8	
T:0		
P:0(In H	ours/Week)	
Theory -	1 Hr. = 1 Credit	
Practical	- 2 Hrs.=1Credit	
Thetheat	2 11151 Credit	
	/eek=4Credits)	
		No. of
(4Hrs./W	/eek=4Credits)	No. of Lectures
(4Hrs./W	/eek=4Credits)	
(4Hrs./W	Contents What is cloud? History of Cloud Computing, How Cloud Computing works, Advantages and disadvantages, Application for Businesses, Cloud Service	Lectures
(4Hrs./W Unit I	Veek=4Credits) Contents What is cloud? History of Cloud Computing, How Cloud Computing works, Advantages and disadvantages, Application for Businesses, Cloud Service Providers, Cloud Computing Architecture, Cloud Computing Terminology.	Lectures Allotted 10
(4Hrs./W Unit	Contents What is cloud? History of Cloud Computing, How Cloud Computing works, Advantages and disadvantages, Application for Businesses, Cloud Service Providers, Cloud Computing Architecture, Cloud Computing Terminology. Communication-as-a-Service (CaaS), Infrastructure-as-a-Service (IaaS), Monitoring-as-a Service (MaaS), Software-as-a-Service (SaaS), Platform-as-a-	Lectures Allotted
(4Hrs./W Unit I II III	Contents What is cloud? History of Cloud Computing, How Cloud Computing works, Advantages and disadvantages, Application for Businesses, Cloud Service Providers, Cloud Computing Architecture, Cloud Computing Terminology. Communication-as-a-Service (CaaS), Infrastructure-as-a-Service (IaaS), Monitoring-as-a Service (MaaS), Software-as-a-Service (SaaS), Platform-as-a-Service (Paas) Types of Virtualization & its benefits, Introduction to various Virtualization OS o VMware, KVM etc., Basics Commands, Apache Server, FTP Server, Installing Packages. IIS, FTP Server, Types, Priced and open-source products in the market, overview of Public Cloud vendors, Overview of Private cloud products, Introduction to Amazon Cloud-Pricing, Regions Availability Zones, Types of instances, Overview of different services of AWS, Consuming EC2 Instance Service from AWS (Creating Linux and Window Instances from the available AMIs connecting and remote control from the laptop).	Lectures Allotted 10 10
(4Hrs./W Unit I II	Contents What is cloud? History of Cloud Computing, How Cloud Computing works, Advantages and disadvantages, Application for Businesses, Cloud Service Providers, Cloud Computing Architecture, Cloud Computing Terminology. Communication-as-a-Service (CaaS), Infrastructure-as-a-Service (IaaS), Monitoring-as-a Service (MaaS), Software-as-a-Service (SaaS), Platform-as-a-Service (Paas) Types of Virtualization & its benefits, Introduction to various Virtualization OS o VMware, KVM etc., Basics Commands, Apache Server, FTP Server, Installing Packages. IIS, FTP Server, Types, Priced and open-source products in the market, overview of Public Cloud vendors, Overview of Private cloud products, Introduction to Amazon Cloud-Pricing, Regions Availability Zones, Types of instances, Overview of different services of AWS, Consuming EC2 Instance Service from AWS (Creating Linux and Window Instances from the available AMIs connecting and remote control from the laptop). Consuming EBS block storage service from AWS-Adding volumes to Instances	Lectures Allotted 10 10
(4Hrs./W Unit I II III	Contents What is cloud? History of Cloud Computing, How Cloud Computing works, Advantages and disadvantages, Application for Businesses, Cloud Service Providers, Cloud Computing Architecture, Cloud Computing Terminology. Communication-as-a-Service (CaaS), Infrastructure-as-a-Service (IaaS), Monitoring-as-a Service (MaaS), Software-as-a-Service (SaaS), Platform-as-a-Service (Paas) Types of Virtualization & its benefits, Introduction to various Virtualization OS o VMware, KVM etc., Basics Commands, Apache Server, FTP Server, Installing Packages. IIS, FTP Server, Types, Priced and open-source products in the market, overview of Public Cloud vendors, Overview of Private cloud products, Introduction to Amazon Cloud-Pricing, Regions Availability Zones, Types of instances, Overview of different services of AWS, Consuming EC2 Instance Service from AWS (Creating Linux and Window Instances from the available AMIs connecting and remote control from the laptop). Consuming EBS block storage service from AWS-Adding volumes to Instances Taking snapshots, creating volumes from snapshot, attaching volumes to	Lectures Allotted 10 10
(4Hrs./W Unit I II III	Contents What is cloud? History of Cloud Computing, How Cloud Computing works, Advantages and disadvantages, Application for Businesses, Cloud Service Providers, Cloud Computing Architecture, Cloud Computing Terminology. Communication-as-a-Service (CaaS), Infrastructure-as-a-Service (IaaS), Monitoring-as-a Service (MaaS), Software-as-a-Service (SaaS), Platform-as-a-Service (Paas) Types of Virtualization & its benefits, Introduction to various Virtualization OS o VMware, KVM etc., Basics Commands, Apache Server, FTP Server, Installing Packages. IIS, FTP Server, Types, Priced and open-source products in the market, overview of Public Cloud vendors, Overview of Private cloud products, Introduction to Amazon Cloud-Pricing, Regions Availability Zones, Types of instances, Overview of different services of AWS, Consuming EC2 Instance Service from AWS (Creating Linux and Window Instances from the available AMIs connecting and remote control from the laptop). Consuming EBS block storage service from AWS-Adding volumes to Instances	Lectures Allotted 10 10



j	instances, Automating installing and tasks at the booting tir	ne of a instance,
۲	Using the Load Balancers for load distribution(ELB), Installi	ng command line
	tools, Using clouds watch service, Using Route 53 service, Cre	0
	Virtual Private Cloud- Public and Private Network Scenarios	
	service, Creating a MySQL database using RDS service, IAM	2
	Management, Taking backups using command line tools, U	
	management tools, including auto scaling, EFS, SNS(Sin	-
	System), CDN(Content Delivery Network), Glacier Service Doc Services	s, mail Services,
Text Boo		I
	mar Buyya, "Mastering Cloud Computing", Tata Mc. Graw-Hi	ll Education.
2. Rajku	mar Buyya, James Broberg & Andrzej Goscinski, "Cloud gms", Wiley.	
Reference		
1. Rajkur	marBuyya, "Mastering Cloud Computing", Tata McGraw-Hill	Education.
2. Rajkur	marBuyya, James Broberg& Andrzej Goscinski, "Cloud	Computing: Principles and
	gms", Wiley.	
	ny T. Velte, Tobey J. Velte & Robert Elsenpeter, "Clo	ud Computing: A Practical
Appro	ach", Tata McGraw Hill.	
	Evaluation/Assessment Methodology	
1) (1)		Max. Marks 100
/	tasks/ Sessional Examination	15
 2) Presen 3) Assign 	tations /Seminar	
· ·	rch Project Report	10
	ar On Research Project Report	10
5) ESE	ar on Research Project Report	75
J) LUL	Total:	100
Prerequisi	tes for the course: NIL	100
	earning Outcomes:	
	Explain the core concepts of the cloud computing paradigm:	how and why this paradigm
	shift came about, the characteristics, advantages and challenges	
1	models and services in cloud computing.	
	Apply the fundamental concepts in data centres to underst efficiency and cost.	and the trade-offs in power,
	Identify resource management fundamentals, i.e. resource	e abstraction, sharing and
	sandboxing and outline their role in managing infrastructure in	-
	Analyse various cloud programming models.	
CO 5:	Apply the models to solve problems on the cloud.	



Program	me: Ce	rtificate	Year: I	
Class: BC			Semester: I	
Credits		Subject: Problem Solving using		
Theory:40	Cr	Subject. I robient Solving using	e	
Practical:				
Course C		Title: Problem Solving using C		
BCA-NE		The Troben Solving using C		
Course C		PC•		
	•		ics of programming language and	Fundamental
		s of C Language.	ies of programming language and	i unuumentui
	-	6 6	nderstand Concepts of basic progra	mming with
		onal and Iterative Control statemer		inning with
			Arrays, Pointers, Functions, categorie	es of function
	and rec	-	Tirrays, Tolineis, Tunetions, europoine	is of function
			with Structure; learn Union and Cor	nnlete String
	Operati		i with Structure, learn emon and con	inplete String
	-		g programs to perform read write oper	rations
Nature of			is programs to perform read write oper	utions.
		ng Marks/Credits: 40% Marks		
L:4	11 1 4551			
T:0				
P: 0 (In H	lours/W	eek)		
		,		
	$I H T \equiv$	1 Credit		
•		1 Credit		
Practical-	2 Hrs.=	-1 Credit		
Practical- (4Hrs./W	2 Hrs.=	=1 Credit redits)	nts	No. of
Practical-	2 Hrs.=	-1 Credit	nts	No. of Lectures
Practical- (4Hrs./W	2 Hrs.=	=1 Credit redits)	nts	Lectures
Practical- (4Hrs./Wo Unit	2 Hrs.= eek=4C	1 Credit redits) Conter		Lectures Allotted
Practical- (4Hrs./W	2 Hrs.= eek=4C	-1 Credit redits) Conten luction to 'C' Language: Hi	story, C Character Set, Tokens,	Lectures
Practical- (4Hrs./Wo Unit	2 Hrs.= eek=4C Introd Keywo	 1 Credit redits) Conten Language: Hi brds, Constants, Identifiers, Va 	story, C Character Set, Tokens, rriables, Data Types, Comments,	Lectures Allotted
Practical- (4Hrs./Wo Unit	2 Hrs.= eek=4C Introd Keywo Structu	I Credit redits) Conter luction to 'C' Language: Hi ords, Constants, Identifiers, Va ures of 'C' Program, Introduc	story, C Character Set, Tokens, ariables, Data Types, Comments, etion to Pre-processor Directives:	Lectures Allotted
Practical- (4Hrs./Wo Unit	2 Hrs.= eek=4C Introd Keywo Structu #includ	El Credit redits) Conter Iuction to 'C' Language: Hi ords, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), D	story, C Character Set, Tokens, ariables, Data Types, Comments, etion to Pre-processor Directives: eclaration, Assignment, Operators,	Lectures Allotted
Practical- (4Hrs./Wo Unit	2 Hrs.= eek=4C Introd Keywo Structu #inclue Expres	Conter Iuction to 'C' Language: Hi brds, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), D ssions, Statements, Arithmetic Exp	story, C Character Set, Tokens, ariables, Data Types, Comments, etion to Pre-processor Directives: eclaration, Assignment, Operators, ressions.	Lectures Allotted
Practical- (4Hrs./Wo Unit	2 Hrs.= eek=4C Introd Keywo Structu #inclue Expres Branc	Conter Iuction to 'C' Language: Hi brds, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), D ssions, Statements, Arithmetic Exp. hing and Looping: Two Way S	story, C Character Set, Tokens, ariables, Data Types, Comments, etion to Pre-processor Directives: eclaration, Assignment, Operators, ressions. Selection (if, if-else, Nested if-else,	Lectures Allotted 10
Practical- (4Hrs./Wo Unit	2 Hrs.= eek=4C Introd Keywo Structu #inclue Expres Branc cascad	Luction to 'C' Language: Hi brds, Constants, Identifiers, Va ares of 'C' Program, Introduc de, #define, printf(), scanf(), D ssions, Statements, Arithmetic Exp hing and Looping: Two Way S ed if-else), Switch Statement, T	story, C Character Set, Tokens, ariables, Data Types, Comments, etion to Pre-processor Directives: eclaration, Assignment, Operators, ressions. Selection (if, if-else, Nested if-else, Ternary Operator, goto Statement,	Lectures Allotted 10
Practical- (4Hrs./Wo Unit	2 Hrs.= eek=4C Introd Keywo Structu #includ Expres Branc cascad Loops	Luction to 'C' Language: Hi ords, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), D ssions, Statements, Arithmetic Exp hing and Looping: Two Way S ed if-else), Switch Statement, T (for, while, do-while) in C, brea	story, C Character Set, Tokens, ariables, Data Types, Comments, etion to Pre-processor Directives: eclaration, Assignment, Operators, ressions. Selection (if, if-else, Nested if-else,	Lectures Allotted 10
Practical- (4Hrs./Wo Unit	2 Hrs.= eek=4C Introd Keywo Structu #includ Expres Branc cascad Loops Loops	El Credit redits) Conter Auction to 'C' Language: Hi ords, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), D ssions, Statements, Arithmetic Exp hing and Looping: Two Way S ed if-else), Switch Statement, T (for, while, do-while) in C, brea	story, C Character Set, Tokens, ariables, Data Types, Comments, etion to Pre-processor Directives: eclaration, Assignment, Operators, ressions. Selection (if, if-else, Nested if-else, Ternary Operator, goto Statement, ak and continue Statements, Nested	Lectures Allotted 10
Practical- (4Hrs./Wo Unit	2 Hrs.= eek=4C Introd Keywo Structu #inclue Expres Branc cascad Loops Loops Array	Conter Iuction to 'C' Language: Hi brds, Constants, Identifiers, Va ares of 'C' Program, Introduc de, #define, printf(), scanf(), D ssions, Statements, Arithmetic Exp hing and Looping: Two Way S ed if-else), Switch Statement, T (for, while, do-while) in C, brea s: Types of Arrays, Array Declara	story, C Character Set, Tokens, ariables, Data Types, Comments, etion to Pre-processor Directives: eclaration, Assignment, Operators, ressions. Selection (if, if-else, Nested if-else, Ternary Operator, goto Statement, ak and continue Statements, Nested ation, Array Initialization, Accessing	Lectures Allotted 10
Practical- (4Hrs./Wo Unit	2 Hrs.= eek=4C Introd Keywo Structu #includ Expres Branc cascad Loops Loops Array Data fi	Luction to 'C' Language: Hi brds, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), D ssions, Statements, Arithmetic Exp hing and Looping: Two Way S ed if-else), Switch Statement, T (for, while, do-while) in C, brea s: Types of Arrays, Array Declara com Array, Using Arrays with Fund	story, C Character Set, Tokens, ariables, Data Types, Comments, etion to Pre-processor Directives: eclaration, Assignment, Operators, ressions. Selection (if, if-else, Nested if-else, Ternary Operator, goto Statement, ak and continue Statements, Nested attion, Array Initialization, Accessing ctions, Multi-Dimensional Arrays.	Lectures Allotted 10
Practical- (4Hrs./Wo Unit	2 Hrs.= eek=4C Introd Keywo Structu #inclue Expres Branc cascad Loops Loops Array Data fi Pointe	Conter Inction to 'C' Language: Hi brds, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), D ssions, Statements, Arithmetic Exp hing and Looping: Two Way S ed if-else), Switch Statement, T (for, while, do-while) in C, brea s: Types of Arrays, Array Declara com Array, Using Arrays with Func- ers: Basics, Pointer and Function, A	story, C Character Set, Tokens, ariables, Data Types, Comments, etion to Pre-processor Directives: eclaration, Assignment, Operators, ressions. Selection (if, if-else, Nested if-else, Ternary Operator, goto Statement, ak and continue Statements, Nested ation, Array Initialization, Accessing ctions, Multi-Dimensional Arrays. Array of Pointers.	Lectures Allotted 10
Practical- (4Hrs./Wo Unit	2 Hrs.= eek=4C Introd Keywo Structu #includ Expres Branc cascad Loops Loops Array Data fi Pointe Storag	Conter Inclusion to 'C' Language: Hi brds, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), D ssions, Statements, Arithmetic Exp hing and Looping: Two Way S ed if-else), Switch Statement, Ta (for, while, do-while) in C, brea s: Types of Arrays, Array Declara com Array, Using Arrays with Func- pres: Basics, Pointer and Function, A ge Classes: Automatic, External, Statement, S	story, C Character Set, Tokens, ariables, Data Types, Comments, etion to Pre-processor Directives: eclaration, Assignment, Operators, ressions. Selection (if, if-else, Nested if-else, Fernary Operator, goto Statement, ak and continue Statements, Nested attion, Array Initialization, Accessing ctions, Multi-Dimensional Arrays. Array of Pointers. tatic & Register.	Lectures Allotted 10
Practical- (4Hrs./Wo Unit	2 Hrs.= eek=4C Introd Keywo Structu #includ Expres Branc cascad Loops Loops Array Data fi Pointe Storag Funct	Conter Inclusion to 'C' Language: Hi brds, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), D ssions, Statements, Arithmetic Exp hing and Looping: Two Way S ed if-else), Switch Statement, The (for, while, do-while) in C, brea s: Types of Arrays, Array Declarate trom Array, Using Arrays with Func- ers: Basics, Pointer and Function, A ge Classes: Automatic, External, Statement, Statement	story, C Character Set, Tokens, ariables, Data Types, Comments, etion to Pre-processor Directives: eclaration, Assignment, Operators, ressions. Selection (if, if-else, Nested if-else, Ternary Operator, goto Statement, ak and continue Statements, Nested attion, Array Initialization, Accessing ctions, Multi-Dimensional Arrays. Array of Pointers. tatic & Register. declaring a Function, defining a	Lectures Allotted 10
Practical- (4Hrs./Wo Unit	2 Hrs.= eek=4C Introd Keywo Structu #includ Expres Branc cascad Loops Loops Array Data fi Pointe Storag Functi	I Credit redits) Conter Auction to 'C' Language: Hi ords, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), D ssions, Statements, Arithmetic Exp hing and Looping: Two Way S ed if-else), Switch Statement, T (for, while, do-while) in C, brea s: Types of Arrays, Array Declara com Array, Using Arrays with Fund rs: Basics, Pointer and Function, A ge Classes: Automatic, External, Si ions: Advantages of Functions, on, calling a Function, Argument	story, C Character Set, Tokens, ariables, Data Types, Comments, etion to Pre-processor Directives: eclaration, Assignment, Operators, ressions. Selection (if, if-else, Nested if-else, Ternary Operator, goto Statement, ak and continue Statements, Nested ation, Array Initialization, Accessing ctions, Multi-Dimensional Arrays. Array of Pointers. tatic & Register. declaring a Function, defining a t Passing – Call by Value, Call by	Lectures Allotted 10
Practical- (4Hrs./Wo Unit	2 Hrs.= eek=4C Introd Keywo Structu #includ Expres Branc cascad Loops Loops Array Data fi Pointe Storag Functi Refere	Conter Inclusion to 'C' Language: Hi brds, Constants, Identifiers, Va ures of 'C' Program, Introduc de, #define, printf(), scanf(), D ssions, Statements, Arithmetic Exp hing and Looping: Two Way S ed if-else), Switch Statement, T (for, while, do-while) in C, brea s: Types of Arrays, Array Declara com Array, Using Arrays with Fund- rs: Basics, Pointer and Function, A ge Classes: Automatic, External, Statement ions: Advantages of Functions, on, calling a Function, Argument nce, Types of Functions, Recursion	story, C Character Set, Tokens, ariables, Data Types, Comments, etion to Pre-processor Directives: eclaration, Assignment, Operators, ressions. Selection (if, if-else, Nested if-else, Ternary Operator, goto Statement, ak and continue Statements, Nested ation, Array Initialization, Accessing ctions, Multi-Dimensional Arrays. Array of Pointers. tatic & Register. declaring a Function, defining a t Passing – Call by Value, Call by	Lectures Allotted 10



	Francisco Providencia Contraction	System, Transforming Lives	Section 2f & 12B				
	and Output Functions, String Pointer, Array of Strings, Pas	ssing String to					
	Function.						
	Structure and Union: Basic of Structures, Structures and Fu	unctions, Array					
	of Structures, Pointer to Structure, Union.						
V	File Handling: Introduction, File Types- Text, Binary, Th	e File Pointer,	8				
	Opening a File, Closing a File, Reading and Writing a File,	File Handling					
	Functions: fgetc(), fputc(), fputs(), fgets(), fprintf(), fscanf(), fwrite(), fread(),						
	fseek(), ftell(), feof(), etc.						
Text Bo	oks:						
1. E. Ba	la Guruswamy, "Programming in ANSI C", Tata Mc. Graw-Hill	education.					
	wantKanetkar, "Let us C", BPB Publications						
Reference							
1. V Ra	jaraman, "Computer Basics and C Programming", PHI Learning	g					
-	k N. Kamthane, "Programming in C", Pearson Education.						
	Evaluation/Assessment Methodology						
		May	x. Marks 100				
1) Class	tasks/ Sessional Examination	15					
	ntations /Seminar						
,	gnments						
· · ·	arch Project Report	10					
	nar On Research Project Report						
5) ESE	5 1	75					
	Total:	100					
Prerequis	sites for the course: NIL	100					
-	Learning Outcomes:						
	tudents will be able to develop programs based on fundamental	concents of pro	oramming in				
CO1. 5		concepts of pre					
-	 tudents will be able to solve problems based on Conditional and	Iterative Contro	1 Statements				
	tudents will be able to learn Complete Programming Concepts						
	amiliar with modular programming Concepts of C using Functio		mers and get				
	tudents will be able to learn conceptual programming with		cture and its				
	ifferentiation with Union.	in Sume, Suu					
	tudents will be able to perform File handling programs with reac	l and write conc	ante				
CO3. 3	reducits will be able to perform the nanoning programs with feat		-pis.				



Progra	mme: Ce	rtificate	Year: I	
0	BCA(C&		Semester: I	
Credit	-	Subject: Discrete Ma	thematics	
Theory	:4Cr	Ū		
Course	e Code:	Title: Discrete Mathe	ematics	
BCA-N	NEP-104			
Course	Objective	s:		
CO1:	Identify	and prove properties of	of Algebraic Structures like Groups, Rings and Field	lds.
CO2:			es and recursive functions.	
CO3:			torics to solve basic problems in discrete mathema	
CO4:		6	notation to define and formally reason about bas	ic discrete
		es such as Sets, Relation		
CO5:		-	ts using logical connectives and quantifiers to	
		<u> </u>	h truth tables and propositional and predicate logic	2.
	^	Discipline Specific El		
	im Passin	g Marks/Credits:40%	6 Marks	
L:4				
T:0	TT /XX7	1 \		
	Hours/We	· · · · · · · · · · · · · · · · · · ·		
2	-1Hr.=1Ci		Credita	
Unit	ai-2mrs.=1	Credit(4Hrs./Week=4	Contents	No. of
Umt			Contents	Lectures
				Allotted
Ι	Set The	ory: Introduction S	Size of set sand Cardinals, Venn diagrams,	8
1		•	, ordered pairs and Set Identities.	0
			of functions, Operations on functions, recursively	
	defined fu			
			ns on relations, Composite relations, Properties of	
		Equality of relations,		
II		- ·	Lattices: Introduction, Partial ordered sets,	8
	Combina	tion of Partial ordered	d sets, Hasse diagram, Introduction on flattices,	
			, Complemented, Modular and Complete lattice.	
	Boolean	Algebra: Introductio	n, Axioms and Theorems of Boolean algebra,	
	Boolean	functions. Simplificati	on of Boolean functions, Karnaugh maps, Logic	
	gates.			
III	Predicat	e Logic: Theory of	F Predicates, First order predicate, Predicate	8
		0	1 · · · ·	
		Quantifiers, Inference	e theory of predicate logic.	
	Propositi	Quantifiers, Inference ional: Propositions, Tr	ruth tables, Tautology, Contradiction, Algebra of	
	Propositi	Quantifiers, Inference ional: Propositions, Tr		
IV	Proposit i Propositi	Quantifiers, Inference ional: Propositions, Tr ons, Theory of Inferen	ruth tables, Tautology, Contradiction, Algebra of	8
IV	Proposition Proposition Algebrai	Quantifiers, Inference ional: Propositions, Tr ons, Theory of Inferen c Structures: Introd	ruth tables, Tautology, Contradiction, Algebra of ce and Natural Detection.	8
IV	Proposition Proposition Algebrain Types of	Quantifiers, Inference ional: Propositions, Trons, Theory of Inferen c Structures: Introd algebraic structures: S	ruth tables, Tautology, Contradiction, Algebra of ce and Natural Detection. uction to algebraic Structures and properties.	8
IV	Proposition Proposition Algebrain Types of Propertien	Quantifiers, Inference ional: Propositions, Trons, Theory of Inferen c Structures: Introd algebraic structures: S	ruth tables, Tautology, Contradiction, Algebra of ce and Natural Detection. uction to algebraic Structures and properties. Semi group, Monoid, Group, Abelian group and p, Cyclic group, Cosets, Permutation groups,	8



	Transforming Education Syste		Section 21 & 128			
	Natural Numbers: Introduction, Piano's axioms, Mathematic	al Induction,	8			
	Strong Induction and Induction with Nonzero Base cases.					
	Recurrence Relation & Generating functions: Introduction and properties of					
	Generating Functions. Simple Recurrence relation with constant co					
	Linear recurrence relation without constant coefficients. Method	ds of solving				
	recurrences.					
	Combinatorics: Introduction, Counting techniques and Pigeonhole principle,					
	Polya's Counting theorem.					
Text Bo						
	neth H. Rosen, "Discrete Mathematics and Its Applications", Mc. G					
2. B.K	Colman, R.C. Bus by and S.C. Ross, "Discrete Mathematics Structur	es", Prentice H	lall, 2004.			
	ce Book:					
	Girimaldi, "Discrete and Combinatorial Mathematics", Addison W	•				
2. Y.N	I. Singh, "Discrete Mathematical Structures", Wiley-India, First edit	tion, 2010.				
	Evaluation/Assessment Methodology					
		Max. Ma	rks 100			
/	s tasks/Sessional Examination	15	5			
/	entations /Seminar					
3) Assi	gnments					
	earch Project Report	10)			
	inar On Research Project Report					
5) ESE		75	5			
	Total:	10	0			
Prerequ	isites for the course: NIL					
Course	Learning Outcomes:					
CO1:	Able to identify the properties of functions and relations.					
CO2:	Able to understand the concepts of sets and perform operations.					
CO3:	Able to verify the correctness of an argument using truth tables.					
CO4:	Able to solve problem using counting techniques and combinatorie	cs.				
CO5:	Able to analyze preposition and predicate logics.					



Program	nme: Ce	rtificate Year: I					
Class:	BCA(C&	& CS) Semester: I					
Credits		Subject: English communication					
Theory:	3						
Course	Code:	Title: English Communication					
NHU-1	111						
Course	Objectiv	'es:					
CO1:	It aims writing.	to improve English communication skills i.e., Listening, speaking,	reading, &				
CO2:	To deve	To develop potential skills to deal confidently in English with diverse situations in the external world.					
CO3:		in a collaborative manner & communicate effectively in English.					
CO3: CO4:	To get exposure to various activities related to English Communication which will enable						
04.	the learners to take initiative, solve problems, and demonstrate a positive work ethics.						
Nature		ers to take initiative, solve problems, and demonstrate a positive work energy are a positive work energy and the solution of	incs.				
	_	ing Marks/Credits: 40% Marks					
L: 3	uiii i uss						
T: 0							
	h Hours/W	Veek)					
		= 1 Credit					
Unit		Contents	No. of				
0			Lectures				
			Allotted				
Ι	English	h Communication skills:	8				
	0	ng skills,	-				
		ng skills,					
	-	g skills,					
	writing						
	0	g and sustaining a conversation.					
		s of Communication, Essential of effective Communication, Barriers					
	to Com	nmunication, Role of Communication					
II	Public semina Adjecti Comm	Speech, Delivering skills, Group discussion, Communication in urs, Conferences and Committees Parts of Speech- Noun, Pronoun, ive, Verb, Adverb, Conjunction, Preposition, Interjection, Articles, on errors in English	8				
III	Present Etiquet	tation: Features, Styles, Use of visual aids, Creating a Dynamic tation, Presentation and interaction, Telephonic conversation & Basic tte.Non Verbal Communication: Meaning, Types and Importance. ng: Difference between Listening and Hearing.	8				
IV	Word S	Skills-Synonyms, Antonyms, Words often Confused, Idioms, Phrases, l Verbs.	8				
V	Draftin Corres	ng of Notices, Agendas, Minutes, Job Application letter, CV, Business pondence, Essentials of Effective Business Correspondence, Types ructure of Business Letter.	8				



Text Books:

- English Grammar and Composition by Wren & Martin
- Effective Communication and Soft Skills by Nitin Bhatnagar
- The ACE of Soft Skills: Attitude, Communication and Etiquette for Success by Gopalaswamy Ramesh and Mahadevan Ramesh.

Reference

- English Grammar in Use by Raymond Murphy
- English Grammar Composition and Usage by J.C. Nesfield

Evaluation/Assessment Methodology				
	Max. Marks 50			
1) Class tasks/ Sessional Examination	15			
2) Presentations /Seminar/Attendance				
3) Assignments/TA				
4) Research Project Report	Nil			
Seminar On Research Project Report				
5) ESE	35			
Total:	50			
Prerequisites for the course: NIL				
Course Learning Outcome				
CO1: To get knowledge about communication skills.				
CO2: To understand about use of grammar.				
CO3: To understand about presentation.				
CO4: To get information about how to face interview and public.				
CO5: To get knowledge about telephonic conversation & etiquette.				



Progra	amme: Certifi	icate	Year: I				
Class:	BCA(C& CS	5)	Semester: I				
Credit	ts	Subject:Math	ematics-I				
Theory	y:4Cr						
Cours	e Code:	Title: Mathem	natics-I				
BCA-NEP-104							
Cours	e Objectives:						
CO1:	1 5 1						
CO2:	CO2: Computation of Limits of Various Types of Functions, Continuity over an Inter-						
	Intermediat	e Value Theore	m and type of Discontinuities.				
CO3:	Understand	the Derivative	es, Chain Rule, Derivatives of Composite Functions,	Logarithmic			
	Differentiat	ion, Successive	Differentiation.				
CO4:	Use of diff	erent theorems	like Rolle's Theorem, Mean Value Theorem, Leibn	itz Theorem,			
	Partial Diffe	erentiation, Eul	er's Theorem.				
CO5:		0 0	l as Limit of Sum, Riemann Sum, Fundamental	Theorem of			
			als, Methods of Integration Substitution.				
Natur	e of Paper: D	SE					
Minim	num Passing	Marks/Credits	: 40% Marks				
L:4							
T:0							
P:0(In	Hours/Week)						
Theory	y - 1 Hr. = 1 C	redit					
Practic	cal- 2 Hrs.=1C	tredit(4Hrs./We	ek=4Credits)				
Practic Unit	cal- 2 Hrs.=1C		contents	No. of			
	cal- 2 Hrs.=1C			Lectures			
Unit		fredit(4Hrs./We	Contents	Lectures Allotted			
	Determinan	tredit(4Hrs./We	Contents Minors, Cofactors, Properties of Determinants,	Lectures			
Unit	Determinan Matrices:	tredit(4Hrs./We ts: Definition, 1 Definition, Ty	Contents Minors, Cofactors, Properties of Determinants, pes of Matrices, Addition, Subtraction, Scalar	Lectures Allotted			
Unit	Determinan Matrices : Multiplication	ts: Definition, Ty on and Multipli	Contents Minors, Cofactors, Properties of Determinants, rpes of Matrices, Addition, Subtraction, Scalar cation of Matrices, Adjoint, Inverse, Cramer's Rule,	Lectures Allotted			
Unit	Determinan Matrices: Multiplicatio Rank of Mat	ts: Definition, Ty on and Multipli	Contents Minors, Cofactors, Properties of Determinants, pes of Matrices, Addition, Subtraction, Scalar	Lectures Allotted			
Unit	Determinan Matrices: Multiplicatio Rank of Mat proof)	ts: Definition, I Definition, Ty on and Multipli- trix, Eigen Vect	Contents Minors, Cofactors, Properties of Determinants, pes of Matrices, Addition, Subtraction, Scalar cation of Matrices, Adjoint, Inverse, Cramer's Rule, tors of a Matrix, Cayley-Hamilton Theorem (without	Lectures Allotted 8			
Unit	Determinan Matrices: D Multiplicatio Rank of Mat proof) Limits & C	ts: Definition, I Definition, Ty on and Multipli- trix, Eigen Vect	Contents Minors, Cofactors, Properties of Determinants, rpes of Matrices, Addition, Subtraction, Scalar cation of Matrices, Adjoint, Inverse, Cramer's Rule, tors of a Matrix, Cayley-Hamilton Theorem (without nit at a Point, Properties of Limit, Computation of	Lectures Allotted			
Unit	Determinan Matrices: Multiplicatio Rank of Mat proof) Limits & C Limits of Va	ts: Definition, I Definition, Ty on and Multipli- trix, Eigen Vect Continuity: Lin prious Types of	Contents Minors, Cofactors, Properties of Determinants, pes of Matrices, Addition, Subtraction, Scalar cation of Matrices, Adjoint, Inverse, Cramer's Rule, tors of a Matrix, Cayley-Hamilton Theorem (without mit at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an	Lectures Allotted 8			
Unit I II	Determinan Matrices: Multiplicatic Rank of Mat proof) Limits & C Limits of Va Interval, Interval	ts: Definition, Ty Definition, Ty on and Multipli- trix, Eigen Vect Continuity: Lin trious Types of trimediate Value	Contents Minors, Cofactors, Properties of Determinants, pes of Matrices, Addition, Subtraction, Scalar cation of Matrices, Adjoint, Inverse, Cramer's Rule, tors of a Matrix, Cayley-Hamilton Theorem (without nit at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an e Theorem, Type of Discontinuities.	Lectures Allotted 8			
Unit	Determinan Matrices: Multiplicatio Rank of Mat proof) Limits & C Limits of Va Interval, Inter	ts: Definition, I Definition, Ty on and Multipli- trix, Eigen Vect Continuity: Lin trious Types of trimediate Value ion: Derivativ	Contents Minors, Cofactors, Properties of Determinants, pes of Matrices, Addition, Subtraction, Scalar cation of Matrices, Adjoint, Inverse, Cramer's Rule, tors of a Matrix, Cayley-Hamilton Theorem (without nit at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an e Theorem, Type of Discontinuities. e, Derivatives of Sum, Differences, Product &	Lectures Allotted 8			
Unit I II	Determinan Matrices: Multiplicatio Rank of Mat proof) Limits & C Limits of Va Interval, Inter Differentiat quotients, C	ts: Definition, I Definition, Ty on and Multipli- crix, Eigen Vect Continuity: Lin rious Types of ermediate Value ion: Derivativ Chain Rule, D	Contents Minors, Cofactors, Properties of Determinants, pes of Matrices, Addition, Subtraction, Scalar cation of Matrices, Adjoint, Inverse, Cramer's Rule, tors of a Matrix, Cayley-Hamilton Theorem (without nit at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an e Theorem, Type of Discontinuities. e, Derivatives of Sum, Differences, Product & Derivatives of Composite Functions, Logarithmic	Lectures Allotted 8 8			
Unit I II III	Determinan Matrices: Multiplicatic Rank of Mat proof) Limits & C Limits of Va Interval, Inte Differentiat quotients, C Differentiat	ts: Definition, I Definition, Ty on and Multipli- trix, Eigen Vect Continuity: Lin trious Types of ermediate Value ion: Derivativ Chain Rule, D on, Successive	Contents Minors, Cofactors, Properties of Determinants, pes of Matrices, Addition, Subtraction, Scalar cation of Matrices, Adjoint, Inverse, Cramer's Rule, tors of a Matrix, Cayley-Hamilton Theorem (without nit at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an e Theorem, Type of Discontinuities. e, Derivatives of Sum, Differences, Product & Derivatives of Composite Functions, Logarithmic Differentiation.	Lectures Allotted 8 8 8 8			
Unit I II	Determinan Matrices: Multiplication Rank of Mate proof) Limits & C Limits of Va Interval, Interval, Interv	ts: Definition, I Definition, Ty on and Multipli- trix, Eigen Vect Continuity: Lin trious Types of trimediate Value ion: Derivativ Chain Rule, D on, Successive of Different	Contents Minors, Cofactors, Properties of Determinants, pes of Matrices, Addition, Subtraction, Scalar cation of Matrices, Adjoint, Inverse, Cramer's Rule, tors of a Matrix, Cayley-Hamilton Theorem (without nit at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an e Theorem, Type of Discontinuities. e, Derivatives of Sum, Differences, Product & Derivatives of Composite Functions, Logarithmic Differentiation. iation: Rolle's Theorem, Mean Value Theorem,	Lectures Allotted 8			
Unit I II III	Determinan Matrices: I Multiplicatio Rank of Mat proof) Limits & C Limits of Va Interval, Inter Differentiat quotients, C Differentiation Expansion of	ts: Definition, I Definition, Ty on and Multipli- crix, Eigen Vect Continuity: Lin arious Types of crmediate Value ion: Derivativ Chain Rule, D on, Successive of Different of Functions (N	Contents Minors, Cofactors, Properties of Determinants, pes of Matrices, Addition, Subtraction, Scalar cation of Matrices, Adjoint, Inverse, Cramer's Rule, tors of a Matrix, Cayley-Hamilton Theorem (without nit at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an <u>e Theorem, Type of Discontinuities.</u> e, Derivatives of Sum, Differences, Product & Derivatives of Composite Functions, Logarithmic Differentiation. iation: Rolle's Theorem, Mean Value Theorem, Maclaurin's & Taylor's), Indeterminate Forms, L'	Lectures Allotted 8 8 8 8			
Unit I II III	Determinan Matrices: Multiplication Rank of Mat proof) Limits & C Limits of Va Interval, Inter Oifferentiation Expansion of Hospitals Ru	ts: Definition, 1 Definition, Ty Definition, Ty on and Multipli- trix, Eigen Vect Continuity: Lin trious Types of trimediate Value ion: Derivativ Chain Rule, D on, Successive of Different of Functions (N ale, Maxima &	Contents Minors, Cofactors, Properties of Determinants, pes of Matrices, Addition, Subtraction, Scalar cation of Matrices, Adjoint, Inverse, Cramer's Rule, tors of a Matrix, Cayley-Hamilton Theorem (without nit at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an e Theorem, Type of Discontinuities. e, Derivatives of Sum, Differences, Product & Derivatives of Composite Functions, Logarithmic Differentiation. iation: Rolle's Theorem, Mean Value Theorem,	Lectures Allotted 8 8 8 8			
Unit I II III	Determinan Matrices: Multiplication Rank of Mat proof) Limits & C Limits of Va Interval, Interval, Interva	ts: Definition, I Definition, Ty on and Multipli- trix, Eigen Vect Continuity: Lin trious Types of trimediate Value ion: Derivativ Chain Rule, D on, Successive of Different of Functions (N ule, Maxima & orem.	Contents Minors, Cofactors, Properties of Determinants, pes of Matrices, Addition, Subtraction, Scalar cation of Matrices, Adjoint, Inverse, Cramer's Rule, tors of a Matrix, Cayley-Hamilton Theorem (without nit at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an e Theorem, Type of Discontinuities. e, Derivatives of Sum, Differences, Product & Derivatives of Composite Functions, Logarithmic Differentiation. iation: Rolle's Theorem, Mean Value Theorem, Maclaurin's & Taylor's), Indeterminate Forms, L' Minima, Leibnitz Theorem, Partial Differentiation,	Lectures Allotted 8 8 8 8 8 8 8 8 8			
Unit I II III	Determinan Matrices: I Multiplicatio Rank of Mat proof) Limits & C Limits of Va Interval, Inter Differentiate quotients, C Differentiate Application Expansion of Hospitals Ru Euler's Theo Integration	ts: Definition, I Definition, Ty on and Multipli- crix, Eigen Vect Continuity: Lin arious Types of crimediate Value ion: Derivativ Chain Rule, D on, Successive of Different of Functions (N ale, Maxima & orem. Integral as Lir	Contents Minors, Cofactors, Properties of Determinants, pes of Matrices, Addition, Subtraction, Scalar cation of Matrices, Adjoint, Inverse, Cramer's Rule, tors of a Matrix, Cayley-Hamilton Theorem (without nit at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an e Theorem, Type of Discontinuities. e, Derivatives of Sum, Differences, Product & Derivatives of Composite Functions, Logarithmic Differentiation. iation: Rolle's Theorem, Mean Value Theorem, Maclaurin's & Taylor's), Indeterminate Forms, L' Minima, Leibnitz Theorem, Partial Differentiation, nit of Sum, Riemann Sum, Fundamental Theorem of	Lectures Allotted 8 8 8 8			
Unit I II III	Determinan Matrices: Multiplication Rank of Mat proof) Limits & C Limits of Va Interval, Interval, Interva	ts: Definition, I Definition, Ty Definition, Ty on and Multipli- trix, Eigen Vect Continuity: Lin trious Types of trimediate Value ion: Derivativ Chain Rule, D on, Successive of Different of Functions (N ale, Maxima & orem. Integral as Lin definite Integra	Contents Minors, Cofactors, Properties of Determinants, pes of Matrices, Addition, Subtraction, Scalar cation of Matrices, Adjoint, Inverse, Cramer's Rule, tors of a Matrix, Cayley-Hamilton Theorem (without nit at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an e Theorem, Type of Discontinuities. e, Derivatives of Sum, Differences, Product & Derivatives of Composite Functions, Logarithmic Differentiation. iation: Rolle's Theorem, Mean Value Theorem, Maclaurin's & Taylor's), Indeterminate Forms, L' Minima, Leibnitz Theorem, Partial Differentiation, nit of Sum, Riemann Sum, Fundamental Theorem of als, Methods of Integration Substitution, By Parts,	Lectures Allotted 8 8 8 8 8 8 8 8 8			
Unit I II III	Determinan Matrices: I Multiplicatio Rank of Mat proof) Limits & C Limits of Va Interval, Inter Differentiation Application Expansion of Hospitals Ru Euler's Theo Integration Calculus, In Partial Frac	ts: Definition, I Definition, Ty on and Multipli- crix, Eigen Vect Continuity: Lin arious Types of crmediate Value ion: Derivativ Chain Rule, D on, Successive of Different of Functions (I ale, Maxima & orem. Integral as Lir definite Integrat	Contents Minors, Cofactors, Properties of Determinants, pes of Matrices, Addition, Subtraction, Scalar cation of Matrices, Adjoint, Inverse, Cramer's Rule, tors of a Matrix, Cayley-Hamilton Theorem (without nit at a Point, Properties of Limit, Computation of Functions, Continuity at a Point, Continuity Over an e Theorem, Type of Discontinuities. e, Derivatives of Sum, Differences, Product & Derivatives of Composite Functions, Logarithmic Differentiation. iation: Rolle's Theorem, Mean Value Theorem, Maclaurin's & Taylor's), Indeterminate Forms, L' Minima, Leibnitz Theorem, Partial Differentiation, nit of Sum, Riemann Sum, Fundamental Theorem of	Lectures Allotted 8 8 8 8 8 8 8 8 8			



Text Books:				
1. Babu Ram, <i>"Engineering Mathematics"</i> , Pearson Education				
2. H.K. Dass, "Advanced Engineering Mathematics", S. Chand & Company				
Reference :				
1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & So	ns.			
2. B. S. Grewal, "Elementary Engineering Mathematics", Khanna Publishers				
Evaluation/Assessment Methodology				
	Max. Marks 100			
1) Class tasks/ Sessional Examination	15			
2) Presentations /Seminar				
3) Assignments				
4) Research Project Report	10			
Seminar On Research Project Report				
5) ESE	75			
Total:	100			
Prerequisites for the course: NIL				
Course Learning Outcomes:				
CO 1: Compute the rank and inverse of a matrix and solve system of linear	equations.			
CO 2: Computation of Limits of Various Types of Functions, Continuity	1			
Intermediate Value Theorem and type of Discontinuities.	<i>,</i>			
CO 3: Understand the Derivatives, Chain Rule, Derivatives of Composite	Functions, Logarithmic			
Differentiation and successive Differentiation.	· C			
CO 4: Use of different theorems like Rolle's Theorem, Mean Value Theorem	orem. Leibnitz Theorem.			
Partial Differentiation, Euler's Theorem.				
r untur Enforcemunicity, Euror 5 Theorem.				

CO 5: Understanding of Integral as Limit of Sum, Riemann Sum, Fundamental Theorem of Calculus, Indefinite Integrals, Methods of Integration Substitution.



Claces D	n:UG	Year:I	
Class: BCA(C & CS)			
Credits	_	Subject: Problem-Solving using C Lab	
Theory:			
Practical			
Course		Title: Problem-Solving using C Lab	
	EP-105P		
	Objectives:		. 1
		be able to learn the basics of programming language and Fundar	mental concepts
	of C Languag		
		be able to learn and understand Concepts of basic programming w	with Conditional
		Control statements.	
		l be familiar with the concept of Arrays, Pointers, Functions	s, categories of
	function, and	be able to develop a Program with Structure; learn Union and C	Complete String
	Operations.	be able to develop a Frogram with Structure, learn Union and C	complete sumg
		be familiar with File handling programs to perform read-write ope	erations
	of Paper: Co		autons.
		Marks/Credits: 50% Marks	
L:0	ini i assing i		
T:0			
	lours/Week)		
•	$\cdot 1$ Hr. = 1 Ci	redit	
•		redit(4Hrs./Week=4Credits)	
Unit	Contents		No. of
			Lectures
			Allotted
Ι	Write a pro		Anotteu
		gram to display "hello world" in C.	02
		gram to display "hello world" in C. ogram to find the largest and smallest among three entered	
II			02
	numbers an even or odd	ogram to find the largest and smallest among three entered and also display whether the identified largest/smallest number is l.	02 02
II III	numbers an even or odd	ogram to find the largest and smallest among three entered and also display whether the identified largest/smallest number is	02
III	numbers an even or odd Write a pro year is a lea	ogram to find the largest and smallest among three entered and also display whether the identified largest/smallest number is a l. bgram to check whether the entered year is a leap year or not (a ap if it is divisible by 4 and divisible by 100 or 400.)	02 02 02
	numbers an even or odd Write a pro year is a lea Write a pro	ogram to find the largest and smallest among three entered ad also display whether the identified largest/smallest number is gram to check whether the entered year is a leap year or not (a up if it is divisible by 4 and divisible by 100 or 400.) ogram to read a string and check for palindrome without using	02 02
III	numbers an even or odd Write a pro year is a lea Write a pro	ogram to find the largest and smallest among three entered and also display whether the identified largest/smallest number is a l. bgram to check whether the entered year is a leap year or not (a ap if it is divisible by 4 and divisible by 100 or 400.)	02 02 02
III IV	numbers an even or odd Write a pro year is a lea Write a pro string-relate itself.	ogram to find the largest and smallest among three entered ad also display whether the identified largest/smallest number is agram to check whether the entered year is a leap year or not (a ap if it is divisible by 4 and divisible by 100 or 400.) ogram to read a string and check for palindrome without using ed functions (a string is a palindrome if its half is mirror by	02 02 02 02 02
III IV V	numbers an even or odd Write a pro year is a lea Write a pro string-relate itself. Write a pro	ogram to find the largest and smallest among three entered ad also display whether the identified largest/smallest number is begram to check whether the entered year is a leap year or not (a ap if it is divisible by 4 and divisible by 100 or 400.) begram to read a string and check for palindrome without using ed functions (a string is a palindrome if its half is mirror by gram to find the biggest among three numbers using a pointer.	02 02 02 02 02 02
III IV	numbers an even or odd Write a pro year is a lea Write a pro string-relate itself. Write a pro Create a str	ogram to find the largest and smallest among three entered ad also display whether the identified largest/smallest number is a gram to check whether the entered year is a leap year or not (a ap if it is divisible by 4 and divisible by 100 or 400.) ogram to read a string and check for palindrome without using ed functions (a string is a palindrome if its half is mirror by gram to find the biggest among three numbers using a pointer. ructure named company which has a name, address, phone, and	02 02 02 02 02
III IV V	numbers an even or odd Write a pro year is a lea Write a pro string-relate itself. Write a pro Create a str as member	ogram to find the largest and smallest among three entered ad also display whether the identified largest/smallest number is agram to check whether the entered year is a leap year or not (a ap if it is divisible by 4 and divisible by 100 or 400.) ogram to read a string and check for palindrome without using ed functions (a string is a palindrome if its half is mirror by gram to find the biggest among three numbers using a pointer. ructure named company which has a name, address, phone, and variables. Read the name of the company, its address, phone,	02 02 02 02 02 02
III IV V VI	numbers an even or odd Write a pro year is a lea Write a pro string-relate itself. Write a pro Create a str as member and no Of H	ogram to find the largest and smallest among three entered ad also display whether the identified largest/smallest number is a gram to check whether the entered year is a leap year or not (a ap if it is divisible by 4 and divisible by 100 or 400.) ogram to read a string and check for palindrome without using ed functions (a string is a palindrome if its half is mirror by gram to find the biggest among three numbers using a pointer. Pucture named company which has a name, address, phone, and variables. Read the name of the company, its address, phone, Employee. Finally display these members' values.	02 02 02 02 02 02 02 02
III IV V VI VII	numbers an even or odd Write a pro year is a lea Write a pro string-relate itself. Write a pro Create a str as member and no Of H The BCT cl	ogram to find the largest and smallest among three entered d also display whether the identified largest/smallest number is l. ogram to check whether the entered year is a leap year or not (a ap if it is divisible by 4 and divisible by 100 or 400.) ogram to read a string and check for palindrome without using ed functions (a string is a palindrome if its half is mirror by gram to find the biggest among three numbers using a pointer. ructure named company which has a name, address, phone, and variables. Read the name of the company, its address, phone, Employee. Finally display these members' values. lass and display the details from the function.	02 02 02 02 02 02 02 02 02
III IV V VI	numbers an even or odd Write a pro year is a lea Write a pro string-relate itself. Write a pro Create a str as member and no Of E The BCT cl Write a p	ogram to find the largest and smallest among three entered ad also display whether the identified largest/smallest number is a gram to check whether the entered year is a leap year or not (a ap if it is divisible by 4 and divisible by 100 or 400.) ogram to read a string and check for palindrome without using ed functions (a string is a palindrome if its half is mirror by gram to find the biggest among three numbers using a pointer. Pucture named company which has a name, address, phone, and variables. Read the name of the company, its address, phone, Employee. Finally display these members' values.	02 02 02 02 02 02 02 02
III IV V VI VII VIII	numbers an even or odd Write a pro year is a lea Write a pro string-relate itself. Write a pro Create a str as member and no Of F The BCT cl Write a p structures.	ogram to find the largest and smallest among three entered d also display whether the identified largest/smallest number is l. ogram to check whether the entered year is a leap year or not (a ap if it is divisible by 4 and divisible by 100 or 400.) ogram to read a string and check for palindrome without using ed functions (a string is a palindrome if its half is mirror by gram to find the biggest among three numbers using a pointer. Pucture named company which has a name, address, phone, and variables. Read the name of the company, its address, phone, Employee. Finally display these members' values. lass and display the details from the function. rogram to show programming examples with unions and	02 02 02 02 02 02 02 02 02
III IV V VI VII VIII Referen	numbers an even or odd Write a pro year is a lea Write a pro string-relate itself. Write a pro Create a str as member and no Of H The BCT cl Write a p structures. ce / Text Bo	ogram to find the largest and smallest among three entered d also display whether the identified largest/smallest number is l. ogram to check whether the entered year is a leap year or not (a ap if it is divisible by 4 and divisible by 100 or 400.) ogram to read a string and check for palindrome without using ed functions (a string is a palindrome if its half is mirror by gram to find the biggest among three numbers using a pointer. Pucture named company which has a name, address, phone, and variables. Read the name of the company, its address, phone, Employee. Finally display these members' values. lass and display the details from the function. rogram to show programming examples with unions and	02 02 02 02 02 02 02 02 02



*	C Programming: A Modern Approach" by K. N. King.	
	Evaluation/Assessment Methodology	
		Max. Marks:50
1)	Class tasks/ Sessional Examination	25
2)	Presentations /Seminar	
3)	Assignments	
4)	Research Project Report	
	Seminar On Research Project Report	
5)	ESE	25
	Total:	50
Pro	ogram Learning Outcomes:	
CO	1: Students will be able to develop programs based on fundamental c	oncepts of programming in
CO	2: C.	
	Students will be able to solve problems based on Conditio	nal and Iterative Control
CO	3: Statements.	
	Students will be able to learn Complete Programming Concepts of	of Arrays, Pointers and get
CO	4: familiar with modular programming Concepts of C using Functions	

Students will be able to learn conceptual programming with String, Structure, and its CO5: differentiation with Union.

Students will be able to perform File handling programs with read and write concepts.



Program		Year: I	
	CA(C&CS)	Semester:I	
Credits		ibject:SPT-I (Introduction to Cloud Lab)	
Practical	-		
Course (tle:SPT-I (Introduction to Cloud Lab	
BCA-NE			
	Objectives:		
		lamental concepts and principles of cloud computing.	C
		s with the major cloud service models, such as Infrastructure	e as a Service
		ice (PaaS), and Software as a Service (SaaS).	Amoran Wal
		xperience in working with popular cloud platforms, such as ft Azure, or Google Cloud Platform (GCP).	Amazon wei
		y and manage virtual machines, containers, and server less fu	nctions in th
	vironment.	y and manage virtual machines, containers, and server less ru	
	of Paper: Core		
		s/Credits: 50% Marks	
L:0			
L:0 T:0			
	ours/Week)		
	1 Hr. = 1 Credit		
		4Hrs./Week=2Credits)	
Unit	Contents		No. of
			Lectures
			Allotted
Ι	Install Virtual b	box/VMware Workstation with different flavours of Linux or	2
	windows OS or	n top of windows7 or 8.	
II	Install a C con	npiler in the virtual machine created using virtual box and	2
	execute Simple	Programs.	
III	Install Google	App Engine. Create hello world app and other simple web	2
	applications usi	ng python/java	
IV	Use GAE launc	her to launch the web applications.	2
V	Simulate a clou	d scenario using Cloud Sim and run a scheduling algorithm	2
		ent in Cloud Sim.	
VI		re to transfer the files from one virtual machine to another	2
	virtual machine		
VII		are to launch virtual machine using trystack (Online Open	2
	stack Demo Ve	·	
VIII	Install Hadoop	single node cluster and run simple applications like word	2
	count.		
	ce / Text Books:		
	_	nciples and Paradigms by Rajkumar Buyya, Amir Vahid Dastje	erdi.
) Later	not of Things by I	Raj Kamal, Mc. Graw-Hill Education.	

- 2. Internet of Things by Raj Kamal, Mc. Graw-Hill Education.
- 3. Blockchain Revolution: How the Technology Behind Bitcoin and Other Crypto currencies is Changing the World by Don Tapscott, Alex Tapscott.
- 4. Fog Computing: Theory and Practice by Assad Abbas; Samee U. Khan; Albert Y. Zomaya, Wiley



Telecom 2020.

5. Fog and Edge Computing: Principles and Paradigms by Satish Narayana Srirama, Rajkumar Buyya, Wiley 2019

If the course is available as Generic Elective then the students of following departments may opt it. Evaluation/Assessment Methodology

		Max. Marks:50
1) Class tasks/ Sessional Examination		25
2) Presentations /Seminar		
3) Assignments		
4) Research Project Report		
Seminar On Research Project Report		
5) ESE		25
	Total:	50

Course Learning Outcomes:

Student will be able to :

CO1: Demonstrate a comprehensive understanding of cloud computing concepts and principles.

CO2: Apply knowledge of cloud service models (IaaS, PaaS, SaaS) to select appropriate solutions for different business scenarios.

CO3: Utilize cloud platforms (such as AWS, Azure, or GCP) to deploy and manage virtual machines, containers, and server less functions.

CO4: Configure and manage cloud storage, databases, and networking resources effectively.

CO5: Apply cloud computing knowledge and skills to address real-world challenges and scenarios effectively.



Progra	mme: Certificat	e	Year: I	
Class:	BCA(C& CS)		Semester: II	
Credit		Subject: Data Struc	cture Algorithms using C	
Theory	:4Cr	Ŭ	e e	
Practic	al:2Cr			
Course	e Code:	Title: Data Structur	e Algorithms using C	
BCA-N	NEP-201			
Course	e Objectives:			
CO1:			lgorithms and data structures.	
CO2:	Analyze perform	mance of algorithms	and choose the appropriate data structure and	l algorithm
	U	for a specified application		
CO3:		-	structure to use in different scenarios and be fa	miliar with
	writing recursiv			
CO4:		-	stract properties of various data structures such	
	-	rees and graphs and	Use various data structures effectively in	application
005	programs.	1 1 0		
CO5:		-	is sorting algorithms, including bubble sort, ins	ertion sort,
	,	eap sort and quick so	rt.	
	e of Paper: Core		r 1	
	um Passing Ma	rks/Credits: 40% M	arks	
L:4				
T:0	I Jours (Weals)			
	Hours/Week) · - 1 Hr. = 1 Cred	it.		
•		lit(4Hrs./Week=4Crea	lite)	
Unit			Contents	No. of
Cint			Contents	Lectures
				Allotted
Ι	Introduction:	Basic Terminology	v, Data Structures, Classification of Data	8
		a Structure Operation		-
		-	tialization of Array, Accessing Elements of	
			parse Matrix, Lower and Upper Triangular	
	Matrices, Vect	tor, Memory Represe	entation of Array- Row Major and Column	
	Major, Address	s Calculation of Array	y, Insertion and Deletion on Array	
II	Linked List:	Introduction, Dynami	ic Memory Allocation, Singly Linked Lists,	8
	Operations on	Linked List Such as	Traversal, Insertion, Deletion and Searching,	
			cularly Linked Lists and Doubly Linked Lists,	
	Two-Way Lists			
III			and Primitive Operations on Stack, Stack	8
			efix Expressions; Evaluation of Postfix	
	-	-	ix, Infix and Postfix; Recursion; Introduction	
		Operation on Queue	s, Deques, Priority Queues, Applications of	
	Queue.			
TT 7	~			
IV	Trees: Introdu		erminology; Tree Representations as Array ns for Tree Operations such as Insertion,	8



	Internet Transforming Fourier 1		ection 27 & 128			
	eletion, Traversal; Traversal of Binary Trees; Application of	•				
	nary Search Tree (BST), Insertion and Deletion in BST, B-Tree					
	arching & Sorting Techniques: Bubble Sort, Insertion sort,		8			
	Merge Sort, Heap Sort, Linear Search, Binary Search and Hashing.					
Text Book						
	aum, "Data Structures Using C", Pearson Education.					
	Kumar Bandyopadhyay, K. N. Dey, "Data Structures Using C";		on.			
3. Lipschu	ttz (Schaum's Series), "Data Structure with C", Tata McGraw	Hill Education				
Reference						
1. Robert	Kruse, C. L.Tondo, "Data Structures and Program Design in C	", Pearson Educa	tion.			
2. E. Horo	owitz, S. Sahni & D. Mehta, "Fundamentals of Data Structures"	', Galgotia Public	ations.			
3. R. S. Sa	alaria, "Data Structures & Algorithms", Khanna Book Publishir	ng Co. (P) Ltd.				
	Evaluation/Assessment Methodology					
		Max.	Marks 100			
1) Class ta	sks/ Sessional Examination	15				
2) Present	ations /Seminar					
3) Assignt	nents					
4) Researc	ch Project Report	10				
· · ·	r On Research Project Report					
5) ESE	5 1	75				
,	Total:	100				
Prerequisite	es for the course: Problem Solving using C					
-	arning Outcomes:					
	nonstrate familiarity with major algorithms and data structures.					
	alyze performance of algorithms and choose the appropriate of		l algorithm			
	ign method for a specified application.		8			
	ermine which algorithm or data structure to use in different sc	enarios and be fa	miliar with			
	ting recursive methods.					
	nonstrate understanding of the abstract properties of various da	ata structures suc	h as stacks.			
	ues, lists, trees and graphs and Use various data structure					
-	grams.		rprication			
1	nonstrate understanding of various sorting algorithms, includin	g bubble sort ins	sertion sort			
	ection sort, heap sort and quick sort.		,ernon sort,			
5010	whom sort, heap sort and quick sort.					



Program	nme: Certificate	Year: I	
-	BCA(C& CS)	Semester: II	
Credits	Subject: Environmer	nt and Ecology	
Theory:	•		
Course	Code: Title: Environment a	nd Ecology	
NHU			
Course	Objectives:		
CO1: C	reating the awareness about en	nvironmental problems among people	
CO2: In	nparting basic knowledge abo	ut the environment and its allied problems.	
CO3: D	eveloping an attitude of conce	ern for the environment.	
		e in environment protection and environment impr	
		es related to ecosystems, biodiversity and natural	resources.
-	of Paper: AECC		
-	m Passing Marks/Credits: 4	0% Marks	
L:3			
T:0			
	lours/Week)		
-	1Hr.=1Credit		
Unit		Contents	No.
			ofLectures
			Allotted
Ι		re Of Environmental Studies:	8
		tance, Need for Public Awareness.	
II		able And Non-Renewable Resources;	8
	Natural Resources and Ass		
		and Over-Exploitation, Deforestation, Case	
		on, Mining, Dams and Their Effects on Forests	
	and Tribal People.		
		and Over-Utilization of Surface and Ground	
	•	t, Conflicts Over Water, Dams-Benefits and	
	Problems.		
		e and Exploitation, Environmental Effects of	
1		namel Deservação Cose Stradias	
1		neral Resources, Case Studies.	
	D. Food Resources: World	Food Problems, Changes Caused By Agriculture	
	D. Food Resources: World I and Overgrazing, Effec	Food Problems, Changes Caused By Agriculture ts of Modern Agriculture, Fertilizer-Pesticide	
	D. Food Resources: World I and Overgrazing, Effec Problems, Water Logging	Food Problems, Changes Caused By Agriculture ts of Modern Agriculture, Fertilizer-Pesticide g, Salinity, Case Studies.	
	 D. Food Resources: World I and Overgrazing, Effec Problems, Water Logging E. Energy Resources: Group 	Food Problems, Changes Caused By Agriculture ts of Modern Agriculture, Fertilizer-Pesticide g, Salinity, Case Studies. owing Energy Needs, Renewable and Non	
	 D. Food Resources: World I and Overgrazing, Effec Problems, Water Logging E. Energy Resources: Gra renewable Energy Sour 	Food Problems, Changes Caused By Agriculture ts of Modern Agriculture, Fertilizer-Pesticide g, Salinity, Case Studies.	
	 D. Food Resources: World I and Overgrazing, Effec Problems, Water Logging E. Energy Resources: Gra renewable Energy Sour Studies 	Food Problems, Changes Caused By Agriculture ts of Modern Agriculture, Fertilizer-Pesticide g, Salinity, Case Studies. owing Energy Needs, Renewable and Non rces, Use of Alternate Energy Sources, Case	
	 D. Food Resources: World I and Overgrazing, Effec Problems, Water Logging E. Energy Resources: Gra renewable Energy Sour Studies F. Land Resources: Land a 	Food Problems, Changes Caused By Agriculture ts of Modern Agriculture, Fertilizer-Pesticide g, Salinity, Case Studies. owing Energy Needs, Renewable and Non rces, Use of Alternate Energy Sources, Case as a Resource, Land Degradation, Man Induced	
	 D. Food Resources: World I and Overgrazing, Effec Problems, Water Logging E. Energy Resources: Gra renewable Energy Sour Studies F. Land Resources: Land a Landslides, Soil Erosion 	Food Problems, Changes Caused By Agriculture ts of Modern Agriculture, Fertilizer-Pesticide g, Salinity, Case Studies. owing Energy Needs, Renewable and Non rces, Use of Alternate Energy Sources, Case as a Resource, Land Degradation, Man Induced and Desertification.	
	 D. Food Resources: World I and Overgrazing, Effec Problems, Water Logging E. Energy Resources: Gra renewable Energy Sour Studies F. Land Resources: Land a Landslides, Soil Erosion 	Food Problems, Changes Caused By Agriculture ts of Modern Agriculture, Fertilizer-Pesticide g, Salinity, Case Studies. owing Energy Needs, Renewable and Non rces, Use of Alternate Energy Sources, Case as a Resource, Land Degradation, Man Induced and Desertification.	



		Transforming Education Syste	im, Transforming Lives	Section 21 & 128	
	III Ecosyst	ems:		8	
	Concept	Concept of an Ecosystem; Structure and Function of an Ecosystem;			
	Producers, Consumers and Decomposers; Energy Flow in the Ecosystem; Ecological Succession; Food Chains, Food Webs and Ecological Pyramids; Introduction, Types, Characteristic Features, Structure And Function of the				
		ng Ecosystem: -			
		st Ecosystem			
		sland Ecosystem			
		ert Ecosystem			
	D. Aquatic Ecosystems (Ponds, Streams, Lakes, Rivers, Oceans, Estuaries)				
	_	rsity and Its Conservation:	Lotuditesy	8	
		tion – Definition: Genetic, Species and Ecosystem Div	versity: Bio	0	
		nical Classification of India; Value of Biodiversity: C			
	0 0 1	· · · · · · · · · · · · · · · · · · ·	-		
		oductive Use, Social, Ethical, and Aesthetic and Opti			
		rsity at Global, National and Local Levels; India as a Meg	•		
		Hot-Sports of Biodiversity; Threats to Biodiversity: Ha			
		g of Wildlife, Man-Wildlife Conflicts; Endangered an			
	-	of India; Conservation of Biodiversity: In-Situ an	iu Ex-Situ		
		ation of Biodiversity.		0	
		mental Pollution:		8	
		on, Causes, Effects and Control Measures of Air Pollu			
	Pollution, Soil Pollution, Marine Pollution, Noise Pollution, Thermal				
		n, Nuclear Pollution; Solid Waste Management: Causes,			
		Measures of Urban and Industrial Wastes; Role of an Ir			
		on of Pollution; Pollution Case Studies; Disaster M	anagement:		
		Earthquake, Cyclone and Landslides.			
	t Books:				
		<i>ironmental Studies</i> ", Pearson Education.			
		e, "Environmental Studies", New Age International			
	erence:				
1.	J. P. Sharma, "	Environmental Studies", University Science Press.			
		Evaluation/Assessment Methodology			
			Max. M	Marks 50	
1)		ssional Examination		15	
2)	Presentations	'Seminar			
3)	Assignments				
4)	Research Proj	-			
		esearch Project Report			
5)	5) ESE			35	
		Total:		50	
Pre	erequisites for	he course: NIL			
Co	ourse Learning	g Outcomes:			
0	CO1: Student	will be able to recognize the physical and biological comp	ponents of ea	rth's system.	
0	CO2: Student	will be able to examine all environmental issues.			
0	CO3: Student	will be able to do independent research on hum	an interactio	on with the	
0	CO4: environ	-			
0	CO5: Student will be able to develop and attitude of concern for the environment.				



Progra	mme: Certificate	Year: I	
Class:	BCA(C& CS)	Semester:II	
Credit	s Subject: LINUX	ADMINISTRATION WITH SCRIPTING(SPT-II)	
Theory	:4Cr		
Practic	al:2Cr		
Course	Code: Title: LINUX AI	OMINISTRATION WITH SCRIPTING	
BCA-N	IEP-211		
Course	Objectives:		
CO1:T	o understand and make effe	ective use of linux utilities and shell scripting language	ge to solve
-	problems	land I inverse utilities like mere an laste	
	1	dard Linux utilities like mv, cp, lsetc.	1
	-	necessary for systems programming including f	lie system
		gnal management and interposes communication	
		uired to write network programs using sockets	
	of Paper: Core		
	um Passing Marks/Credits	: 40% Marks	
L:4			
T:0			
	Hours/Week)		
-	- 1 Hr. = 1 Credit		
	al- 2 Hrs.=1Credit(4Hrs./We	ek=4Credits)	
Unit	Contents		No. of
			Lectures
			Allotted
Ι	Linux History, overview,	Principles, Getting started with GNOME and edit text	10
	files with gedit, Manage	e files graphically and access remote system with	
	Nautilus, Getting help in g	graphical environment, Installation overview, directory	
		aphical, Configuring Local Services, date and time,	
	Configuration of printer, H	Basic commands vi editor, manage users and groups.	
II		vm, quota management and permanent mouting, Raid,	10
	_	or cron use of helping command scp or ssh, filter	
	command, Understand run		
III		rpm, package installation with yum, Use hard links,	10
	e	lar Expressions, Pipelines, and I/O Redirection, nfs,	10
		ntrolling Access to files, Analyzing and Storing Logs,	
	· · ·	ning and Maintaining the Kernel, System Recovery	
		er Security, Apache Server.	
IV		Route Network Traffic Secure Network Traffic, NTP	10
14		Veb Server Additional Configuration, Basic SMTP	10
	e ,	e	
		only DNS Server, FTP, Squid, samba, dhcp, nis, pam, Bash Scripting and tools, basic Shell Scripting,	
	Graphical tools of Scriptin		



Evaluation/Assessment Methodology					
		Max. Marks 100			
1) Cla	ss tasks/ Sessional Examination	15			
2) Pre	sentations /Seminar				
3) Ass	signments				
4) Res	earch Project Report	10			
Sen	ninar On Research Project Report				
5) ESI	E	75			
	Total:	100			
Prerequ	usites for the course: NIL				
Course	e Learning Outcomes:				
CO1:	CO1: Students will be able to understand the basic commands of linux operating system and can write shell scripts.				
CO2:	Students will be able to create file systems and directories and operate	e them.			
CO3:	CO3: Students will be able to create processes background and fore ground etc.by fork() system calls				
CO4:					



Progra	mme: Certifi	cate	Year: I			
Class:BCA(C& CS)			Semester: II			
Credits		Subject: Mathem				
Theory	: 4Cr	U				
	Code:	Title: Mathematic	cs-II			
BCA-N	EP-204					
Course	Objectives:					
CO 1:	Apply mathe	ematical concepts	and principles to perform computations.			
CO 2:	Apply mathe	ematics to solve pr	oblems.			
CO 3:	Create, use a	and analyze graphi	cal representations of mathematical relationships.			
CO 4:	Communica	te mathematical ki	nowledge and understanding.			
CO 5:	Apply techn	ology tools to solv	ve problems.			
Nature	of Paper: D	SE				
Minim	um Passing N	Marks/Credits: 40	0% Marks			
L:4						
T:0						
•	Hours/Week)					
	-1 Hr. $= 1$ C	redit				
Unit			Contents	No. of		
				Lectures Allotted		
Ι			ar differential equations of nth order with constant			
		coefficients, Complementary function and Particular integral, Simultaneous linear				
			n of second order differential equations by changing			
			ariables, Normal form, Method of variation of			
	-	Applications (with				
II			Functions: Series solution of second order ordinary	8		
		-	uriable coefficient (Frobenius method), Bessel and			
			series solutions, Properties of Bessel function and			
	Legendre po			6		
III	Laplace Tr	anstorm: Laplace	e transform, Existence theorem, Laplace transforms	8		
		-	nitial and final value theorems, Unit step function,			
		-	e transform of periodic function, Inverse Laplace			
			prem, Application to solve simple linear and			
137		s differential equation		0		
IV			nulae, Functions having arbitrary periods, Periodic	8		
	,	1	tiod 2π , Change of interval, Even and odd functions,			
N7	0	ine and cosine seri		0		
V			ons: Solution of first order partial differential	8		
	-		nethod, Solution of second order linear partial			
		1	onstant coefficients, Classification of second order			
	-	-	Method of separation of variables for solving partial			
			on of one and two dimensional wave and heat			
	conduction equations, Laplace equation in two dimension, Equation of transmission lines					
	u ansimssion	1 11105				



Text Books:

- 1. E. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons
- 2. B. V. Ramana, "Higher Engineering Mathematics", Tata Mc. Graw Hill Publishing Company Ltd
- 3. R.K. Jain & S.R.K. Iyenger, "Advance Engineering Mathematics", Narosa Publishing House.

Reference:

- 1. H. K. Dass, "Introduction to Engineering Mathematics", S. Chand, New Delhi
- 2. R. Wylie, "Advanced Engineering Mathematics", Mc. Graw-Hill.

2. K. wyne, Advanced Engineering Mathematics, Mc. Oraw-1111.				
Evaluation/Assessment Methodology				
	Max. Marks 100			
1) Class tasks/ Sessional Examination	15			
2) Presentations /Seminar				
3) Assignments				
4) Research Project Report	10			
Seminar On Research Project Report				
5) ESE	75			
Total:	100			
Prerequisites for the course: MATHEMATICS-I				
Course Learning Outcomes:				
CO 1: Apply mathematical concepts and principles to perform computations.				
CO 2: Apply mathematics to solve problems.				
CO 3: Create, use and analyze graphical representations of mathematical relation	ships.			
CO 4: Communicate mathematical knowledge and understanding.				

CO 5: Apply technology tools to solve problems



Program	me: Cert	ificate	Year: I		
Class: BCA(C&			Semester: II		
		Subject: Optimization			
Theory:4		J			
Course Code: Title: Optimization			echniques		
BCA-NE	BCA-NEP-204				
Course (Objective	s:			
CO1: E	CO1: Enumerate the fundamental knowledge of Linear Programming and Dynamic				
P	Programming problems.				
			nization and Maximization of objective function).		
	-	m formulation by usi	ing linear, dynamic programming, game theory an	nd queuing	
	nodels.				
			crete and continuous variables to control inve	entory and	
			dels for the production decision making.	11 .	
		n of mathematical n	nodels for quantitative analysis of managerial pr	roblems in	
	ndustry.	DCE			
	of Paper: m Passing	DSE g Marks/Credits:40%	7 Montra		
L:4	III Fassinş	g Warks/Creuits:409			
T:0					
	ours/Weel				
	1 Hr. = 1	,			
Unit			Contents	No. of	
				Lectures	
				Allotted	
Ι	LINEA	R PROGRAMMING	G (L.P): Revised Simplex Method, Duel simplex	8	
	Method	Sensitivity Analysis			
	DYNAN	AIC PROGRAMM	ING (D.P): Multistage decision processes.		
	-	-	n, Recursive Relation-calculus method, tabular		
	method,				
TT		LP as a case of D.P.			
II	CLASS	ICAL OPTIMIZAT	ION TECHNIQUES:	8	
	CLASS Single v	ICAL OPTIMIZAT	without constraints, Multi variable optimization	8	
	CLASS Single v without	ICAL OPTIMIZAT variable optimization constraints, multivar	without constraints, Multi variable optimization iable optimization with constraints –method of	8	
	CLASS Single v without Lagrang	ICAL OPTIMIZAT variable optimization constraints, multivar e multipliers, Kuhn-T	without constraints, Multi variable optimization iable optimization with constraints –method of ocker conditions.	8	
	CLASS Single v without Lagrang NUME	ICAL OPTIMIZAT variable optimization constraints, multivar e multipliers, Kuhn-T RICAL METHODS	without constraints, Multi variable optimization iable optimization with constraints –method of oucker conditions. FOR OPTIMIZATION:	8	
	CLASS Single v without Lagrang NUME Nelder	ICAL OPTIMIZAT variable optimization constraints, multivar e multipliers, Kuhn-T RICAL METHODS Mead's Simplex sea	without constraints, Multi variable optimization iable optimization with constraints –method of oucker conditions. FOR OPTIMIZATION: whether the state of the sta	8	
	CLASS Single v without Lagrang NUME Nelder descent	ICAL OPTIMIZAT variable optimization constraints, multivar e multipliers, Kuhn-T RICAL METHODS Mead's Simplex sea method, Newton's method	without constraints, Multi variable optimization iable optimization with constraints –method of oucker conditions. FOR OPTIMIZATION: arch method, Gradient of a function, Steepest ethod.		
II	CLASS Single v without Lagrang NUME Nelder descent MODE	ICAL OPTIMIZAT variable optimization constraints, multivar e multipliers, Kuhn-T RICAL METHODS Mead's Simplex sea method, Newton's me RN METHODS OF	without constraints, Multi variable optimization iable optimization with constraints –method of oucker conditions. FOR OPTIMIZATION: arch method, Gradient of a function, Steepest ethod. OPTIMIZATION:	8	
	CLASS Single v without Lagrang NUMEI Nelder descent MODE GENET	ICAL OPTIMIZAT variable optimization constraints, multivar e multipliers, Kuhn-T RICAL METHODS Mead's Simplex sea method, Newton's me RN METHODS OF TIC ALGORITHM (without constraints, Multi variable optimization iable optimization with constraints –method of oucker conditions. FOR OPTIMIZATION: arch method, Gradient of a function, Steepest ethod. OPTIMIZATION: GA):		
	CLASS Single v without Lagrang NUME Nelder descent MODE GENET Differen	ICAL OPTIMIZAT variable optimization constraints, multivar e multipliers, Kuhn-T RICAL METHODS Mead's Simplex sea method, Newton's me RN METHODS OF CIC ALGORITHM (aces and similaritie	without constraints, Multi variable optimization iable optimization with constraints –method of 'ucker conditions. FOR OPTIMIZATION: arch method, Gradient of a function, Steepest ethod. OPTIMIZATION: GA): es between conventional and evolutionary		
	CLASS Single v without Lagrang NUME Nelder descent MODE GENET Different algorithm	ICAL OPTIMIZAT variable optimization constraints, multivar e multipliers, Kuhn-T RICAL METHODS Mead's Simplex sea method, Newton's me RN METHODS OF CIC ALGORITHM (aces and similaritie ms, working principl	without constraints, Multi variable optimization iable optimization with constraints –method of oucker conditions. FOR OPTIMIZATION: arch method, Gradient of a function, Steepest ethod. OPTIMIZATION: GA):		
	CLASS Single v without Lagrang NUME Nelder descent MODE GENET Differen algorithm mutation	ICAL OPTIMIZAT variable optimization constraints, multivar e multipliers, Kuhn-T RICAL METHODS Mead's Simplex sea method, Newton's me RN METHODS OF CIC ALGORITHM (aces and similaritie ms, working principl n	without constraints, Multi variable optimization iable optimization with constraints —method of oucker conditions. FOR OPTIMIZATION: arch method, Gradient of a function, Steepest ethod. OPTIMIZATION: GA): es between conventional and evolutionary e, Genetic Operators- reproduction, crossover,		
	CLASS Single v without Lagrang NUME Nelder descent MODE GENET Differen algorithm mutation GENET	ICAL OPTIMIZAT variable optimization constraints, multivar e multipliers, Kuhn-T RICAL METHODS Mead's Simplex sea method, Newton's me RN METHODS OF CIC ALGORITHM (aces and similarities ms, working principle CIC PROGRAMMIN	without constraints, Multi variable optimization iable optimization with constraints —method of oucker conditions. FOR OPTIMIZATION: arch method, Gradient of a function, Steepest ethod. OPTIMIZATION: GA): es between conventional and evolutionary e, Genetic Operators- reproduction, crossover,		



	hatrian CA & CD Dandam namulation convertion Events	toma Engrand	Second Contraction of the second		
	between GA & GP, Random population generation. Fuzzy Sys Theory, Optimization of Fuzzy systems	tems: Fuzzy set			
IV	QUEUING THEORY		8		
1 V	Queuing Model, poison and exponential distributions -Queues	with combined	0		
	arrivals and departures-random and series queues.	with combined			
V	INTEGER PROGRAMMING:		8		
v		alas' Algorithm	0		
	Graphical Representation, Gomory's Cutting Plane Method, Balas' Algorithm for Zero–One Programming, Branch-and-Bound Method. APPLICATIONS OF OPTIMIZATION IN DESIGN AND MANUFACTURING SYSTEMS:				
	Formulation of model- optimization of path synthesis	of a four-bar			
	mechanism, minimization of weight of a cantilever				
	optimization model of a machining process, optimization				
	parameters, and general procedure in optimizing machin				
	sequence.	ing operations			
Text B					
	. Sharma, "Operations Research", Macmillan, 5 th Edition, 2012.				
2. R. F	Pannerselvan, "Operations Research", 2 nd Edition, PHI Publications	, 2006.			
Refere					
1. A. I	M. Natarajan, P. Balasubramani, A. Tamilarasi, "Operations Res	earch", Pearson	Education,		
201					
2. Mai	rice Saseini, Arhur Yaspan, Lawrence Friedman, "Operation	ns Research: M	Iethods &		
	plems," 1 st Edition, 1959.				
	Evaluation/Assessment Methodology				
/		Max.	Marks 100		
2) Pres	ss tasks/ Sessional Examination	Max. 15	Marks 100		
	entations /Seminar		Marks 100		
	ss tasks/ Sessional Examination sentations /Seminar ignments	15	Marks 100		
4) Res	earch Project Report		Marks 100		
4) Res Sen	earch Project Report ninar On Research Project Report	15 10	Marks 100		
4) Res	earch Project Report ninar On Research Project Report	15	Marks 100		
4) Res Sen	earch Project Report ninar On Research Project Report	15 10	Marks 100		
4) ResSen5) ESH	entations /Seminar ignments earch Project Report hinar On Research Project Report	15 10 75	Marks 100		
4) Res Sen5) ESIPrerequ	ss tasks/ Sessional Examination sentations /Seminar ignments earch Project Report hinar On Research Project Report 2 Total:	15 10 75	Marks 100		
 4) Res Sen 5) ESF Prerequ Course 	ss tasks/ Sessional Examination centations /Seminar ignments earch Project Report hinar On Research Project Report C Total: isites for the course: <i>Problem Solving using C</i>	15 10 75 100			
 4) Res Sen 5) ESF Prerequ Course CO1: 	ss tasks/ Sessional Examination sentations /Seminar ignments earch Project Report hinar On Research Project Report <u>Total:</u> isites for the course: <i>Problem Solving using C</i> Learning Outcomes: Identify appropriate optimization method to solve complex pro	15 10 75 100 oblems involved	in various		
 4) Res Sen 5) ESF Prerequ Course CO1: CO2:	ss tasks/ Sessional Examination centations /Seminar ignments earch Project Report hinar On Research Project Report <u>Total:</u> isites for the course: <i>Problem Solving using C</i> Learning Outcomes: Identify appropriate optimization method to solve complex pro- industries. Demonstrate the optimized material distribution schedule usin minimize total distribution cost. Find the appropriate algorithm for allocation of resources to	15 10 75 100 blems involved ng transportation	in various model to		
 4) Res Sen 5) ESF Prereque Course CO2: CO3: 	ss tasks/ Sessional Examination sentations /Seminar ignments earch Project Report hinar On Research Project Report <u>Total:</u> <u>isites for the course: <i>Problem Solving using C</i> Learning Outcomes: Identify appropriate optimization method to solve complex pro- industries. Demonstrate the optimized material distribution schedule usin minimize total distribution cost. Find the appropriate algorithm for allocation of resources to assignment.</u>	15 10 75 100 oblems involved ng transportation o optimize the	in various model to process of		
 4) Res Sen 5) ESF Prereque Course CO2: CO3: 	ss tasks/ Sessional Examination sentations /Seminar ignments earch Project Report hinar On Research Project Report <u>Earning Outcomes:</u> Identify appropriate optimization method to solve complex pro- industries. Demonstrate the optimized material distribution schedule usin minimize total distribution cost. Find the appropriate algorithm for allocation of resources to assignment. Apply the knowledge of game theory concepts to articulate real-w	15 10 75 100 oblems involved ng transportation o optimize the	in various model to process of		
 4) Res Sen Sen Sen 5) ESF Prereque Course CO1: CO2: CO3: CO4: 	ss tasks/ Sessional Examination sentations /Seminar ignments earch Project Report hinar On Research Project Report <u>Total:</u> <u>isites for the course: <i>Problem Solving using C</i> Learning Outcomes: Identify appropriate optimization method to solve complex pro- industries. Demonstrate the optimized material distribution schedule usin minimize total distribution cost. Find the appropriate algorithm for allocation of resources to assignment.</u>	15 10 75 100 oblems involved ng transportation o optimize the world competitive	in various model to process of e situations		



0	amme:UG	Year: I				
	BCA(C& CS)		Semester: II			
Credit		Subject:Data Structure and algorithm	bject:Data Structure and algorithm using C Lab			
Theory						
Practical: 2						
	e Code:BCA-NEP-205P	Title:Data Structure and algorithm u	sing C Lab			
	e Objectives:					
	1	t basic Data Structure using C				
		r Data Structure in Problem Solving.				
	Fo Implement Searching and	Sorting Algorithm.				
	e of Paper: Core					
	num Passing Marks/Credits	: 50% Marks				
L:0						
T:0						
	Hours/Week)					
-	V - 1 Hr. = 1 Credit					
	al- 2 Hrs.=1Credit(4Hrs./We	ek=4Credits)				
Unit	Contents		No. of			
			Lectures			
-			Allotted			
I		grams- Looping, Data Manipulation, array.				
II		d dynamic Memory allocations.	2			
III	Array Implementation of Sta	*	2			
IV	Linked List Implementation		2			
V	Application of Stacks and Q		2			
VI	Implementation of Trees, Tre		2			
VII	Implementation of Binary S		2			
VIII	Implementation of Linear se	<i>.</i>	2			
IX		Sort,Bubble Sort,Quick Sort and Merge	Sort. 2			
	Eva	luation/Assessment Methodology				
			Max. Marks:50			
· ·	ass tasks/ Sessional Examinat	ion	25			
<i>,</i>	esentations /Seminar					
· ·	signments					
-	• I	r On Research Project Report				
5) ESE			25			
~		Total:	50			
	e Learning Outcomes:					
	it will be able to :					
		gram in C using Linear and Non Linear I	Data Structure.			
	CO2: Implement Data Structure using C. CO3: Choose appropriate Sorting Algorithm for an application and implement it in a modularized way.					
		eir applications such as Stacks, Queues	and Lists and Non-Linear			
Data S	Data Structures and their Applications such as Trees.					



Program	ne: UG		Year: I			
Class: BCA(C & CS)		CS)	Semester: II			
			l administration lab(SPT-II)			
Practical: 2		Subject. Linux une				
Course Code: Title: Linux and administration lab			Iministration lab			
	BCA-NEP-212P					
Course O		•				
		l script programs to se	olve problems.			
			x utilities such as ls.cpetc using system calls.			
	-	etwork based applicat				
Nature of						
		Marks/Credits: 509	% Marks			
L:0	0					
T:0						
P:4 (In Ho	urs/Week	<)				
Theory - 1	Hr. = 1 (Credit				
Practical-	2 Hrs.=10	Credit(4Hrs./Week=4	Credits)			
Unit	Conten	its		No. of		
				Lectures		
				Allotted		
Ι	Write a	shell script that acce	pt a file name starting and ending line numbers	2		
	as arguments and display all the lines between given line no.					
II		Ť.	e all lines containing a specified word.	2		
III			e factorial of given integer	2		
IV			ept a list of file names as arguments count and	2		
	1	he occurrence of each				
V			he number of characters, words and lines in a	2		
		linked list respective				
VI		_	akes a copy of a file using standard I/O and	2		
	system					
VII			eives any number of file names as arguments			
			supplied is a file or a directory and reports			
			gument is a file or directory.			
VIII	Write a		he all files in a directory.	2		
		Evaluati	ion/Assessment Methodology			
	1 / 0			ax. Marks:50		
/	1) Class tasks/ Sessional Examination 25					
/						
· ·	3) Assignments					
·	4) Research Project Report					
	ar On Kes	search Project Report		25		
5) ESE				25 50		
	Total: 50					



Course Learning Outcomes: Student will be able to: CO1: To demonstrate the basic knowledge of Linux commands and file handling utilities by using Linux shell environment. CO2: To understand the concept of client-server communication by using sockets.



Program	me: Diploma	Year:II			
Class:BCA(C& CS)		Semester:III			
Credits	Credits Subject: Advanced cloud security(SPT-III)				
Theory:4	heory:4Cr				
Course (Durse Code: Title: Advanced cloud security				
BCA-NE	BCA-NEP-311				
Course (Objectives:				
CO1: U	Inderstand cloud security and	l its service providers.			
CO2: I	Describe essential features of	cloud computing.			
CO3: I	dentify the threats and issues	associated with cloud based IT services.			
		dvantages of various cloud computing platforms.			
	dentify security and privacy i	ssues in cloud computing.			
	f Paper: Core				
	m Passing Marks/Credits:4	0% Marks			
L:4					
T:0					
•	ours/Week)				
	Hr.=1Credit				
	2Hrs.=1Credit(4Hrs./Week=	,	NL P		
Unit		Contents	No. of Lectures		
Ι	Basic Networking: Intro	duction to Networking, IP Addressing, CIDR,	Allotted 10		
1	Protocols	duction to Networking, in Addressing, CIDR,	10		
		mputing: Why Cloud Computing? What is Cloud			
		Cloud Computing, Service Models, Deployment			
	Models, Cloud Providers				
II		Machines: Virtual Machines Planning, Creating	10		
	-	vs & Linux), Virtual Machines Availability, Virtual			
	Machines Extensions				
	Azure Storage: Storage Ad	ccount, Blob Storage, Azure Files ,Snapshots			
	Virtual Networks: Virtu	al Networks (Vnet), IP Address, Azure DNS,			
	Network Security Groups (NSG),Bastion Host			
III	Inter-site Connectivity:		10		
	•	Net Connections, Express Route, Custom Routes,			
		ure Auto scaling (Sets), Azure Traffic Manager,			
		re Firewall Setup, Virtual WLAN			
		vice Plans, App Service (Web App, Mobile App,			
		Server, Web Jobs, Cross Platform Application,			
13.7	Containers, Docker, Kuber		10		
IV	e	Monitoring, Azure Alerts, Network Watcher	10		
		Replication Types, Azure Data Backup,, Azure			
	-	n-Premises backup using MARS			
	-	What is Azure Active Directory, Azure AD			
	Connect, Azure AD Johr	n, Multi Factor Authentication, Azure Identity			



Protection		Non-bold Antodania
V Governance and Compliance: Subscription and Account, Az	ure Users and	10
Groups, Role Based Access Control (RBAC), Azure		10
Management Group	, i <u>i</u>	
Data Services: CDN (Streaming), Azure File Sync, Data Box '	^r vne	
Text Books:		
1. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and	Cloud Comput	ing. From
Parallel Processing to the Internet of Things", Morgan Kaufmann Publ	-	8,
2. Ritting house, John W., and James F. Ransome, -Cloud Con		nentation.
Management and Security, CRC Press, 2017.		,
Reference:		
1. William Stallings, Network Security Essentials: Applications and Stan	dards, Prentice l	Hall, 4th
edition, 2010.		
2. Michael T. Goodrich and Roberto Tamassia, Introduction to Computer	Security, Addis	son Wesley,
2011.		
Evaluation/Assessment Methodology		
	1	Marks 100
1) Class tasks/ Sessional Examination	15	5
2) Presentations /Seminar		
3) Assignments		
4) Research Project Report	10)
Seminar On Research Project Report		
5) ESE	75	
Total:	100	
Prerequisites for the course: NIL		
Course Learning Outcomes:		
CO1: Able to understand core cloud computing concepts and principles.		
CO2: Able to understand the differences between traditional ar	d cloud base	d security
methodologies.		
CO3: Able to understand standard cloud security architecture models.		
CO4. Able to identify security and privacy issues in cloud computing.		
CO5: Able to identify various application servicer of Azure.		



Program	ne:DIPLOMA		Year:II	
0	A(C& CS)		Semester: III	
Credits	Subjec	t: Computer Sy	stem Architecture	
Theory:4C		1 2		
Course Co		Computer Syster	m Architecture	
BCA-NEP		1 5		
Course O	bjectives:			
	U C	s regarding mici	oprocessor with 8 bit. To learn the concepts regain	ding
			erstand the basic idea of the internal architecture a	
	ion of respective			U
0	-		techniques of with the help of Assembly	Language
Programm		100		00
CO4: To u	inderstand the ba	sic concept of p	parallel computing.	
CO5: To u	inderstand signif	icance of pipelin	ning and parallelism, so that the devices used to p	erform
			IC ELECTIVE	
	Passing Marks			
L:4	~			
T:0				
P:0(In Hou	urs/Week)			
Theory - 1	Hr. = 1 Credit			
Unit			Contents	No. of
				Lectures
				Allotted
Ι	Basic Compute	er Organization	and Design: Instructions and Instruction Codes,	8
	Computer Reg	isters, Timing a	nd Control, Instruction Cycle, Register Transfer	
	and Micro O	perations-Regist	tration Transfer Language, Register Transfer	
	Instructions, B	sus and Memor	y Transfer Instructions, Arithmetic and Logic	
	Micro-Operatio	ons, Shift Mic	pro-Operations, Arithmetic Logic Shift Unit;	
	Memory-Refer	ence Instructio	ons, Input-Output and Interrupts, Complete	
	Computer Des	cription, Design	n of Basic Computer, Design of Accumulator	
	Logic.			
II		accoing Unit		
11	Central Pro	cessing Unit:	General Register Organization, Stacks	8
11	Organization,	Instruction Form	nats, Addressing Modes, RISC, CISC, Parallel	8
ш	Organization,	Instruction Form		8
ц	Organization, Processing, Pip Matrix Multipl	Instruction Forr pelining, Instruct ication, Array P	nats, Addressing Modes, RISC, CISC, Parallel tion and Arithmetic Pipeline, Vector Processing, processors.	8
II	Organization, Processing, Pip Matrix Multipl Computer Au	Instruction Forr belining, Instruc- ication, Array P rithmetic: Add	nats, Addressing Modes, RISC, CISC, Parallel tion and Arithmetic Pipeline, Vector Processing, rocessors. lition, Subtraction Algorithms; Multiplication	8
	Organization, Processing, Pip Matrix Multipl Computer An Algorithms: S	Instruction Forr belining, Instruc- ication, Array P rithmetic: Add Shift and Add	nats, Addressing Modes, RISC, CISC, Parallel tion and Arithmetic Pipeline, Vector Processing, rocessors. lition, Subtraction Algorithms; Multiplication d Algorithms, Booth's Algorithm; Divisor	
	Organization, Processing, Pip Matrix Multipl Computer An Algorithms: S Algorithms, H	Instruction Forr belining, Instruct ication, Array P rithmetic: Add Shift and Add Floating Point	nats, Addressing Modes, RISC, CISC, Parallel tion and Arithmetic Pipeline, Vector Processing, rocessors. lition, Subtraction Algorithms; Multiplication d Algorithms, Booth's Algorithm; Divisor Representations, Arithmetic Operations on	
III	Organization, Processing, Pip Matrix Multipl Computer An Algorithms: S Algorithms, H Floating-Point	Instruction Forr belining, Instruc- ication, Array P rithmetic: Add Shift and Add Floating Point Numbers, Decin	nats, Addressing Modes, RISC, CISC, Parallel tion and Arithmetic Pipeline, Vector Processing, rocessors. lition, Subtraction Algorithms; Multiplication d Algorithms, Booth's Algorithm; Divisor Representations, Arithmetic Operations on nal Arithmetic Operations.	8
	Organization, Processing, Pip Matrix Multipl Computer An Algorithms: S Algorithms, F Floating-Point Input-Output	Instruction Forr belining, Instruc- ication, Array P rithmetic: Add Shift and Add Floating Point Numbers, Decir Organization	nats, Addressing Modes, RISC, CISC, Parallel tion and Arithmetic Pipeline, Vector Processing, rocessors. lition, Subtraction Algorithms; Multiplication d Algorithms, Booth's Algorithm; Divisor Representations, Arithmetic Operations on nal Arithmetic Operations. Peripheral Devices, Input-Output Interface,	
III	Organization, F Processing, Pip Matrix Multipl Computer An Algorithms: S Algorithms, F Floating-Point Input-Output Asynchronous	Instruction Forr belining, Instruct ication, Array P rithmetic: Add Shift and Add Floating Point Numbers, Decin Organizations Data Transfer,	nats, Addressing Modes, RISC, CISC, Parallel tion and Arithmetic Pipeline, Vector Processing, rocessors. lition, Subtraction Algorithms; Multiplication d Algorithms, Booth's Algorithm; Divisor Representations, Arithmetic Operations on nal Arithmetic Operations.	8
III	Organization, Processing, Pip Matrix Multipl Computer An Algorithms: S Algorithms, F Floating-Point Input-Output	Instruction Forr belining, Instruct ication, Array P rithmetic: Add Shift and Add Floating Point Numbers, Decin Organizations Data Transfer,	nats, Addressing Modes, RISC, CISC, Parallel tion and Arithmetic Pipeline, Vector Processing, rocessors. lition, Subtraction Algorithms; Multiplication d Algorithms, Booth's Algorithm; Divisor Representations, Arithmetic Operations on nal Arithmetic Operations. Peripheral Devices, Input-Output Interface,	8
III	Organization, F Processing, Pip Matrix Multipl Computer An Algorithms: S Algorithms, F Floating-Point Input-Output Asynchronous	Instruction Forr belining, Instruc- ication, Array P rithmetic: Add Shift and Add Floating Point Numbers, Decin Organization Data Transfer, dress (DMA),	nats, Addressing Modes, RISC, CISC, Parallel tion and Arithmetic Pipeline, Vector Processing, rocessors. lition, Subtraction Algorithms; Multiplication d Algorithms, Booth's Algorithm; Divisor Representations, Arithmetic Operations on mal Arithmetic Operations. Peripheral Devices, Input-Output Interface, Mode of Transfer, Priority Interrupts, Direct	8
III	Organization, Processing, Pip Matrix Multipl Computer An Algorithms: S Algorithms, F Floating-Point Input-Output Asynchronous Memory Add Communicatio	Instruction Forr belining, Instruct ication, Array P rithmetic: Add Shift and Add Floating Point Numbers, Decin Organization: Data Transfer, dress (DMA), n.	nats, Addressing Modes, RISC, CISC, Parallel tion and Arithmetic Pipeline, Vector Processing, rocessors. lition, Subtraction Algorithms; Multiplication d Algorithms, Booth's Algorithm; Divisor Representations, Arithmetic Operations on mal Arithmetic Operations. Peripheral Devices, Input-Output Interface, Mode of Transfer, Priority Interrupts, Direct	8



Management Hardware.

Text Books:

- 1. Morris Manno, "Computer System Architecture", Pearson Education.
- 2. W. Stallings, "Computer Organisation And Architecture", Pearson Education.

Reference:

- 1. Rao, "Prospective in Computer Architecture", Prentice Hall of India
- 2. John P. Hayes, "Computer Architecture and Organization", McGraw-Hill

Evaluation/Assessme	ent Methodology	
		Max. Marks 100
1) Class tasks/ Sessional Examination		15
2) Presentations /Seminar		
3) Assignments		
4) Research Project Report		10
Seminar On Research Project Report		
5) ESE		75
	Total:	100
Prerequisites for the course: NIL		

Course Learning Outcomes:

- CO1: For a microprocessor system, student should be able to deal with the internal architecture of 8 bits and 16 bit microprocessor to analyze the working operation and to know the pin configuration for the respective microprocessor. A student should be good enough to deal with interrupts internally or externally.
- CO2: He/she should be able to understand the basic concepts of Assembly language programming. For a particular data instruction set, student should be having a clear idea of solving machine language programs using kit. He/she shall be having an idea to tackle with counter delays and subroutines.
- CO3: He/she should be able to know the concept of pipelining and parallelism in uniprocessor system for hazard detection. Understand the basic concept of Parallel computing.
- CO4: A student should have a basic idea of job levels that are governed by an organization on Priority basis. He/she should know the Pipeline scheduling theory.
- CO5: For good networking, a student should be able to draw SIMD interconnections and FFT or a butterfly method system for collision prevention and vector dispatching. He/she should be able to make Cube Interconnection Network, Shuffle-Exchange and Omega Network.



Program	nme: Diplom	a	Year:II	
0	CA(C& CS)		Semester:III	
Credits			tion Skill & Personality Development	
Theory:4		9	y 1	
Course	Code: Tit	tle: Communication	n Skill & Personality Development	
BCA-NE	EP-303			
	Objectives:			
		1 1	s and importance of communication.	
	-		munication both written and oral.	
			of communication skills in the world of business.	
		1 1	onality and personality development and its signifi	cance.
			s traits required for personality development.	
	of Paper: AF			
	m Passing N	larks/Credits: 409	% Marks	
L:3 T:0				
	ours/Week)			
•	1 Hr. = 1 Cr	edit		
•		edit(4Hrs./Week=4	(Credits)	
Unit	21115101		Contents	No. of
Cint			Contents	Lectures
				Allotted
Ι	Introductio	n to Communicat	ion	8
	Meaning a	nd Definition,	Process, Functions, Objectives, Importance,	
	Essentials of	of Good Commun	ication, Communication Barriers, Overcoming	
		tion Barriers.		
II			leed and functions of business letters, Planning	8
	•		ters, Advantages and limitations of written	
	communicat			
			ning, nature and scope, Principles of Effective	
			ues of Effective Speech, The Art of Listening,	
	Communica		ing, Advantages and Limitations of Oral	
III		Development:	The concept of personality Dimensions of	8
111	v	L	development, Significance.	0
			ttitude, Concept, Significance, Factors affecting	
			Advantages, Negative attitude, Disadvantages,	
			itude, Difference between Personalities having	
	•	1 1	e, Concept of motivation, Significance, Internal	
		-	rtance of self-motivation, Factors leading to	
	demotivation	-		
IV	Self-Esteen	Term self-esteen	m, Symptoms, Advantages, Do's and Don'ts to	8
			Low self-esteem, Symptoms, Personality having	
			negative self-esteem.	
	Interpersor	al Relationships:		



	Interpersonal relationships, Teaming, Developing positiv	e personality,	State Line Line
	Analysis of strengths and weaknesses.	1	
V	Goal-Setting: Concept of goal-setting, Importance of goals, I	Dream Vs goal,	8
	Why goal-setting fails- SMART (Specific, Measurable, Achiev	able, Realistic,	
	Time-bound) goals, Art of Prioritisation, Do's and Don'ts about		
	Essential soft skills Assertiveness - Lateral thinking - Wor	k ethics, Good	
	manners and etiquettes Concept, significance.		
Text Bo	ooks:		
	inger, S.C., "Theories of Personality: Understanding Person",	Pearson, New Y	ork, 2008,
	lition.		
	ans F, "Organizational Behaviour", Mc. Graw Hill, New York, 20		
3. Barr	on, R.A. & Brian D, "Social Psychology", Prentice Hall of India,	1998, 8 th edition.	
Referen	ce		
1. Adle	r R.B., Rodman G. & Hutchinson C.C., "Understanding Human	n Communicatio	n", Oxford
Univ	versity Press : New York, 2011.		
	Evaluation/Assessment Methodology		
		Max.	Marks 100
1) Class	s tasks/ Sessional Examination	15	
2) Prese	entations /Seminar		
3) Assi	gnments		
4) Rese	arch Project Report		
Sem	inar On Research Project Report		
5) ESE		35	
	Total:	100	
Prerequi	sites for the course: Problem Solving using C		
Course	Learning Outcomes:		
CO1: Ide	entify different concept of Personality		
	ble to Compare and contrast different personal grooming pertains.		
	ble to explore communication beyond language.		
CO4: At	ble to manage oneself while communicating.		
CO5: At	ble to acquire good communication skills and develop confidence.		



Progra	amme: Diploma	1	Year: II			
	BCA(C& CS)		Semester: III			
Credit	1	Subject: Data	Analytics			
Theory	y:4Cr	0	5			
-	e Code:	Title: Data An	alytics			
BCA-N	NEP-304		-			
Cours	e Objectives:					
CO1:	Understand it	em sets, Cluster	ing, frame works & Visualizations.			
CO2:	Apply R tool for developing and evaluating real time applications.					
CO3:	-	rious Data strea				
CO4:			nalysis Techniques.			
CO5:		· ·	of Data Analytics through discovery, planning an	nd building.		
	e of Paper: Dis					
	num Passing M	arks/Credits:4	0% Marks			
L:4						
T:0						
	Hours/Week)					
Unit	y-1Hr.=1Credit		Contents	No. of		
Unit			Contents	Lectures		
				Allotted		
Ι	Introduction	to Data Analy	tics: Sources and nature of data, classification	8		
-			uctured, unstructured), characteristics of data,	0		
	,		latform, need of data analytics, evolution of			
			process and tools, analysis vs reporting, modern			
	•		ns of data analytics.			
	•		leed, key roles for successful analytic projects,			
	various phase	es of data anal	ytics lifecycle - discovery, data preparation,			
			ng, communicating results, operation alization			
II	•	U U	n modeling, multivariate analysis, Bayesian	8		
			ayesian networks, support vector and kernel			
			series: linear systems analysis & nonlinear			
	•	e induction, Neu				
			eneralization, competitive learning, principal			
	1	•	ural networks, fuzzy logic: extracting fuzzy			
			sion trees, stochastic search methods.	0		
III			duction to streams concepts, stream data model	8		
			nputing, sampling data in a stream, filtering			
		-	elements in a stream, estimating moments,			
1	counting one	chess ma wind	low, decaying window, Real-time Analytics			
	Diatform (DT	AD)applications	Case studies - Real time continent analysis			
	Platform (RT stock market		s, Case studies – Real time sentiment analysis,			

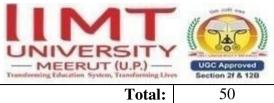


	Transforming Education Syst	em, Transforming Lives	Section 2f & 12B
IV	Frequent Itemset and Clustering: Mining frequent item sets, ma	arket based	8
	modelling, Apriori algorithm, handling large data sets in main	n memory,	
	limited pass algorithm, counting frequent item sets in a stream,	Clustering	
	techniques:	-	
	Hierarchical, K-means, clustering high dimensional data, CLIQU	JE and Pro	
	CLUS, frequent pattern-based clustering methods, clustering	g in non-	
	Euclidean space, clustering for streams and parallelism.		
V	Frame Works and Visualization: Map Reduce, Hadoop, Pig, Hiv	ve, H Base,	8
	Map R, Sharding, NoSQL Databases, S3, Hadoop Distributed Fil	le Systems,	
	Visualization: visual data analysis techniques, interaction	techniques,	
	systems and applications.	-	
Text B	sook:		
1. Jo	hn Garrett, "Data Analytics for IT Networks: Developing Innova	tive Use Cas	es", Pearson
Ed	lucation.		
2. Mi	ichael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, I	Big Analytics	: Emerging
Bu	isiness Intelligence and Analytic Trends for Today's Businesses", W	iley.	
Refere	ence Book:		
1. Pe	te Warden, "Big Data Glossary", O'Reilly.		
2. Gl	enn J. Myatt, "Making Sense of Data", John Wiley & Sons.		
	Evaluation/Assessment Methodology		
		Max. Mark	ks 100
	ss tasks /Sessional Examination		15
2) Pre	sentations /Seminar		
3) Ass	signments		
	search Project Report		10
	ninar On Research Project Report		
5) ESI	E		75
	Total:]]	100
	quisites for the course: NIL		
	e Learning Outcomes:		
	Able to Perform data gathering of large data from a range of data so		
	Able to Critically analyse existing Big Data datasets and implement	ations, taking	g practicality,
	and usefulness metrics into consideration.		
	Able to perform the role of statistics in the analysis of large of datas		
CO4:	Able to apply advanced knowledge of statistical data analytics as ap	plied to large	data sets.

CO4: Able to apply advanced knowledge of statistical data analytics as applied to large data sets.CO5: Employ advanced statistical analytical skills to test assumptions, and to generate and present new information and insights from large datasets.



Program	nme:UG		Year: II	
0	Class: BCA(C & CS)		Semester:III	
Credits		,	loud security lab-1 (SPT-III)	
Practical	: 2	~		
Course	Code:	Title:Advance clou	d security lab	
BCA-N	EP-312P		•	
Course	Objectives			
To learn	the student	t should be made to:		
CO1: Le	arn to use l	Hadoop		
CO2: Le	arn to run v	virtual machines of di	ifferent configuration.	
CO3: Be	e exposed to	o tool kits for cloud e	nvironment.	
Nature	of Paper: (Core		
Minimu	m Passing	Marks/Credits: 509	% Marks	
L:0				
T:0				
· · · ·	Iours/Week	<i>,</i>		
•	1 Hr. = 1 (
		Credit(4Hrs./Week=4	Credits)	ſ
Unit	Contents			No. of
				Lectures Allotted
Ι	Install Vi	rtual box/VMware W	Vorkstation with different flavours of linux or	2
		OS on top of window		
II			irtual machine created using virtual box and	2
		imple Program.		
III			er simple web applications using python/java.	2
IV	Find a pr virtual ma		he files from one virtual machine to another	2
V	Find a pro	ocedure to launch virt	ual machine using try stack.	2
VI	Install H wordcoun		cluster and run simple applications like	2
VII	Prepare a architectu		nputing-introduction, models, services ,and	2
VIII		ur resume in a neat fo	ormat using google.	2
	ce / Text B			•
1. Kai	Hwang, G	eoffrey C. Fox, Jac	k G. Dongarra, "Distributed and Cloud Con	nputing, From
Para	llel Process	ing to the Internet of	Things", Morgan Kaufmann Publishers, 2012.	-
		Evaluat	ion/Assessment Methodology	
			Ν	/lax. Marks:50
/		sional Examination		25
2) Prese	entations /S	Seminar		
3) Assi	gnments			
4) Rese	arch Projec	et Report		
	inar On Res	search Project Report		
5) ESE				25



50

Course Learning Outcomes: Student will be able to: CO1: Design and Implement applications on the Cloud. CO2: Use the cloud tool kits.



Drogram	mailiG		Year: II		
Programme:UGYear: IIClass: BCA(C & CS)Semester:III					
Credits		Subject:OOPS US			
Theory: 0					
Practical:					
Course C		Title:OOPS USING	G IAVA LAB		
BCA-NE					
	bjectives	•			
	0	programs using swir	ng in java.		
		grams implementing (0		
			orld problems using java collectio	n frame work.	
Nature of	f Paper: (Core	· · · · · · · · · · · · · · · · · · ·		
Minimun	n Passing	Marks/Credits: 50%	% Marks		
L:0					
T:0					
P:4(In Ho		,			
Theory -					
		Credit(4Hrs./Week=4	Credits)		
Unit	Content	S			No. of
					Lectures
T	***			11 1	Allotted
Ι		1 to that number.	number from user and print the	odd numbers	2
II	Write a F	Program to find perim	neter of square if area is entered by	user.	2
III	Write a p	program to handle Ar	ray index Out Of Bounds exceptio	n.	2
IV	Write a J	lava program to copy	an array by iterating the array.		2
V	Write a p	program to demonstra	te a divide by zero program excep	tion.	2
VI	Write a J	lava program to get th	he character at the given index with	nin the String.	2
VII	Write a p	program to find the su	Im of each row of a matrix.		2
VIII	Write a p	program to find area of	of rectangle using parameterized co	onstructor.	2
Reference	e / Text B	Books:			
	0		dt, "Java-2 The Complete Referen		ill.
2. Bala C	Guruswam	· · · · ·	th Java: A Primer", Tata McGraw	Hill Education.	
		Evaluati	ion/Assessment Methodology		
		· · · · · ·			x. Marks:50
/		sional Examination		25	
/	ntations /S	Seminar			
, 0	nments				
	rch Projec	-			
	har On Res	search Project Report		27	
5) ESE				25	
			Total:	50	



Course Learning Outcomes:

Student will be able to: CO1: Write programs based on real world problems using java collection frame work... CO2: Write GUI programs using swing in java. CO3: Implement OOPS concepts.



Drogro	mma:Diploma	Year: II	
-	mme:Diploma	Semester: III	
Credits	BCA(C& CS)		
	с .	nted Programming Using Java	
Theory		d Decomming Lloing Love	
Course	5	d Programming Using Java	
	EP-301		
	Objectives:	0.00	
CO 1:	Able to understand the use of	1	
CO 2:	Able to solve real world prob	• •	
CO 3:	Able to understand the use of		
CO 4:		Packages and Interface in java.	
CO 5:	-	rstand exception handling, multithreaded applica	tions with
	synchronization.		
	of Paper: Core		
	um Passing Marks/Credits:40	% Marks	
L:4			
T:0			
	Hours/Week)		
Theory	- 1 Hr. = 1 Credit		
	al- 2 Hrs.=1Credit(4Hrs./Week=	4Credits)	
Unit	Contents		No. of
			Lectures
			Allotted
Ι	Introduction to OOPs and J	ava: OOPs Concepts, Top-Down Approach and	12
	Bottom Up Approach, Introdu	uction to Java, History of Java, Features of Java,	
	Byte Code, JVM, JRE, JDK,	JIT, Java Applications, Character Set, Identifiers,	
	Literals, Comments, Keyword	l, Data Type, Operators, Conditional Statements,	
	Looping Statements, Array De	claration, Creation, Initialization, String Handling-	
	Predefined Functions in Sta	ring, String Methods, Vectors, Command-Line	
	Arguments.		
II	Classes, Objects and Methods	: Object Class, Defining Class, Adding Variables,	12
	Adding Methods, Creating Ob	pjects, Constructors, Types of Constructors, this &	
	static keyword, Garbage Colle	ection, Inheritance, Types of Inheritance, Creating	
	Multilevel Hierarchy, Method	l Over Loading & Overriding, Dynamic Method	
	Dispatching, final keyword, A	bstract Class.	
III	Interfaces and Packages: De	efining Interfaces, Extending and Implementing	12
	Interfaces, Defining Packages,	Access Protection, Importing Packages, Exception	
	Handling: Exception Types,	Multiple Catch Clauses, Nested Try Statements,	
		va's Built-in Exceptions, Creating Your Own	
	•	readed Programming: Thread Life Cycle, Creating	
	Threads, Thread Methods, Thr		
IV		ion, Streams, Stream Classes, File Class, Creation	12
		g to File, Buffering Files, Random Access Files,	
	-	nming: GUI Components, AWT, Swings, Event	
	Handling.		
	O		



	Transforming Education Sy		2
V	Introduction to Applet Programming: Introduction to A		
	Architecture, Applet Life Cycle, Applet Class, Applet Tag, Ap	-	
	Running the Applet. JDBC: Accessing Databases With J	Java Database	
	Connectivity		
Text B	ooks:		
1. Patı	ick Naughton and Herbertz Schildt, "Java-2 The Complete Reference	ce", McGraw Hill.	
2. Ivor	Horton, "Beginning Java-2", Wiley Publishing.		
3. Bala	aguruswamy, "Programming with Java: A Primer", Tata McGraw H	ill Education.	
Refere	nce:		
1. Hor	etmann Cay and Cornell Gary, "Core Java Volume – I", Pearson Ed	lucation.	
2. Hor	etmann Cay and Cornell Gary, "Core JavaTM 2, Volume II – Ac	lvanced Features", Pears	son
	ication.		
	Evaluation/Assessment Methodology		
		Max. Marks 100	
1) Cla	ss tasks/ Sessional Examination	15	
	sentations /Seminar		
3) Ass	ignments		
4) Res	earch Project Report	10	
,	ninar On Research Project Report		
5) ESH	• •	75	
,	Total:	100	
Prerequ	isites for the course: NIL		
Course	Learning Outcomes:		
	Able to understand the use of OOPs concepts.		
CO 2:	Able to solve real world problems using OOP techniques.		
CO 3:	1 0 1		
CO 4:	Able to understand the use of Packages and Interface in java.		
CO 5:	Able to develop and understand exception handling, multit synchronization.	hreaded applications w	ith



Program	me•DIPI	ΟΜΑ	Year: II	
U	Programme:DIPLOMA Class:BCA(C& CS)		Semester: IV	
Credits			oud Security-2 (SPT-IV)	
Theory:4	Cr	Subject. Auvance Ch	oud Sceunty-2 (SI 1-1V)	
Course (Title: Advance Cloud	1 Security	
BCA-NE			, socurity	
	Objective	S:		
			computing security including different architect	ure service
	nodels.		······································	
CO2: 7	Го learn d	ifferent solutions of se	curity issue.	
			services available in cloud for different pur	poses and
	pplication	-	-	-
CO4: 7	To unders	tand different security	solutions and applications available on AWS.	
CO5: 7	Го learn d	esign different method	s to provide backup solutions for cloud data.	
	of Paper:			
	m Passin	g Marks/Credits: 40%	% Marks	
L:4				
T:0				
	ours/Wee	,		
•	1 Hr. = 1			
	-2 Hrs.=1	Credit(4Hrs./Week=4	,	
Unit			Contents	No. of
				Lectures
I	Introdu	nation to Ethical II	advinge Vary issues plaquing the information	Allotted 8
1			acking: Key issues plaguing the information gement process, and penetration testing	0
	-	-	sance: Various types of footprinting, footprinting	
	_	nd countermeasures	sance. Various types of rootprinting, rootprinting	
			twork scanning techniques and scanning	
		measures	the seatting teeningues and seatting	
			echniques and enumeration countermeasures.	
II			erability Analysis using different tools	8
			cking methodology, steganography, steganalysis	
	-	and converting tracks		
	Malwa	re Threats: Different	types of Trojans, Trojan analysis, and Trojan	
		rmeasures, Working	of viruses, virus analysis, computer worms,	
	Counter malwar	e analysis procedure, a	nd countermeasures.	
III	Counter malwar Sniffin	e analysis procedure, a g: Packet sniffing tech	nd countermeasures. niques and how to defend against sniffing	8
III	Counter malwar Sniffin Social	e analysis procedure, a g: Packet sniffing tech Engineering: Social E	nd countermeasures.	8
III	Counter malwar Sniffin Social enginee	e analysis procedure, a g: Packet sniffing tech Engineering: Social E ring countermeasures	nd countermeasures. niques and how to defend against sniffing Engineering techniques, identify theft, and social	8
III	Counter malwar Sniffin Social enginee Denial-	e analysis procedure, a g: Packet sniffing tech Engineering: Social E ring countermeasures of-Service: DoS/DDo	nd countermeasures. niques and how to defend against sniffing Engineering techniques, identify theft, and social S attack techniques, botnets, DDoS attack tools,	8
III	Counter malwar Sniffin Social enginee Denial- and Do	e analysis procedure, a g: Packet sniffing tech Engineering: Social E ring countermeasures of-Service: DoS/DDo S/DDoS countermeasu	nd countermeasures. niques and how to defend against sniffing Engineering techniques, identify theft, and social S attack techniques, botnets, DDoS attack tools, res	8
	Counter malwar Sniffin Social enginee Denial- and Do Session	e analysis procedure, a g: Packet sniffing tech Engineering: Social E ring countermeasures of-Service: DoS/DDo S/DDoS countermeasures Hijacking: Session hi	nd countermeasures. niques and how to defend against sniffing Engineering techniques, identify theft, and social S attack techniques, botnets, DDoS attack tools, res ijacking techniques and countermeasures	
III	Counter malwar Sniffin Social enginee Denial- and Do Session SQL Ir	e analysis procedure, a g: Packet sniffing tech Engineering: Social E ring countermeasures of-Service: DoS/DDo S/DDoS countermeasures Hijacking: Session hi	nd countermeasures. niques and how to defend against sniffing Engineering techniques, identify theft, and social S attack techniques, botnets, DDoS attack tools, res ijacking techniques and countermeasures attacks and injection detection tools	8



Hacking Mobile Platforms: Mobile platform attack vector, android vulnerabilities, jailbreaking iOS, windows phone 8 vulnerabilities, mobile security guidelines, and tools. V Evading IDS, Firewalls and Honey pots: Firewall, IDS and honey pot evasion techniques, evasion tools, and Countermeasures Cloud Computing: Various cloud computing concepts, threats, attacks, and security techniques and tools 8 Cryptography: Different types of cryptography ciphers, Public Key Infrastructure (PKI), cryptography attacks, and cryptanalysis tools 8 Text Books: 1. Securing The Cloud: Cloud Computing Security Techniques and Tactics by Vic (J.R.) Winkler (Syngress/Elsevier) - 978-1-59749-592-9 9. Cloud Computing Design Patterns by Thomas Erl (Prentice Hall) Reference 1. Samani, Raj; Reavis, Jim; Honan, Brian. CSA Guide to Cloud Computing: Implementing Cloud Privacy and Security Resources https://aws.amazon.com/security/security-resources. 15 V Evaluation/Assessment Methodology 10 10 Seminar On Research Project Report 10 2) Presentations /Seminar 10 5 3) Assignments 10 10 4) Research Project Report 10 5 5) ESE 75 5 Course Learning Outcomes: 10 10 CO1: Identify different services and deployment models used for implementation of cloud computing. 100 <		ystem, Transforming Lives St	iction 2f & 12B		
vulnerabilities, jailbreaking iOS, windows phone 8 vulnerabilities, mobile security guidelines, and tools. V Evading IDS, Firewalls and Honey pots: Firewall, IDS and honey pot evasion techniques, evasion tools, and Countermeasures Cloud Computing: Various cloud computing concepts, threats, attacks, and security techniques and tools 8 Cryptography: Different types of cryptography ciphers, Public Key Infrastructure (PKI), cryptography attacks, and cryptanalysis tools 8 Text Books: 1. Securing The Cloud: Cloud Computing Security Techniques and Tactics by Vic (J.R.) Winkler (Syngress/Elsevier) - 978-1-59749-592-9 9. Cloud Computing Design Patterns by Thomas Erl (Prentice Hall) Reference 1. Samani, Raj; Reavis, Jim; Honan, Brian. CSA Guide to Cloud Computing: Implementing Cloud Privacy and Security, 1 edition ed. Syngress, 2014. 9. Awax. Marks 100 1) Class tasks/ Sessional Examination 15 9 2) Presentations /Seminar 10 8 3) Assignments 10 10 4) Research Project Report 10 10 Seminar On Research Project Report 75 5 5) ESE 75 CO1: Identify different services and deployment models used for implementation of cloud computing. 100 OPrerequisites for the course: <i>NIL</i> Course Lea	methodology, wireless hacking tools, and wi-fi security tools				
security guidelines, and tools. V Evading IDS, Firewalls and Honey pots: Firewall, IDS and honey pot evasion techniques, evasion tools, and Countermeasures Cloud Computing: Various cloud computing concepts, threats, attacks, and security techniques and tools Cryptography: Different types of cryptography ciphers, Public Key Infrastructure (PKI), cryptography attacks, and cryptanalysis tools Text Books: 1. Securing The Cloud: Cloud Computing Security Techniques and Tactics by Vic (J.R.) Winkler (Syngress/Elsevier) - 978-1-59749-592-9 2. Cloud Computing Design Patterns by Thomas Erl (Prentice Hall) Reference 1. Samani, Raj; Reavis, Jim; Honan, Brian. CSA Guide to Cloud Computing: Implementing Cloud Privacy and Security, 1 edition ed. Syngress, 2014. 2. AWS Cloud Security Resources https://aws.amazon.com/security/security-resources. Evaluation/Assessment Methodology Max. Marks 100 1) Class tasks/ Sessional Examination 15 2) Presentations /Seminar 10 3) Assignments 10 4) Research Project Report Seniar On Research Project Report 10 5) ESE 75 Course Learning Outcomes: 100 C01: Identify different services and deployment models used for implementation of cloud computing. 10 C02: Able to Compare and contrast different solutions available for virtualization. 103 C03: Able to analyze different	C I	-			
V Evading IDS, Firewalls and Honey pots: Firewall, IDS and honey pot evasion techniques, evasion tools, and Countermeasures 8 Cloud Computing: Various cloud computing concepts, threats, attacks, and security techniques and tools Cryptography: Different types of cryptography ciphers, Public Key Infrastructure (PKI), cryptography attacks, and cryptanalysis tools Text Books: 1. Securing The Cloud: Cloud Computing Security Techniques and Tactics by Vic (J.R.) Winkler (Syngress/Elsevier) - 978-1-59749-592-9 2. Cloud Computing Design Patterns by Thomas Erl (Prentice Hall) Reference 1. 1. Samani, Raj; Reavis, Jim; Honan, Brian. CSA Guide to Cloud Computing: Implementing Cloud Privacy and Security, 1 edition ed. Syngress, 2014. 2. AWS Cloud Security Resources https://aws.amazon.com/security/security-resources. Evaluation/Assessment Methodology Max. Marks 100 1) Class tasks/ Sessional Examination 15 2) Presentations /Seminar 10 3) Assignments 10 Prerequisites for the course: NIL Course Learning Outcomes: 10 CO1: Identify different services and deployment models used for implementation of cloud computing. 10 Cloud computing. Course Learning Outcomes: 10 CO1: Identify different services					
evasion techniques, evasion tools, and Countermeasures T Cloud Computing: Various cloud computing concepts, threats, attacks, and security techniques and tools Teryptography: Different types of cryptography ciphers, Public Key Infrastructure (PKI), cryptography attacks, and cryptanalysis tools Text Books: Infrastructure (PKI), cryptography attacks, and cryptanalysis tools Securing The Cloud: Cloud Computing Security Techniques and Tactics by Vic (J.R.) Winkler (Syngress/Elsevier) - 978-1-59749-592-9 2. 2. Cloud Computing Design Patterns by Thomas Erl (Prentice Hall) Reference 1. Samani, Raj; Reavis, Jim; Honan, Brian. CSA Guide to Cloud Computing: Implementing Cloud Privacy and Security, 1 edition ed. Syngress, 2014. Max. Marks 100 2. AWS Cloud Security Resources https://aws.amazon.com/security/security-resources. Evaluation/Assessment Methodology Max. Marks 100 15 15 1) Class tasks/ Sessional Examination 15 2) Presentations /Seminar 10 3) Assignments 10 4) Research Project Report 10 5) ESE 75 CO1: Identify different services and deployment models used for implementation of cloud computing. 10 CO2: Able to Compare and contrast different solutions available for virtualization. CO3: Able to analyze different cloud services and techniques required to work on cloud for application.<					
Cloud Computing: Various cloud computing concepts, threats, attacks, and security techniques and tools Cryptography: Different types of cryptography ciphers, Public Key Infrastructure (PKI), cryptography attacks, and cryptanalysis tools Text Books: 1. Securing The Cloud: Cloud Computing Security Techniques and Tactics by Vic (J.R.) Winkler (Syngress/Elsevier) - 978-1-59749-592-9 2. Cloud Computing Design Patterns by Thomas Erl (Prentice Hall) Reference 1. Samani, Raj; Reavis, Jim; Honan, Brian. CSA Guide to Cloud Computing: Implementing Cloud Privacy and Security, I edition ed. Syngress, 2014. 2. AWS Cloud Security Resources https://aws.amazon.com/security/security-resources. Evaluation/Assessment Methodology Max. Marks 100 1) Class tasks/ Sessional Examination 15 2) Presentations /Seminar 10 3) Assignments 100 4) Research Project Report 100 Seminar On Research Project Report 75 CO1: Identify different services and deployment models used for implementation of cloud computing. 100 CO2: Able to Compare and contrast different solutions available for virtualization. CO3: Able to analyze different cloud services and techniques required to work on cloud for application. CO4: Able to select different existing solutions and methods to work on AWS.		and honey pot	8		
security techniques and tools Cryptography: Different types of cryptography ciphers, Public Key Infrastructure (PKI), cryptography attacks, and cryptanalysis tools Text Books: 1. Securing The Cloud: Cloud Computing Security Techniques and Tactics by Vic (J.R.) Winkler (Syngress/Elsevier) - 978-1-59749-592-9 2. Cloud Computing Design Patterns by Thomas Erl (Prentice Hall) Reference 1. Samani, Raj; Reavis, Jim; Honan, Brian. CSA Guide to Cloud Computing: Implementing Cloud Privacy and Security, 1 edition ed. Syngress, 2014. 2. AWS Cloud Security Resources https://aws.amazon.com/security/security-resources. Evaluation/Assessment Methodology Max. Marks 100 1) Class tasks/ Sessional Examination 2) Presentations /Seminar 3) Assignments 4) Research Project Report 5) ESE 75 Total: 100 Prerequisites for the course: NIL Course Learning Outcomes: CO1: Identify different services and deployment models used for implementation of cloud computing. CO2: Able to analyze different solutions available for virtualization. CO3: Able to select different existing solutions and methods to work on AWS.	1				
Cryptography: Different types of cryptography ciphers, Public Key Infrastructure (PKI), cryptography attacks, and cryptanalysis tools Text Books: 1. Securing The Cloud: Computing Security Techniques and Tactics by Vic (J.R.) Winkler (Syngress/Elsevier) - 978-1-59749-592-9 2. Cloud Computing Design Patterns by Thomas Erl (Prentice Hall) Reference 1. Samani, Raj; Reavis, Jim; Honan, Brian. CSA Guide to Cloud Computing: Implementing Cloud Privacy and Security, 1 edition ed. Syngress, 2014. 2. AWS Cloud Security Resources https://aws.amazon.com/security/security-resources. Evaluation/Assessment Methodology Max. Marks 100 1) Class tasks/ Sessional Examination 2) Presentations /Seminar 3) Assignments 4) Research Project Report 5) ESE 75 75 75 75 75 75 75 75 75 75 75 75 75 76 75 75 75 75 75 75 75<		ts, attacks, and			
Infrastructure (PKI), cryptography attacks, and cryptanalysis tools Text Books: 1. Securing The Cloud: Cloud Computing Security Techniques and Tactics by Vic (J.R.) Winkler (Syngress/Elsevier) - 978-1-59749-592-9 2. Cloud Computing Design Patterns by Thomas Erl (Prentice Hall) Reference 1. Samani, Raj; Reavis, Jim; Honan, Brian. CSA Guide to Cloud Computing: Implementing Cloud Privacy and Security, 1 edition ed. Syngress, 2014. 2. AWS Cloud Security Resources https://aws.amazon.com/security/security-resources. Wax. Marks 100 1) Class tasks/ Sessional Examination 15 2) Presentations /Seminar 10 3) Assignments 10 4) Research Project Report 10 5) ESE 75 Total: 100 Prerequisites for the course: <i>NIL</i> Course Learning Outcomes: CO1: Identify different services and deployment models used for implementation of cloud computing. CO2: Able to Compare and contrast different solutions available for virtualization. CO3: Able to analyze different cloud services and techniques required to work on cloud for application. CO4: Able to select different existing solutions and methods to work on AWS.					
Text Books: 1. Securing The Cloud: Cloud Computing Security Techniques and Tactics by Vic (J.R.) Winkler (Syngress/Elsevier) - 978-1-59749-592-9 2. Cloud Computing Design Patterns by Thomas Erl (Prentice Hall) Reference 1. Samani, Raj; Reavis, Jim; Honan, Brian. CSA Guide to Cloud Computing: Implementing Cloud Privacy and Security, 1 edition ed. Syngress, 2014. 2. AWS Cloud Security Resources https://aws.amazon.com/security/security-resources. Evaluation/Assessment Methodology Max. Marks 100 1) Class tasks/ Sessional Examination 15 2) Presentations /Seminar 10 3) Assignments 10 4) Research Project Report 10 5) ESE 75 Total: 100 Prerequisites for the course: NIL Course Learning Outcomes: CO1: Identify different services and deployment models used for implementation of cloud computing. CO2: Able to Compare and contrast different solutions available for virtualization. CO3: Able to analyze different cloud services and techniques required to work on cloud for application. CO4: Able to select different existing solutions and methods to work on AWS.		•			
1. Securing The Cloud: Cloud Computing Security Techniques and Tactics by Vic (J.R.) Winkler (Syngress/Elsevier) - 978-1-59749-592-9 2. Cloud Computing Design Patterns by Thomas Erl (Prentice Hall) Reference 1. Samani, Raj; Reavis, Jim; Honan, Brian. CSA Guide to Cloud Computing: Implementing Cloud Privacy and Security, 1 edition ed. Syngress, 2014. 2. AWS Cloud Security Resources https://aws.amazon.com/security/security-resources. Waterns by Thomas Erl (Prentice Hall) Max Marks 100 Privacy and Security Resources https://aws.amazon.com/security/security-resources. Waterns by Thomas Erl (Prentice Hall) Max Marks 100 Privacy and Security Resources https://aws.amazon.com/security/security-resources. Water Methodology Max. Marks 100 1) Class tasks/ Sessional Examination 15 Sec 75 Total: 100 Prerequisites for the course: <i>NIL</i> Course Learning Outcomes: CO1: Identify different services and deployment models used for implementation of cloud computing. CO2: Able to Compare and contrast different solutions av		ols			
(Syngress/Elsevier) - 978-1-59749-592-9 2. Cloud Computing Design Patterns by Thomas Erl (Prentice Hall) Reference 1. Samani, Raj; Reavis, Jim; Honan, Brian. CSA Guide to Cloud Computing: Implementing Cloud Privacy and Security, 1 edition ed. Syngress, 2014. 2. AWS Cloud Security Resources https://aws.amazon.com/security/security-resources. Evaluation/Assessment Methodology Max. Marks 100 1) Class tasks/ Sessional Examination 2) Presentations /Seminar 3) Assignments 4) Research Project Report 5) ESE Total: 100 Prerequisites for the course: <i>NIL</i> Course Learning Outcomes: CO1: Identify different services and deployment models used for implementation of cloud computing. CO2: Able to Compare and contrast different solutions available for virtualization. CO3: Able to analyze different cloud services and techniques required to work on cloud for application. CO4: Able to select different existing solutions and methods to work on AWS.					
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Reference 1. Samani, Raj; Reavis, Jim; Honan, Brian. CSA Guide to Cloud Computing: Implementing Cloud Privacy and Security, 1 edition ed. Syngress, 2014. 2. AWS Cloud Security Resources https://aws.amazon.com/security/security-resources. Evaluation/Assessment Methodology Max. Marks 100 1) Class tasks/ Sessional Examination 15 2) Presentations /Seminar 15 3) Assignments 10 4) Research Project Report 10 5) ESE 75 Total: 100 Prerequisites for the course: NIL Course Learning Outcomes: CO1: Identify different services and deployment models used for implementation of cloud computing. CO2: Able to Compare and contrast different solutions available for virtualization. CO3: Able to analyze different cloud services and techniques required to work on cloud for application. CO4: Able to select different existing solutions and methods to work on AWS.					
1. Samani, Raj; Reavis, Jim; Honan, Brian. CSA Guide to Cloud Computing: Implementing Cloud Privacy and Security, 1 edition ed. Syngress, 2014. 2. AWS Cloud Security Resources https://aws.amazon.com/security/security-resources. Evaluation/Assessment Methodology Max. Marks 100 1) Class tasks/ Sessional Examination 15 2) Presentations /Seminar 15 3) Assignments 10 4) Research Project Report 10 5) ESE 75 Total: 100 Prerequisites for the course: NIL Course Learning Outcomes: CO1: Identify different services and deployment models used for implementation of cloud computing. CO2: Able to Compare and contrast different solutions available for virtualization. CO3: Able to analyze different cloud services and techniques required to work on cloud for application. CO4: Able to select different existing solutions and methods to work on AWS.	2. Cloud Computing Design Patterns by Thomas Erl (Prentice Hall)				
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 2) Presentations /Seminar 3) Assignments 4) Research Project Report 5) ESE 75 Total: 100 Prerequisites for the course: <i>NIL</i> Course Learning Outcomes: CO1: Identify different services and deployment models used for implementation of cloud computing. CO2: Able to Compare and contrast different solutions available for virtualization. CO3: Able to analyze different cloud services and techniques required to work on cloud for application. CO4: Able to select different existing solutions and methods to work on AWS.		Max. 1	Marks 100		
 3) Assignments 4) Research Project Report	1) Class tasks/ Sessional Examination	15			
 4) Research Project Report Seminar On Research Project Report 5) ESE 75 Total: 100 Prerequisites for the course: <i>NIL</i> Course Learning Outcomes: CO1: Identify different services and deployment models used for implementation of cloud computing. CO2: Able to Compare and contrast different solutions available for virtualization. CO3: Able to analyze different cloud services and techniques required to work on cloud for application. CO4: Able to select different existing solutions and methods to work on AWS.	2) Presentations /Seminar				
 4) Research Project Report Seminar On Research Project Report 5) ESE 75 Total: 100 Prerequisites for the course: <i>NIL</i> Course Learning Outcomes: CO1: Identify different services and deployment models used for implementation of cloud computing. CO2: Able to Compare and contrast different solutions available for virtualization. CO3: Able to analyze different cloud services and techniques required to work on cloud for application. CO4: Able to select different existing solutions and methods to work on AWS.	3) Assignments				
Seminar On Research Project Report 75 5) ESE 75 Total: 100 Prerequisites for the course: NIL Course Learning Outcomes: CO1: Identify different services and deployment models used for implementation of cloud computing. CO2: Able to Compare and contrast different solutions available for virtualization. CO3: Able to analyze different cloud services and techniques required to work on cloud for application. CO4: Able to select different existing solutions and methods to work on AWS.		10			
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 Course Learning Outcomes: CO1: Identify different services and deployment models used for implementation of cloud computing. CO2: Able to Compare and contrast different solutions available for virtualization. CO3: Able to analyze different cloud services and techniques required to work on cloud for application. CO4: Able to select different existing solutions and methods to work on AWS. 	Total:	100			
 Course Learning Outcomes: CO1: Identify different services and deployment models used for implementation of cloud computing. CO2: Able to Compare and contrast different solutions available for virtualization. CO3: Able to analyze different cloud services and techniques required to work on cloud for application. CO4: Able to select different existing solutions and methods to work on AWS. 	Prerequisites for the course: <i>NIL</i>				
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CO3: Able to analyze different cloud services and techniques required to work on cloud for application.CO4: Able to select different existing solutions and methods to work on AWS.		alization.			
application. CO4: Able to select different existing solutions and methods to work on AWS.	-		cloud for		
CO4: Able to select different existing solutions and methods to work on AWS.	7 1 1	to work on			
e e	11	AWS.			
	e				



Programme: Diploma Year: III Class: BCA(C& CS) Semester: IV Credits Subject: Data Mining Theory:4Cr Title: Data Mining Course Code: Title: Data Mining BCA-NEP-404 Title: Data Mining Course Objectives: Course Objectives: CO1: To introduce students to basic applications, concepts, and techniques of data mining CO2: To develop skills for using recent data mining software to solve practical prob	
Credits Theory:4CrSubject: Data MiningCourse Code: BCA-NEP-404Title: Data MiningCourse Objectives: CO1: CO1: CO2:To introduce students to basic applications, concepts, and techniques of data mining cO2: To develop skills for using recent data mining software to solve practical prob	
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CO2: To develop skills for using recent data mining software to solve practical prob	
	5.
	olems in a
variety of disciplines.	
CO3: To extract knowledge from data repository for data analysis, frequent pattern, cla	ssification
and prediction.	
CO4: Understand and implement classical models and algorithms in data warehouses	and data
mining.	
CO5: Master data mining techniques in various applications like social, scier	ntific and
environmental context.	
Nature of Paper: DSE	
Minimum Passing Marks/Credits: 40% Marks	
L:4	
P:0(In Hours/Week)	
Theory - 1 Hr. = 1 Credit	N. C
Unit Contents	No. of
	Lectures Allotted
I Introduction: Data Mining - Overview, Motivation, Definition &	10
Functionalities, Major issues in Data Mining, Integration of Data Mining	10
System with Data Warehouse System.	
Data Preprocessing : Descriptive Data Summarization, Data Cleaning-Missing	
Values, Noisy Data, Data Integration and Transformation, Data Reduction-	
Data Cube Aggregation, Attribute Subset Selection, Dimensionality Reduction,	
Numerosity Reduction, Discretization and Concept Hierarchy.	
II Association Rules: Introduction, Frequent Itemsets, Closed Item sets, Methods	10
to Discover Association Rules, Apriori Algorithm, Multilevel Association Rule	
Mining, and Rule Evaluation Metrics.	
III Classification and Prediction: Classification Techniques-Decision Tree,	10
Rule-Based Classification, Bayesian Classification, k-Nearest-Neighbor	-
Classifier, Linear Regression, Accuracy and Error Measures	
IV Cluster Analysis: Introduction, Types of Data, Partitioning Methods- k-Means	10
and k-Medoids, Hierarchical Clustering- Chameleon, Density Based Methods-	
DBSCAN, OPTICS. Grid Based Methods- STING, Model Based Methods-	
Neural Network Approach, Outlier Analysis.	
V Recent Trends and Applications: Web Mining, Spatial Data Mining, Text	10
Mining, Multimedia Data Mining, Applications of data mining in finance,	



Text Books:

1. Jiawei Han, Jian Pei, Micheline Kamber, "Data Mining: Concepts and Techniques", Elsevier. Reference:

Reference:

1. Margaret H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education.

2. Arun K. Pujari, "Data Mining Techniques", Universities Press.

3. Pieter Adriaans & Dolf Zantinge, "Data Mining", Pearson Education.

	Evaluation/Assessment Methodology	Max. Marks 100
1)	Class tasks/ Sessional Examination	15
2)	Presentations /Seminar	
3)	Assignments	
4)	Research Project Report	10
	Seminar On Research Project Report	
5)	ESE	75
	Total:	100
Pre	requisites for the course: NIL	

Course Learning Outcomes:

CO1: Understand the functionality of the various data mining and data warehousing component.

CO2: Appreciate the strengths and limitations of various data mining and data warehousing models.

- CO3: Explain the analyzing techniques of various data.
- CO4: Describe different methodologies used in data mining and data ware housing.
- CO5: Compare different approaches of data ware housing and data mining with various technologies.



IIMTU-NEP IMPLEMENTATION Year-II / Semester-IV

0		ficate/Diploma/Degree/	Year: II	
UG(R)/PG/Ph.D. Certificate			Semester: IV	
Class: A	ll UG Clas	sses of IIMT University		
Credits		Subject: Human values a	and professional ethics	
Theory-	3Cr			
Course (Code	Title: Human values and	l professional ethics	
Theory				
UVE-401				
Course (Objectives	:		
CO1:	To reinst	ate the rich cultural legacy a	and human values of which we are the	custodians.
	To focus	on professional ethics which	ch are broader indicators of desirable a	actions vis-à-vi
CO2:	undesirat	ble actions.		
			alues and ethics for internal and external	
CO3:			for value-based and ethical practices	s in the highe
	education	al institutions leading to in	plementation and monitoring.	
CO4:			a value-based and ethical culture in H	
CO5:	CO6:To	suggest indicative reinforce	cement programmes for nurturing hur	nan values an
	ethics in	HEIs.		
Nature o	f Paper: (Core/DSE/SEC/GE/AECC	C-AECC	
Minimu	n Passing	Marks/Credits: 40% Mar	rks	
L:3				
T:0				
P: 0 (In F	Iours/Wee	k)		
•	1 Hr. = 1 (Credit		
Practical	NA.			
Unit		Content	ts (Theory)	No. of
				Lectures
				Allotted
Ι	Course	e Introduction - Need, Bas	sic Guidelines, Content and Process	6
	for Va	lue Education		
II			uman Being - Harmony in Myself	6
III	Under	standing Harmony in the	Family and Society- Harmony in	6
	Human	n-Human Relationship		
IV	Under	standing Harmony in the	e Nature and Existence - Whole	6
	exister	nce as Co-existence		
V	Implic	ations of the above Holis	stic Understanding of Harmony on	6
		sional Ethics		
Suggeste		gs: For Theory		
00		•		
1. Iva	n Illich, 19	974, Energy & Equity, The	Trinity Press, Worcester, and Harper C	ollins, USA.
			Trinity Press, Worcester, and Harper C ful: a study of economics as if people	
2. E.F		cher, 1973, Small is Beauti	Trinity Press, Worcester, and Harper C ful: a study of economics as if people	

3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991.

- 4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth Club of Rome's report, Universe Books.
- 5. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.



- 6. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
- 7. A N Tripathy, 2003, Human Values, New Age International Publishers.
- 8. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
- 9. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
- 10. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
- 11. B P Banerjee, 2005, Foundations of Ethics and Management, ExcelBooks.
- 12. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted2008.
- 13. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.

Evaluation/Assessment Methodology				
Max. Marks: 5				
1) Class tasks/ Sessional Examination	10 marks			
2) Presentations /Seminar	05 marks			
3) Assignments				
4) Research Project Report				
Seminar On Research Project Report				
5) ESE	35			
Total:				
Prerequisites for the course: First year must be clear for appearing in III	rd /IV th for the study of this			
Audit/Qualifying course- for theory				
Course Learning Outcomes:				
CO1: The learning process for holistic development.				
CO2: Impeccable governance.				
CO3: Effective institutional management.				
CO4: Well laid system of rewards and chastisement.				
CO5: Institutional climate where 'rights' enjoy and 'wrongs' are discou	raged.			



+ rrogra	amme: Dipl	oma	Year:II	
U	BCA(C&		Semester:IV	
	Credits Subject: Numerical A			
Theory		~	-	
		Title: Numerical Ar	nalysis	
	NEP-404		2	
Cours	e Objective	s:		
CO1:	0	erstanding of numeri	ical Algorithms.	
CO2:	Adequate	exposure to learn	alternative methods and analyze mathematical	problems to
	-	the suitable numeric	•	
CO3:	Use the co	oncepts of interpolat	ion, eigen value problem techniques for mathemati	cal problems
	arising in v	various fields.		
CO4:	Solve initi	al value and bounda	ary value problems which have great significance in	n engineering
			rtial differential equations.	
CO5:			ramming language, implementation of algorithms a	and computer
		to solve mathematica	al problems.	
	e of Paper:			
	num Passing	g Marks/Credits:40	0% Marks	
L:4				
T:0				
	Hours/Wee			
-	y - 1 Hr. = 1			
	cal- 2 Hrs.=	Credit(4Hrs./Week=		
Unit			Contents	No. of
				Lectures
T	Introduct	ion: Numbers ret	presentation on a computing machine with	Lectures Allotted
Ι		1	presentation on a computing machine with	Lectures
Ι	particulari	zation to single pred	cision, double precision, quadruple precision and	Lectures Allotted
Ι	particulari the Intel 8	zation to single pred 6 family of process	cision, double precision, quadruple precision and sors. Definitions of numerical rounding error and	Lectures Allotted
	particulari the Intel 8 chopping e	zation to single pred 6 family of process error, Discussion of	cision, double precision, quadruple precision and sors. Definitions of numerical rounding error and major sources of error in numerical analysis	Lectures Allotted 8
I	particulari the Intel 8 chopping 6 Solution 6	zation to single precedent of family of process error, Discussion of a ligebraic equation	cision, double precision, quadruple precision and ors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of : Bijection algorithm and its	Lectures Allotted
	particulari the Intel 8 chopping of Solution o coding; M	zation to single pred 6 family of process error, Discussion of f of algebraic equation ethod of False Positi	cision, double precision, quadruple precision and cors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of : Bijection algorithm and its tion and its coding; The Secant algorithm and its	Lectures Allotted 8
	particulari the Intel 8 chopping 6 Solution 6 coding; M coding; Th	zation to single pred 6 family of process error, Discussion of r of algebraic equation ethod of False Position ne Newton-Raphson	cision, double precision, quadruple precision and ors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of : Bijection algorithm and its tion and its coding; The Secant algorithm and its algorithm and its coding. Brief discussion of the	Lectures Allotted 8
	particulari the Intel 8 chopping 6 Solution 6 coding; M coding; Th robustness	zation to single precedent 6 family of process error, Discussion of the of algebraic equation ethod of False Position in Newton-Raphson and relative perform	cision, double precision, quadruple precision and cors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of : Bijection algorithm and its tion and its coding; The Secant algorithm and its	Lectures Allotted 8
	particulari the Intel 8 chopping of Solution o coding; M coding; Th robustness point algor	zation to single precedent for the second s	cision, double precision, quadruple precision and cors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of : Bijection algorithm and its tion and its coding; The Secant algorithm and its algorithm and its coding. Brief discussion of the mance of these algorithm, Properties of the fixed	Lectures Allotted 8
	particulari the Intel 8 chopping 6 Solution 6 coding; M coding; Th robustness point algor the notion	zation to single precedent for the single precedent of the second secon	cision, double precision, quadruple precision and cors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of : Bijection algorithm and its tion and its coding; The Secant algorithm and its algorithm and its coding. Brief discussion of the mance of these algorithm, Properties of the fixed given x0. Definition of the Lipshitz condition and	Lectures Allotted 8
	particulari the Intel 8 chopping of Solution of coding; M coding; Th robustness point algor the notion g(xn), Erro	zation to single precedent for the single precedent of the second secon	cision, double precision, quadruple precision and ors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of : Bijection algorithm and its tion and its coding; The Secant algorithm and its algorithm and its coding. Brief discussion of the mance of these algorithm, Properties of the fixed given x0. Definition of the Lipshitz condition and gorithm Conditions for convergence of $xn+1 =$	Lectures Allotted 8
	particulari the Intel 8 chopping of Solution o coding; M coding; Th robustness point algor the notion g(xn), Erro of an iter	zation to single precedent for the single precedent of the second secon	cision, double precision, quadruple precision and bors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of : Bijection algorithm and its tion and its coding; The Secant algorithm and its algorithm and its coding. Brief discussion of the mance of these algorithm, Properties of the fixed given x0. Definition of the Lipshitz condition and gorithm Conditions for convergence of xn+1 = gorithm xn+1 = g(xn),General notion of the order witken acceleration and Steffensen's algorithm,	Lectures Allotted 8
	particulari the Intel 8 chopping of Solution o coding; M coding; Th robustness point algor the notion g(xn), Erro of an iter Solution o Numerica	zation to single precedent for the second s	cision, double precision, quadruple precision and cors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of : Bijection algorithm and its tion and its coding; The Secant algorithm and its algorithm and its coding. Brief discussion of the mance of these algorithm, Properties of the fixed given x0. Definition of the Lipshitz condition and gorithm Conditions for convergence of xn+1 = gorithm xn+1 = g(xn),General notion of the order tikken acceleration and Steffensen's algorithm, ic equations	Lectures Allotted 8
Π	particulari the Intel 8 chopping of Solution o coding; M coding; Th robustness point algor the notion g(xn), Erro of an iter Solution o Numerica interpolati	zation to single pred 6 family of process error, Discussion of f of algebraic equation ethod of False Position and relative perform the Newton-Raphson and relative perform the xn+1 = $g(xn)$ for of a cont raction algorithm, A f systems of algebra I Interpolation: Poling polynomial ,Interpolation	cision, double precision, quadruple precision and bors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of : Bijection algorithm and its tion and its coding; The Secant algorithm and its algorithm and its coding. Brief discussion of the mance of these algorithm, Properties of the fixed given x0. Definition of the Lipshitz condition and gorithm Conditions for convergence of xn+1 = gorithm xn+1 = g(xn),General notion of the order witken acceleration and Steffensen's algorithm, ic equations lynomial interpolation, Definition of the Lagrange erpolation based on the Lagrange interpolating	Lectures Allotted 8
Π	particulari the Intel 8 chopping of Solution of coding; M coding; Th robustness point algor the notion g(xn), Erro of an iter Solution o Numerica interpolati polynomia	zation to single precedent for the single precedent of the second process for the second process of the second proces of the second proces of the second proces of the second p	cision, double precision, quadruple precision and cors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of : Bijection algorithm and its tion and its coding; The Secant algorithm and its algorithm and its coding. Brief discussion of the mance of these algorithm, Properties of the fixed given x0. Definition of the Lipshitz condition and gorithm Conditions for convergence of xn+1 = gorithm xn+1 = g(xn),General notion of the order sitken acceleration and Steffensen's algorithm, ic equations lynomial interpolation, Definition of the Lagrange erpolation based on the Lagrange interpolating ation using divided differences, Error analysis	Lectures Allotted 8
Π	particulari the Intel 8 chopping e Solution o coding; M coding; Th robustness point algor the notion g(xn), Erro of an iter Solution o Numerica interpolati polynomia underlying	zation to single precedent for the second s	cision, double precision, quadruple precision and cors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of : Bijection algorithm and its tion and its coding; The Secant algorithm and its algorithm and its coding. Brief discussion of the mance of these algorithm, Properties of the fixed given x0. Definition of the Lipshitz condition and gorithm Conditions for convergence of xn+1 = gorithm xn+1 = g(xn),General notion of the order tiken acceleration and Steffensen's algorithm, ic equations lynomial interpolation, Definition of the Lagrange erpolation based on the Lagrange interpolating ation using divided differences, Error analysis rpolation based on, Rolle's theorem The	Lectures Allotted 8
Π	particulari the Intel 8 chopping of Solution o coding; M coding; Th robustness point algor the notion g(xn), Erro of an iter Solution o Numerica interpolati polynomia underlying Chebyshev	zation to single pred 6 family of process error, Discussion of f of algebraic equation ethod of False Position and relative perform rithm xn+1 = $g(xn)$ for of a cont raction algorithm, A f systems of algebra I Interpolation: Pol- ng polynomial ,Inter 1, Newton interpol for polynomial inter for Economization and	cision, double precision, quadruple precision and cors. Definitions of numerical rounding error and major sources of error in numerical analysis ons: Description of : Bijection algorithm and its tion and its coding; The Secant algorithm and its algorithm and its coding. Brief discussion of the mance of these algorithm, Properties of the fixed given x0. Definition of the Lipshitz condition and gorithm Conditions for convergence of xn+1 = gorithm xn+1 = g(xn),General notion of the order sitken acceleration and Steffensen's algorithm, ic equations lynomial interpolation, Definition of the Lagrange erpolation based on the Lagrange interpolating ation using divided differences, Error analysis	Lectures Allotted 8



use on dimentation	and the second second	General Contractor	
use and implementation		0	
IV Solution of linear equations: Concept of Gaussian elimination, the co		8	
pivoting and a simple illustration of why pivoting is needed, LU factoriz			
matrices with and without partial/full pivoting, The Choleski facto			
Matrix inversion Iterative methods, The concept of a matrix norm with			
examples, e.g. the Frobenius norm ,The Jacobi iteration algorithm, The	e Gauss-		
Seidel algorithm, The Gauss-Seidel algorithm with over-relaxation	• .1	0	
V Numerical calculation of matrix eigenvalues: Gershgorin's theorem		8	
example - The Power algorithm, The Inverse Power algorithm ,The			
transformation, The Householder transformation ,Construction of the	e Upper		
Hessenberg matrix, The QR algorithm			
Text Books:			
1. V. A. Patel. Numerical Analysis. Harcourt Brace, College Publishers, 1994.	1 (0 1	D 11' 1'	
2. W. Cheney and D. Kincaid. Numerical Mathematics and Computing. B	rooks/Col	e Publishing	
Company, 2003.			
Reference	1 7050		
1. Numerical Analysis. 9th ed. R.L. Burden and J.D. Faires: Edition Brooks / c	ole: -7356	3-538-0-978	
.2011136		5010100(1	
2. An Introduction to Numerical Analysis. Endre Süli, David F. Mayers Camb	oridge : -0	521810264 -	
2003 .0521007941			
Evaluation/Assessment Methodology			
		Marks 100	
1) Class tasks/ Sessional Examination	15		
2) Presentations /Seminar			
3) Assignments	10		
4) Research Project Report	10		
Seminar On Research Project Report	75		
5) ESE	75		
Total:	100		
Prerequisites for the course: <i>NIL</i>			
Course Learning Outcomes:			
CO1: Discuss robustness and relative performance of different algorithm			
CO2: Able to apply interpolation methods for solving the problems numerical	ly		
CO3: Able to calculate the errors and the rates of convergence			
CO4: Able to evaluate the relationships between different areas of mathemati	cs and the	connections	
between mathematics and other disciplines.	-		
D5: Able to develop numerical algorithms for the solution of the algebraic eigen value problem.			



Drogro	mma: Diploma	Year: II		
Programme: Diploma Class: BCA(C& CS)		Semester: IV		
Credits				
Theory				
Course		vineering		
BCA-N		5		
Course	Objectives:			
	0	t software development process models.		
CO2:	Extract and analyze software r	requirements specifications for different projects.		
CO3:	Develop some basic level of so	oftware architecture/design.		
CO4:	Define the basic concepts and	importance of Software project management concep	ots like cost	
	estimation, scheduling and rev	0 1 0		
		bugging techniques and analyzing their effectiveness.		
	of Paper: Core			
	um Passing Marks/Credits: 4	0% Marks		
L:4				
T:0	T (117 1)			
	Hours/Week)			
	-1 Hr. $= 1$ Credit	(Creadite)		
Unit	al- 2 Hrs.=1Credit(4Hrs./Week		No. of	
Unit	Contents		Lectures	
			Allotted	
Ι	Introduction: Software- Char	acteristics and Applications, Software Engineering,	10	
		rs, Software Process Framework, CMM, Software		
		ics, Software Development Life Cycle, Software		
	Process ModelsWater Fall	Model, Prototyping Model, RAD Model, Spiral		
	Model, Evolutionary Models,	Component-based Development Model.		
II	Software Requirements E	ngineering and Analysis Modeling: Software	10	
	1 1	Engineering Process, Elicitation Requirements,		
	Analysis and Negotiating H	Requirements, Requirement Specification, System		
	Modeling, Requirements V	alidation, Requirement Management, Creating a		
	Modeling, Requirements V Software Requirements Spe	alidation, Requirement Management, Creating a ecification Document, IEEE Standards for SRS,		
	Modeling, Requirements V Software Requirements Spe Feasibility Study, Elements	alidation, Requirement Management, Creating a ecification Document, IEEE Standards for SRS, of Analysis Model, Data Modeling- ER Diagram,		
	Modeling, Requirements V Software Requirements Spe Feasibility Study, Elements Information Modeling- DF	alidation, Requirement Management, Creating a ecification Document, IEEE Standards for SRS, of Analysis Model, Data Modeling- ER Diagram, D, Behavioral Modeling, Control Specification,		
	Modeling, Requirements V Software Requirements Spe Feasibility Study, Elements Information Modeling- DF Process Specification, Data	alidation, Requirement Management, Creating a ecification Document, IEEE Standards for SRS, of Analysis Model, Data Modeling- ER Diagram,		
	Modeling, Requirements V Software Requirements Spe Feasibility Study, Elements Information Modeling- DF Process Specification, Data Metrics for Analysis Model.	alidation, Requirement Management, Creating a ecification Document, IEEE Standards for SRS, of Analysis Model, Data Modeling- ER Diagram, D, Behavioral Modeling, Control Specification, Dictionary, Software Quality Framework, Quality	10	
III	Modeling, Requirements V Software Requirements Spe Feasibility Study, Elements Information Modeling- DF Process Specification, Data Metrics for Analysis Model. Software Design and Impler	alidation, Requirement Management, Creating a ecification Document, IEEE Standards for SRS, of Analysis Model, Data Modeling- ER Diagram, D, Behavioral Modeling, Control Specification, Dictionary, Software Quality Framework, Quality mentation: Design Process, Principles, and Design	10	
III	Modeling, Requirements V Software Requirements Spec Feasibility Study, Elements Information Modeling- DF Process Specification, Data Metrics for Analysis Model. Software Design and Impler Concepts-Abstraction, Archi	alidation, Requirement Management, Creating a ecification Document, IEEE Standards for SRS, of Analysis Model, Data Modeling- ER Diagram, D, Behavioral Modeling, Control Specification, Dictionary, Software Quality Framework, Quality mentation: Design Process, Principles, and Design itecture, Refinement, Modularity, Data Structure,	10	
III	Modeling, Requirements V Software Requirements Spec Feasibility Study, Elements Information Modeling- DF Process Specification, Data Metrics for Analysis Model. Software Design and Impler Concepts-Abstraction, Archi Information Hiding, Function	alidation, Requirement Management, Creating a ecification Document, IEEE Standards for SRS, of Analysis Model, Data Modeling- ER Diagram, D, Behavioral Modeling, Control Specification, Dictionary, Software Quality Framework, Quality mentation: Design Process, Principles, and Design tecture, Refinement, Modularity, Data Structure, onal Independence, Cohesion, Coupling; Design	10	
III	Modeling, Requirements V Software Requirements Spec Feasibility Study, Elements Information Modeling- DF Process Specification, Data Metrics for Analysis Model. Software Design and Impler Concepts-Abstraction, Archi Information Hiding, Function Documentation, Design Stra	alidation, Requirement Management, Creating a ecification Document, IEEE Standards for SRS, of Analysis Model, Data Modeling- ER Diagram, D, Behavioral Modeling, Control Specification, Dictionary, Software Quality Framework, Quality mentation: Design Process, Principles, and Design tecture, Refinement, Modularity, Data Structure, onal Independence, Cohesion, Coupling; Design tegies-Top Down and Bottom Up Design; Design	10	
III	Modeling, Requirements V Software Requirements Spec Feasibility Study, Elements Information Modeling- DF Process Specification, Data Metrics for Analysis Model. Software Design and Impler Concepts-Abstraction, Archi Information Hiding, Function Documentation, Design Strate ModelData Design Element	alidation, Requirement Management, Creating a ecification Document, IEEE Standards for SRS, of Analysis Model, Data Modeling- ER Diagram, D, Behavioral Modeling, Control Specification, Dictionary, Software Quality Framework, Quality mentation: Design Process, Principles, and Design itecture, Refinement, Modularity, Data Structure, onal Independence, Cohesion, Coupling; Design tegies-Top Down and Bottom Up Design; Design ts, Architectural Design, User Interface Design,	10	
III	Modeling, Requirements V Software Requirements Spec Feasibility Study, Elements Information Modeling- DF Process Specification, Data Metrics for Analysis Model. Software Design and Impler Concepts-Abstraction, Archi Information Hiding, Function Documentation, Design Stra ModelData Design Element Component-Level Design, Desig	alidation, Requirement Management, Creating a ecification Document, IEEE Standards for SRS, of Analysis Model, Data Modeling- ER Diagram, D, Behavioral Modeling, Control Specification, Dictionary, Software Quality Framework, Quality mentation: Design Process, Principles, and Design tecture, Refinement, Modularity, Data Structure, onal Independence, Cohesion, Coupling; Design tegies-Top Down and Bottom Up Design; Design	10	



IV	Software Testing: Verification, Validation, Testing Objectives, Unit T Integration Testing, Validation Testing, System Testing, Acceptance T Regression Testing, Test Characteristics, White Box Testing, Basic Path T Control Structure Testing, Black Box Testing, Test Plan, Test Case I	Testing, Testing,	10		
	Quality Metrics for Testing.				
V	Software Maintenance: Nature and Need of Maintenance, Types of Maint	enance	10		
	(Perceptive, Preventive, Adoptive, Corrective), Cost of Maintenance, Ev	olution			
	of Software, Software Maintenance Process, Software Maintenance Techn	niques-			
	Reverse Engineering, Reengineering; Factors affecting Software Maintee	enance,			
	Key Issues in Maintenance, Software Configuration Management, Versi	on and			
	Release Control, Change Control, Configuration Audit, Metrics for Mainte	enance.			
Text B	ooks:				
1. Rog	ger S. Pressman, "Software Engineering: A Practitioner's Approach", Addisc	on Wesley	7		
2. Pan	kaj Jalote, "An Integrated Approach to Software Engineering", Springer				
Refere	nce:				
1. K. I	K. Aggarwal & Yogesh Singh "Software Engineering", New Age Internation	nal.			
2. I. S	ommerville, "Software Engineering", Pearson Education.				
3. Jam	nes Peter, W. Pedrycz, "Software Engineering: An Engineering Approach", J	lohn Wile	y & Sons.		
	ramanian Chandramouli, Saikat Dutt, ChandramouliSeetharaman, B. G				
Eng	ineering", Pearson Education India				
Evalua	tion/Assessment Methodology				
		Max. N	larks 100		
1) Cla	ss tasks/ Sessional Examination		15		
2) Pres	sentations /Seminar				
3) Ass	ignments				
4) Res	earch Project Report		10		
	ninar On Research Project Report				
5) ESH	3		75		
	Total:	1	00		
Prerequ	isites for the course: NIL	•			
Course	Learning Outcomes:				
CO1:	Select and implement different software development process models.				
CO2:	Extract and analyze software requirements specifications for different proje	ects.			
CO3:	Develop some basic level of software architecture/design.				
CO4:	Define the basic concepts and importance of Software project managemen	t concept	s like cost		
	estimation, scheduling and reviewing the progress.				
CO5:	Apply different testing and debugging techniques and analyzing their effec	tiveness.			



Progra	amme: UG	Year: II				
Class:	BCA(C & CS	S) Semester: IV				
Credit	ts	Subject: Software Engineering Lab				
Practic	al: 2					
Cours	e Code:	Title: Software Engineering Lab				
BCA-l	NEP-405P					
	e Objectives:					
	• •	inconsistencies and incompleteness from a requirement	ts specification and state			
		unctional requirement				
	e of Paper: Co					
	um Passing N	Marks/Credits: 50% Marks				
L:0						
T:0						
	Hours/Week)					
-	y - 1 Hr. = 1 Ci					
		redit(4Hrs./Week=4Credits)				
Unit	Contents		No. of			
			Lectures			
			Allotted			
Ι	Draw the use case diagram and specify the role of each of the actors. Also 2					
		state the precondition, post condition and function of each use case				
II	-	of Software Requirement Specification Documen	t, Design 2			
TTT	Documents		1 1			
III	class diagram	classes. Classify them as weak and strong classes and	I draw the 2			
IV	0	of Software Configuration Management and Risk Ma	anagement 2			
1 V	related docu					
V		sage of any Design phase CASE tool	2			
VI		RS document in line with the IEEE recommended stands				
VI			2			
VIII		t cases for unit testing and integration testing t cases for various white box and black box testing techn				
IX	1	tivity diagram	2 2			
X		ate chart diagram.				
	ence / Text Bo					
		ftware Engineering: A Practitioners Approach, McGrav	v Hill			
		ftware Engineering, Wiley	Y 11111,			
	5	amentals of Software Engineering, PHI Publication.				
		d Yogesh Singh, Software Engineering, New Age Intern	national Publishers.			
		able as Generic Elective then the students of following c				
		to a contra literative then the students of following t	epartmentes may opt it.			



Evaluation/Assessment Methodology	
	Max. Marks:50
1) Class tasks/ Sessional Examination	25
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	
Seminar On Research Project Report	
5) ESE	25
Total:	50
Course Learning Outcomes:	
Student will be able to:	
CO1: Draw a class diagram after identifying classes and association among th	ie
CO2: Graphically represent various UML diagrams, and associations amount	ng them and identify the

CO2: Graphically represent various UML diagrams, and associations among them and identify the logical sequence of activities undergoing in a system, and represent them pictorially

CO3: Able to use modern engineering tools for specification, design, implementation and testing CO4: Develop test cases for various white box and black box testing techniques.



Program	nme:UG	Year:	II		
0			ster:IV		
Credits		Subject:Advance cloud se			
Practical	: 2	Subjectific cloud st			
	Course Code: Title:Advance cloud security lab (SPT-IV)				
BCA-NI					
	Objectives				
	0	should be made to:			
CO1: Ur	nderstand th	e limitations imposed by da	ta privacy laws.		
		ts and risks within context of			
CO3: To	have an ov	erview of the cyber laws &	concepts of cyber forensics		
	of Paper: (• • •		
Minimu	m Passing	Marks/Credits: 50% Mar	ks		
L:0					
T:0					
P:4 (In H	Iours/Week)			
	1 Hr. = 1 (
	- 2 Hrs.=10	Credit(4Hrs./Week=4Credits			
Unit	Contents			No. of Lectures Allotted	
Ι	•		sance tools like WHOIS, dig, trace tion about networks and domain	2	
II	U	a code to simulate buffer c	verflow attack.	2	
III	<u> </u>		with different options to scan open	2	
			a ping scan, tcp port scan, udp port		
IV		P spoofing using open-sour	ce tool ARPWATCH.	2	
V		essus tool to scan the netwo		2	
VI	Set up IPS	EC under LINUX		2	
VII	Mini proje	ct		2	
		Evaluation/As	sessment Methodology		
			<u> </u>	Max. Marks:50	
1) Class	s tasks/ Ses	sional Examination		25	
2) Prese	entations /S	eminar			
3) Assig	gnments				
4) Rese	arch Projec	t Report/Seminar On Resea	rch Project Report		
5) ESE				25	
			Total:	50	
Student CO1: Di			•		
	•	nown cyber attack incidents			
I. DISC	over well K	iown cyber attack incidents			



Programme: Degree		;	Year: III	
Class:BCA(C& CS)			Semester: V	
Credits Subject: Big Data		Subject: Big Dat	a	
Theory:4Cr				
	e Code:	Title: Big Data		
	NEP-503			
	e Objectives:			
CO1:		0 0	Data Analytics concepts and its applications in b	ousiness.
CO2:			ponents of Map Reduce Framework and HDFS.	
CO3:		ries in NoSQL env		<i>.</i> •
CO4:			Map Reduce based distributed processing applications using LIP ASE. Dis sta	tions.
CO5:	<u> </u>		applications using HBASE, Pig etc.	
	_	scipline Specific E		
L:4	um Passing N	Aarks/Credits:404	10 IVIARKS	
T:0				
	Hours/Week)			
	-1Hr.=1Credit			
Unit		~	Contents	No. of
Ont			contents	Lectures
				Allotted
Ι	Introduction	n to Big Data: 7	Types of digital data, history of Big Data	8
	innovation, in	ntroduction to Big	Data platform, drivers for Big Data, Big Data	
	architecture	and characteristic	s, 5 Vs of Big Data, Big Data technology	
	components,	Big Data import	ance and applications, Big Data features -	
	security, con	npliance, auditing	and protection, Big Data privacy and ethics,	
	Big Data A	nalytics, Challeng	es of conventional systems, intelligent data	
	analysis, nat	ure of data, analyt	tic processes and tools, analysis vs reporting,	
		analytic tools.		
II			mework and basics, how Map Reduce works,	8
			lication, unit tests with MR unit, test data and	
		• •	educe job run, failures, job scheduling, shuffle	
		-	Reduce types, input formats, output formats,	
	-	features, Real-wor		0
III		loop Distributed	File System): Design of HDFS, HDFS	8
	concepts,	challongos filo siz	es, block sizes and block abstraction in HDFS,	
			S store, read, and write files, Java interfaces to	
	-		Hadoop file system interfaces, data flow, data	
			Hadoop archives, Hadoop I/O: Compression,	
	-	-	ased data structures. Hadoop Environment:	
			er, cluster specification, cluster setup and	
		-	on, securityin Hadoop,	



	Transforming Education System	Transforming Lives	Section 2f & 12B		
IV	Hadoop Eco System and YARN: Hadoop ecosystem com	mponents,	8		
	schedulers, fair and capacity, Hadoop 2.0 New Features – Name Node high				
	availability, HDFS federation, MRv2, YARN, Running MRv1 in YARN.				
	NoSQL Databases: Introduction to NoSQL Mongo DB: Introduction, data				
	types, creating, updating and deleing documents, querying, introduction to				
	indexing, capped collections				
V	Hadoop Eco System Frameworks: Applications on Big Data u	using Pig,	8		
	Hive and HBase.	6 6,			
	Pig : Introduction to PIG, Execution Modes of Pig, Comparison of	f Pig with			
	Databases, Grunt, Pig Latin, User Defined Functions, Data H	-			
	operators,	U			
	HBase – Hbase concepts, clients, example, Hbase vs RDBMS,	advanced			
	usage, schema design, advance indexing, Zookeeper - how it				
	monitoring a cluster, how to build applications with Zookeeper.	-			
	Data strategy, introduction to Info sphere, Big Insights and Bi	U			
	introduction to Big SQL.	<i>c</i> ,			
Text B			•		
	chael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Bi	ig Analytics	: Emerging		
	siness Intelligence and Analytic Trends for Today's Businesses", Wil	•	00		
	g-Data Black Book, DT Editorial Services, Wiley.	5			
Refere	nce Book:				
1. Gl	enn J. Myatt, "Making Sense of Data", John Wiley & Sons.				
2. Pe	te Warden, "Big Data Glossary", O'Reilly.				
	Evaluation/Assessment Methodology				
		Max	. Marks 100		
1) C	lasstasks/Sessional Examination		15		
,	resentations /Seminar				
	ssignments				
	esearch Project Report		10		
	eminar On Research Project Report				
	ESE				
	Total:		100		
Prerec	uisites for the course: NIL				
	se Learning Outcomes:				
CO1:	Able to understand the concept of HDFS and map reduce.				
	Able to gather large data from a range of data sources.				
CO1:	The to guiller large data from a range of data sources.				
CO1: CO3:					
	Able to understand the hadoop ecosystem components Able to explain the architecture of pig and hive with different opera	tions.			



NEPIMPLEMENTATION

Year-III /Semester- V

Programme: Degree		Year: III				
Class: BCA(C& CS)		Semester: V				
Credits						
Theory:40	÷					
Course Code: Title: Data communication network						
BCA-NE	BCA-NEP-503					
Course C	bjectives:					
CO1: To	introduce the various types of	of computer networks.				
CO2: To	explore the various layers of	OSI Model.				
CO3: To	introduce UDP and TCP Mc	odels.				
CO4: To	identify various application	layer protocols.				
	demonstrate the TCP/IP and	OSI models				
Nature of	f Paper: DSE					
Minimun	n Passing Marks/Credits:40	0% Marks				
L:4						
T:0						
	urs/Week)					
	Hr.=1Credit					
	2Hrs.=1Credit(4Hrs./Week=	4Credits)				
Unit		Contents	No. of			
			Lectures			
			Allotted			
Ι		nponents – Direction of Data flow – Networks –	10			
		s – Types of Connections – Topologies –Protocols				
		model, Example Networks such as ATM, Frame				
	•	s, Multiplexing, Transmission Media, Switching,				
	Circuit Switched Networks					
II		n, Framing, and Error – Detection and Correction	10			
		amming code, Flow and Error Control, , HDLC,				
		LOHA, CSMA/CD, LAN – Ethernet IEEE 802.3,				
		802.11, Random access, Controlled access,				
	Channelization.					
III	1 2	Process Delivery, UDP and TCP protocols, Data	10			
	Traffic, Congestion, Congestion Control, QoS, Integrated Services,					
IV		Addressing, Internetworking, Address mapping,	10			
ICMP, IGMP, Forwarding, Uni-Cast Routing Protocols, Multicast Routing						
	Protocols.					
V	Application Layer: Domain SMTP, FTP, WWW, HTTP	n name space, DNS in internet, electronic mail, , SNMP.	10			
Text Boo	ks:					
		king, Behrouz A. Farozan, Fourth Edition TMH, 20	06.			



Reference:

- 1. Data communications and Computer Networks, P.C. Gupta, PHI.
- 2. An Engineering Approach to Computer Networks, S. Keshav, 2ndEdition, Pearson Education.
- Computer Networking: A Top-Down Approach Featuring the Internet. James Kurose & Keith W. Ross, 3rdEdition, Pearson Education.

Evaluation/Assessment Methodology				
	Max. Marks 100			
1) Class tasks/ Sessional Examination	15			
2) Presentations /Seminar				
3) Assignments				
4) Research Project Report	10			
Seminar On Research Project Report				
5) ESE	75			
Total:	100			
Prerequisites for the course: NIL				
Course Learning Outcomes:				
CO1. Students should understand and explore the basics of Computer	Networks and Various			
Protocols.				
CO2. Students will be in a position to administrate a network and flow of information.				
CO3. Able to understand the World Wide Web Concepts.				
CO4. Able to understand the concepts of network security				
CO5. Able to secure device from network issues.				



Programme:Degree Class:BCA(C& CS)			Year: III	
		S)	Semester: V	
Credits Subject:ER		Subject:ERP	·	
Theory:4Cr				
	Course Code: Title:ERP			
BCA-N	EP-503			
	Objectives			
CO1:			y and forward-looking on the theory and practice of	Enterprise
G Q Q		Planning Technol		
CO2:		on a strong empha	asis upon practice of theory in Applications and Practic	cal oriented
CO2.	approach.	a students to day	valor the basic understanding of how EDD envisions t	ha husinasa
CO3:			velop the basic understanding of how ERP enriches the a multidimensional growth.	ne business
CO4:			n thinking towards business processes.	
CO4. CO5:			udents technological competitive and make them rea	ndv to self-
005.		ith the higher tech	e 1	
Nature	of Paper: 1			
	-	Marks/Credits:	:40% Marks	
L:4		, _ · _ · _ · _ · · · · · · · · · · · ·		
T:0				
P:0(In H	Iours/Week	x)		
	1 TT 1			
Theory	- 1 Hr. = 1	Credit		
		Credit Credit(4Hrs./Wee	ek=4Credits)	
			ek=4Credits) Contents	No. of
Practica				Lectures
Practica Unit	1- 2 Hrs.=1	Credit(4Hrs./Wee	Contents	Lectures Allotted
Practica	l- 2 Hrs.=1	Credit(4Hrs./Wee	Contents Evolution of ERP;. what is ERP?, Reasons for the	Lectures
Practica Unit	I- 2 Hrs.=1 Introduc Growth	Credit(4Hrs./Wee ction to ERP:	Contents Evolution of ERP;. what is ERP?, Reasons for the o and Justification of ERP in India;. Evaluation of	Lectures Allotted
Practica Unit I	I- 2 Hrs.=1 Introduc Growth ERP; Va	Credit(4Hrs./Wee ction to ERP: 1 of ERP; Scenario rious Modules of	Contents Evolution of ERP;. what is ERP?, Reasons for the o and Justification of ERP in India;. Evaluation of ERP;. Advantage of ERP.	Lectures Allotted 8
Practica Unit	I- 2 Hrs.=1 Introduc Growth ERP; Va An Ove	Credit(4Hrs./Wee ction to ERP: 1 of ERP; Scenario rious Modules of erview of Enter	Contents Evolution of ERP;. what is ERP?, Reasons for the o and Justification of ERP in India;. Evaluation of ERP;. Advantage of ERP. rprise: An Overview of Enterprise;. Integrated	Lectures Allotted
Practica Unit I	I- 2 Hrs.=1 Introduc Growth ERP; Va An Ove Manager	Credit(4Hrs./Wee ction to ERP: 1 of ERP; Scenario rious Modules of erview of Enter nent Information	Contents Evolution of ERP;. what is ERP?, Reasons for the o and Justification of ERP in India;. Evaluation of ERP;. Advantage of ERP. rprise: An Overview of Enterprise;. Integrated n;. Business Modeling; ERP for Small Business;.	Lectures Allotted 8
Practica Unit I	I- 2 Hrs.=1 Introdue Growth ERP; Va An Ove Manager ERP for	Credit(4Hrs./Wee ction to ERP: of ERP; Scenario rious Modules of erview of Enter nent Information Make to Order	Contents Evolution of ERP;. what is ERP?, Reasons for the o and Justification of ERP in India;. Evaluation of ERP;. Advantage of ERP. rprise: An Overview of Enterprise;. Integrated n;. Business Modeling; ERP for Small Business;. Companies;. Business Process Mapping for ERP	Lectures Allotted 8
Practica Unit I	I- 2 Hrs.=1 Introduc Growth ERP; Va An Ove Manager ERP for Module	Credit(4Hrs./Wee ction to ERP: 1 of ERP; Scenario rious Modules of erview of Enter nent Information Make to Order Design;. Hardw	Contents Evolution of ERP;. what is ERP?, Reasons for the o and Justification of ERP in India;. Evaluation of ERP;. Advantage of ERP. rprise: An Overview of Enterprise;. Integrated n;. Business Modeling; ERP for Small Business;.	Lectures Allotted 8
Practica Unit I	I- 2 Hrs.=1 Introduc Growth ERP; Va An Ove Manager ERP for Module Impleme	Credit(4Hrs./Wee ction to ERP: 1 of ERP; Scenario rious Modules of erview of Enter ment Information Make to Order Design;. Hardwentation	Contents Evolution of ERP;. what is ERP?, Reasons for the o and Justification of ERP in India;. Evaluation of ERP;. Advantage of ERP. rprise: An Overview of Enterprise;. Integrated n;. Business Modeling; ERP for Small Business;. Companies;. Business Process Mapping for ERP ware Environment and its Selection for ERP	Lectures Allotted 8
Practica Unit I	I- 2 Hrs.=1 Introduc Growth ERP; Va An Ove Manager ERP for Module Impleme ERP and	Credit(4Hrs./Wee ction to ERP: 1 of ERP; Scenario rious Modules of erview of Enter nent Information Make to Order Design;. Hardw entation d Related Techn	Contents Evolution of ERP;. what is ERP?, Reasons for the o and Justification of ERP in India;. Evaluation of ERP;. Advantage of ERP. rprise: An Overview of Enterprise;. Integrated n;. Business Modeling; ERP for Small Business;. Companies;. Business Process Mapping for ERP ware Environment and its Selection for ERP mologies: ERP and Related Technologies;. Business	Lectures Allotted 8
Practica Unit I	I- 2 Hrs.=1 Introduc Growth ERP; Va An Ove Manager ERP for Module Impleme ERP and Process	Credit(4Hrs./Wee ction to ERP: 1 of ERP; Scenario rious Modules of erview of Enter nent Information Make to Order Design;. Hardwentation d Related Techn Reengineering (Contents Evolution of ERP;. what is ERP?, Reasons for the o and Justification of ERP in India;. Evaluation of ERP;. Advantage of ERP. rprise: An Overview of Enterprise;. Integrated n;. Business Modeling; ERP for Small Business;. Companies;. Business Process Mapping for ERP ware Environment and its Selection for ERP mologies: ERP and Related Technologies;. Business (BPR);. Management Information System (MIS);.	Lectures Allotted 8
Practica Unit I	I- 2 Hrs.=1 Introdue Growth ERP; Va An Ove Manager ERP for Module Impleme ERP and Process Executiv	Credit(4Hrs./Wee ction to ERP: 1 of ERP; Scenario rious Modules of erview of Enter ment Information Make to Order Design;. Hardwentation d Related Techn Reengineering (re Information S	Contents Evolution of ERP;. what is ERP?, Reasons for the o and Justification of ERP in India;. Evaluation of ERP;. Advantage of ERP. rprise: An Overview of Enterprise;. Integrated n;. Business Modeling; ERP for Small Business;. Companies;. Business Process Mapping for ERP ware Environment and its Selection for ERP mologies: ERP and Related Technologies;. Business (BPR);. Management Information System (MIS);. System (EIS);. Decision support System (DSS);.	Lectures Allotted 8
Practica Unit I II	I- 2 Hrs.=1 Introduc Growth ERP; Va An Ove Manager ERP for Module Impleme ERP and Process Executiv Supply C	Credit(4Hrs./Wee ction to ERP: 1 of ERP; Scenario rious Modules of erview of Enter nent Information Make to Order Design;. Hardw Intation d Related Techn Reengineering (re Information S Chain Managemen	Contents Evolution of ERP;. what is ERP?, Reasons for the o and Justification of ERP in India;. Evaluation of ERP;. Advantage of ERP. rprise: An Overview of Enterprise;. Integrated n;. Business Modeling; ERP for Small Business;. Companies;. Business Process Mapping for ERP ware Environment and its Selection for ERP mologies: ERP and Related Technologies;. Business (BPR);. Management Information System (MIS);. System (EIS);. Decision support System (DSS);. nt (SCM).	Lectures Allotted 8 8 8
Practica Unit I	I- 2 Hrs.=1 Introduc Growth ERP; Va An Ove Manager ERP for Module Impleme ERP and Process Executiv Supply C ERP Ma	Credit(4Hrs./Wee ction to ERP: 1 of ERP; Scenario rious Modules of erview of Enter nent Information Make to Order Design;. Hardwentation d Related Techn Reengineering (re Information S Chain Managemen arket: Introduct	Contents Evolution of ERP;. what is ERP?, Reasons for the o and Justification of ERP in India;. Evaluation of ERP;. Advantage of ERP. rprise: An Overview of Enterprise;. Integrated n;. Business Modeling; ERP for Small Business;. Companies;. Business Process Mapping for ERP ware Environment and its Selection for ERP mologies: ERP and Related Technologies;. Business (BPR);. Management Information System (MIS);. System (EIS);. Decision support System (DSS);. nt (SCM). ion, SAP AG, Baan Company, Oracle Corporation,	Lectures Allotted 8
Practica Unit I II	I- 2 Hrs.=1 Introdue Growth ERP; Va An Ove Manager ERP for Module Impleme ERP and Process Executiv Supply C ERP Ma People S	Credit(4Hrs./Wee ction to ERP: 1 of ERP; Scenario rious Modules of erview of Enter nent Information Make to Order Design;. Hardy ntation d Related Techn Reengineering (re Information S Chain Managemen arket: Introduct Soft, JD Edwards	Contents Evolution of ERP;. what is ERP?, Reasons for the o and Justification of ERP in India;. Evaluation of ERP;. Advantage of ERP. rprise: An Overview of Enterprise;. Integrated n;. Business Modeling; ERP for Small Business;. Companies;. Business Process Mapping for ERP ware Environment and its Selection for ERP mologies: ERP and Related Technologies;. Business (BPR);. Management Information System (MIS);. System (EIS);. Decision support System (DSS);. nt (SCM). ion, SAP AG, Baan Company, Oracle Corporation, World Solutions Co, System Software Associates,	Lectures Allotted 8 8 8
Practica Unit I II	I- 2 Hrs.=1 Introduc Growth ERP; Va An Ove Manager ERP for Module Impleme ERP and Process Executiv Supply C ERP Ma People S Inc. (SS	Credit(4Hrs./Wee ction to ERP: 1 of ERP; Scenario rious Modules of erview of Enter ment Information Make to Order Design;. Hardwentation d Related Techn Reengineering (re Information S Chain Managemen arket: Introduct Soft, JD Edwards SA); QAD; A 0	Contents Evolution of ERP;. what is ERP?, Reasons for the o and Justification of ERP in India;. Evaluation of ERP;. Advantage of ERP. rprise: An Overview of Enterprise;. Integrated n;. Business Modeling; ERP for Small Business;. Companies;. Business Process Mapping for ERP ware Environment and its Selection for ERP mologies: ERP and Related Technologies;. Business (BPR);. Management Information System (MIS);. System (EIS);. Decision support System (DSS);. nt (SCM). ion, SAP AG, Baan Company, Oracle Corporation,	Lectures Allotted 8 8 8
Practica Unit I II	I- 2 Hrs.=1 Introduc Growth ERP; Va An Ove Manager ERP for Module Impleme ERP and Process Executiv Supply C ERP Ma People S Inc. (SS Packages	Credit(4Hrs./Wee ction to ERP: 1 of ERP; Scenario rious Modules of erview of Enter ment Information Make to Order Design;. Hardwentation d Related Techn Reengineering (re Information S Chain Managemen arket: Introduct Soft, JD Edwards SA); QAD; A G s and Modules.	Contents Evolution of ERP;. what is ERP?, Reasons for the o and Justification of ERP in India;. Evaluation of ERP;. Advantage of ERP. rprise: An Overview of Enterprise;. Integrated n;. Business Modeling; ERP for Small Business;. Companies;. Business Process Mapping for ERP ware Environment and its Selection for ERP mologies: ERP and Related Technologies;. Business (BPR);. Management Information System (MIS);. System (EIS);. Decision support System (DSS);. nt (SCM). ion, SAP AG, Baan Company, Oracle Corporation, World Solutions Co, System Software Associates,	Lectures Allotted 8 8 8
Practica Unit I II III	I- 2 Hrs.=1 Introduc Growth ERP; Va An Ove Manager ERP for Module Impleme ERP and Process Executiv Supply C ERP Ma People S Inc. (SS Packages	Credit(4Hrs./Wee ction to ERP: 1 of ERP; Scenario rious Modules of erview of Enter nent Information Make to Order Design;. Hardwentation d Related Techn Reengineering (re Information S Chain Managemen arket: Introduct Soft, JD Edwards SA); QAD; A (s and Modules. plementation L	Contents Evolution of ERP;. what is ERP?, Reasons for the o and Justification of ERP in India;. Evaluation of ERP;. Advantage of ERP. rprise: An Overview of Enterprise;. Integrated n;. Business Modeling; ERP for Small Business;. Companies;. Business Process Mapping for ERP ware Environment and its Selection for ERP mologies: ERP and Related Technologies;. Business (BPR);. Management Information System (MIS);. System (EIS);. Decision support System (DSS);. nt (SCM). ion, SAP AG, Baan Company, Oracle Corporation, World Solutions Co, System Software Associates, Comparative Assessment and Selection of ERP	Lectures Allotted 8 8 8 8



Testing; Going Live; End-User Training; Post Implementation	n (Maintenance				
Mode).					
Text Books:					
1. Daniel E.O'Leary, Enterprise Resource Planning Systems, Cambridge	e University Press,2002.				
Ellen Monk, Bret Wagner, Concepts in Enterprise resource planning, Cengage learning, Third					
edition, 2009.					
Reference					
1. Enterprise Resource Planning – Alexis Leon – Second Edition – TMF	ł				
2. Manufacturing Resource Planning (MRP II) with Introduction to ERI					
Sheikh, Publisher: Mc.Graw-Hill					
Evaluation/Assessment Methodology					
	Max. Marks 100				
1) Class tasks/ Sessional Examination	15				
2) Presentations /Seminar					
3) Assignments					
4) Research Project Report	10				
Seminar On Research Project Report					
5) ESE	75				
Total:	100				
Prerequisites for the course: <i>nil</i>					
Course Learning Outcomes:					
CO1: Make basic use of Enterprise software, and its role in integrating b	ousiness functions				
CO2: Analyze the strategic options for ERP identification and adoption.					
CO3: Design the ERP implementation strategies.					
CO4: Analyze the strategic options for ERP identification and adoption.					
OS. Create and income division of the second for an approximate EDD implementation					

CO5: Create reengineered business processes for successful ERP implementation.



Program	ne:UG		Year: III		
Class:BCA(C & CS)		S)	Semester: V		
		Subject:Computer F	Forensics Lab (SPT- V)		
Practical: 2					
Course Code: Title:Computer Forensics Lab (SPT- V)					
BCA-NEP					
Course O	•				
		t practices of digital i			
	-	different techniques	and procedures that enables the	m to perfor	m a digital
investigati					
	•	· · · ·	evidence and identify the most signif	ficant data	
Nature of	_				
	Passing	Marks/Credits: 50%	o Marks		
L:0					
T:0 D:4(In Hor	$1 m_0 / (1) - 1 = 1$)			
P:4(In Hou Theory - 1					
•		Credit(4Hrs./Week=40	Cradits)		
Unit	Conten				No. of
Omt	Conten	15			Lectures
					Allotted
Ι	Discuss	different tools used for	or forensic investigation		2
II			ure to hide and unhide inside animag	e file using	2
		nd prompt in windows		,•	-
III			ed Files using 4FTK Imager Forensic	s Tools.?	2
IV		-	Int animage using Access Data FTK		2
V		*	netric keys for protection of digital re	-	2
VI		out imaging 00of ha			2
VII			e digital evidence from crime scenes	5	2
VIII			tions and modifications of files us		2
1	softwar	e		c	
Reference	e / Text B	ooks:			
1. R.K. T	Tiwari, P.	K. Sastry and K.V. R	avikumar, Computer Crimes and Co	mputer Fore	nsics, Select
		^v Delhi (2003).			
			n Criminal Justice, Prentice Hall, Nev		
If the cour	rse is avai		ive then the students of following de	partments m	ay opt it.
		Evaluati	on/Assessment Methodology		
				x. Marks:50	
1) Class tasks/Sessional Examination25					
2) Presentations /Seminar					
3) Assignments4) Research Project Report					
	•	-			
	ar On Kes	search Project Report		25	
5) ESE 25			23 50		
			Total:	30	



Course Learning Outcomes:

Student will be able to :

CO1: Ensure the development of students applied skills in computer forensics related areas.

CO2: Able to identify the elements involved in investigation of digital crimes

CO3: Students will gain knowledge in apply a number of different computer forensic tools to a given scenario.

CO4: Able to implement digital evidence collection and preservation.

CO5: Able to analyze acquisition methods for digital evidence related to system security.



Programme:Degree		ree	Year: III	
Class:BCA(C& CS)		CS)	Semester:VI	
Credit	5	Subject:E-Commerce		
Theory	:4Cr			
Course		Title:E-Commerce		
	EP-603			
	Objective			
	-		e and understanding of contemporary trends in e-co	ommerce.
	1	ctronic system and Inter		
		e use of e-commerce se	•	
	-		d understanding about E-Com practices to the stud	ents.
		<u> </u>	and marketing for e-commerce.	
	of Paper:		Mala	
	um Passin	g Marks/Credits:40%	viarks	
L:4 T:0				
		sk)		
	Hours/Wee - 1 Hr. = 1			
	- I III. = I	Clean	~	
Unit			Contents	No. of
				Lectures
.				Allotted
Ι			commerce : What is E-Commerce (Introduction	8
			E-Commerce. Goals of E-Commerce, Technical	
	-		Functions of E-Commerce, Advantages and	
			Scope of E-Commerce, Electronic Commerce and Electronic Business(C2C)(C2G;G2G,	
		P, B2A, P2P, B2A, C2A		
II			olution of Internet, Domain Names and Internet	8
11			, .gov, .net etc.), Types of Network, Internet	0
	-		Veb, Internet & Extranet, Role of Internet in B2B	
			site, Cost, Time, Reach, Registering a Domain	
		e e	mail, Barter, Exchange, Shopping Bots	
III		*	ransaction, Computer Monitoring, Privacy on	8
		·	cy, Computer Crime (Laws, Types of Crimes),	-
			ystem, Software Packages for privacy, Hacking,	
		-	ds, Virus problem, virus protection, Encryption	
	and Decr	yption, Secret key Cry	yptography, DES, Public Key Encryption, RSA,	
	Authoriza	ation and Authenticatio	n, Firewall, Digital Signature.	
IV	Electron	ic Data Exchange: I	ntroduction, Concepts of EDI and Limitation,	8
	Applicati	ons of EDI, Disadvan	tages of EDI, EDI model, Electronic Payment	
	System:	Introduction, Types of	f Electronic Payment System, Payment Types,	
		e .	edit Card System, Electronic Fund Transfer,	
	Paperless	bill, Modern Payment	Cash, Electronic Cash	



	Transforming Education Sy	stem, Transforming Lives S	ection 2f & 12B		
V	Planning for Electronic Commerce: Planning Electronic Commerce initiates,8				
	Linking objectives to business strategies, Measuring cost objectives, Comparing				
	benefits to Costs, Strategies for developing electronic commerce web sites.				
	Internet Marketing; The PROS and CONS of online shopping, The cons of				
	online shopping. Justify an Internet business, Internet marketing t	techniques, The			
	E-cycle of Internet marketing, Personalization e-commerce.				
Text I	Books:				
1. G.S	S.V. Murthy, E-Commerce Concepts, Models, Strategies:- Himalaya	Publishing Hous	se, 2011.		
2. Ka	mlesh K. Bajaj and Debjani Nag, E- Commerce, 2005.				
Refere	nce				
1. Gra	ay P. Schneider, Electronic commerce, International Student Edition	, 2011.			
2. E-C	Commerce, Fundamentals and Applications, Wiely Student Edition,				
	Evaluation/Assessment Methodology				
		Max.	Marks 100		
1. Cla	ss tasks/ Sessional Examination	15			
2. Pre	sentations /Seminar				
3. Ass	signments				
4. Res	search Project Report	10			
Ser	ninar On Research Project Report				
5. ES	75				
	Total:	100			
Prerequ	uisites for the course: NIL				
	e Learning Outcomes:				
CO1:	Identify and explain fundamental web site tools including design	n tools, program	ming tools,		
	and data processing tools.		_		
CO2:	1 6				
CO3:					
	security threats.				
CO4:	Communicate effectively in ways appropriate to the discipline, aud	ience and purpos	e.		
CO5:	CO5: Implement the corrective measures to management issues underlying e-Commerce issues				
	including organizational structure, strategic planning, goal setting.				



IIMTU-NEP IMPLEMENTATION Year-III /Semester- VI

Program	nme: Degree	Year	:III	
Class: E	CA(C& CS)	Seme	ster:VI	
Credits		Subject: Advance Compu	ter Forensics (SPT - VII)	
Theory:	4Cr			
Course	Code:	Title: Advance Computer	Forensics (SPT - VII)	
BCA-NI	EP-611			
Course	Objectives:			
CO1:	Overview of	database and Cloud Forens	sics.	
CO2:	Learn different techniques and procedures that enable them to perform Packet Analysis.			
	Analyze lar	ge amount of digital evi	dence and Malware Analysis technique	es and thei
CO3:	behavior.			
CO4:	Overview of	dark forensics.		
CO5:	Digital inves	igation report writing such	as preservation, analysis and acquisition of	of artifacts
Nature	of Paper: Co	re		
Minimu	m Passing N	larks/Credits:40% Mark	S	
L:4				
T:0				
P:0(In H	ours/Week)			
Theory -	1 Hr. = 1 Cr	edit		
Practica	- 2 Hrs.=1Cr	edit(4Hrs./Week=4Credits))	
Unit		Co	ntents	No. of
				Lectures
				Allotted
Ι	Database 1	Forensics: MSSQL Forens	ics, My SQL Forensics	8
	Cloud For	ensics: Usage of Cloud H	Forensics, Stakeholders and their Roles,	
	Investigati	g Cloud Storage Services		
	Malware 1	Forensics: Malware Analy	sis: Static, Malware Analysis: Dynamic,	
	Analysis of	Malicious Documents, Ma	alware Analysis Challenges	
II			nail System, Email Crimes (Email	8
	Spamming	Mail Bombing/Mail Stor	m, Phishing, Email Spoofing, Crime via	
			tter), Steps to Investigate Email Crimes	
	and Violat	ion, Examine E-mail Me	essages, Laws and Acts against Email	
	Crimes.			
III	Mobile P	one & IOT Forensics:	Mobile Forensics Process, Forensics	8
	Imaging, P	atform Security Removal	Techniques: Jail breaking/Rooting	
IV	Android F	orensics Analysis: Dark V	Veb Forensics, Dark Web Forensics, Tor	8
	Browser In	vestigation, Checking Files	5	
V	Forensics	Report Writing and Pres	entation: Writing Investigation Reports,	8
		ness Testimony, Deposition	• • •	
Text B	ooks:		-	
		o, Z., Manepalli, V. R., Me	eng, K., & Xiao, Y. (2015). Network foren	sics analysi
		· · · · · · · · · · · · · · · · · · ·	curity and Networks, 10(2), 91-106.	···)~-
	, D			

2. Computer Forensics and Cyber Crime: An Introduction", Marjie T. Britz



Reference

- 1. "The Art of Memory Forensics: Detecting Malware and Threats in Windows, Linux, and Mac Memory", Michael Hale Ligh, Andrew Case, Jamie Levy, A Aron Walters.
- 2. Computer Evidence Collection & Presentation by Chrostopher L.T. Brown, Firewall Media.

Evaluation/Assessment Methodology			
	Max. Marks 100		
1) Class tasks/ Sessional Examination	15		
2) Presentations /Seminar			
3) Assignments			
4) Research Project Report	10		
Seminar On Research Project Report			
5) ESE	75		
Total:	100		
Prerequisites for the course: NIL			
Course Learning Outcomes:			
CO1: Able to perform database and Cloud Forensics.			
CO2: Distinguish different techniques and procedures that enable them to per Able to analyze large amount of digital evidence and Malware Analysis	•		

- CO3: behavior.
- CO4: Able to perform dark forensics.
- CO5: Able to report writing such as preservation, analysis and acquisition of artifacts



IIMTU-NEP IMPLEMENTATION Year-III /Semester- VI

Programme:Degree		e	Year: III		
Class:BCA (C& CS)		S)	Semester: VI		
Credit	edits Subject:Mobile Computing				
	bry:4Cr				
Cours	e Code:	Title:Mobile Comp	uting		
BCA-I	NEP-603				
Cours	e Objectives	:			
CO1:	To understa	and the basic concept	s of mobile computing.		
CO2:			ta management system.		
CO3:			layer protocols and Ad-Hoc networks.		
CO4:			and application layer protocols.		
CO5:	-	-	ent mobile platforms and application development.		
	e of Paper: l				
	num Passing	Marks/Credits:409	% Marks		
L:4					
T:0	** /**** ·	、 、			
	Hours/Week	<i>.</i>			
Theory	y - 1 Hr. = 1	Credit			
Unit			Contents	No. of	
				Lectures	
				Allotted	
Ι			Mobile Computing, Wireless Telephony, Digital	8	
			Technology, Wireless Multiple Access Protocols,		
			Systems. Wireless Application Protocol, WRITE		
		••	Abile Information device, Mobile Computing		
	Application				
II			bility, Wireless Communication and Portability,	8	
			tion Schemes, Basic Concept of Multihopping,		
	-		Network, Multicluster Architecture.	0	
III		e	ation Based Services, Automatically Locating	8	
			ganizing Services, Issues and Future Directions,		
13.7		Comparison of TCP		0	
IV		U	Data Dissemination, Cache Consistency, Mobile	8	
		-	e Database Research Directions, Security Fault		
V		or Mobile N/W.	blame with Massage Douting in Winslage Ad has	8	
v			blems with Message Routing in Wireless Ad-hoc	8	
		-	heme based on signal strength, Link state and		
Terr4	Books:	ector routing protoco	ls, Ad-hoc on Demand Distance Vector .		
	ambhu Upa	dhuaua Abbijaat (Chaudhary, Kevin Kwiat, Mark Weises,"Mobile C	omputing"	
	-	nic Publishers.	Chaudhary, Kevin Kwiat, Mark Weises, Woone C	omputing,	
			Martin-S-Nickious, Thomas Stohe, "Principles	of Mobile	
		oringer International	-	or moune	
		-	hitectures, by Yi-Bing Lin & Imrich Chlamtac, Joh	n Wiley &	
	ns, 2001.		incource, by 11 bing Lin & mitten Cinamae, Jon	in which a	
50	113, 2001.				



Reference

- 1. Mobile and Personal Communication systems and services, by Raj Pandya, Prentice Hall of India, 2001.
- 2. Wireless Web Development, Ray Rischpater, Springer Publishing, 2000.

Evaluation/Assessment Methodology			
	Max. Marks 100		
1) Class tasks/ Sessional Examination	15		
2) Presentations /Seminar			
3) Assignments			
4) Research Project Report	10		
Seminar On Research Project Report			
5) ESE	75		
Total:	100		
Prerequisites for the course: NIL			
Course Learning Outcomes:			
CO1: Understand about mobile communication with their different rout	ing algorithms.		
CO2: Apply different data backup schemes used in mobile network to s	CO2: Apply different data backup schemes used in mobile network to store the data.		
CO3: Able to explain about location management that is much importan	CO3: Able to explain about location management that is much important for mobile network.		
CO4: Build the knowledge of how transactions are done through mobile, different security issues			
while mobile transaction.			
CO5: Appraise different routing protocols used for routing the path like	ADDV, DSR, FSR etc.		



IIMTU-NEP IMPLEMENTATION Year-III /Semester- VI

-	amme: Degree Year:III		
	BCA(C& CS) Semester:VI		
Credits	3		
Theory			
	e Code: Title:Real Time System		
	NEP-603		
	e Objectives:		
CO1:	To study the basic of tasks and scheduling.		
CO2:	To understand programming languages and databases.		
CO3:	To analyze real time communication.		
CO4:	To analyze evaluation techniques and reliability models	for Hardware Redundancy.	
CO5:	To understand clock synchronization.		
	e of Paper: DSE		
	num Passing Marks/Credits:40% Marks		
L:4			
T:0			
	Hours/Week)		
	y - 1 Hr. = 1 Credit	1	
Unit	Contents	No. of	
		Lecture	
		Allottee	
Ι	INTRODUCTION TO TASK SCHEDULING:		
	Introduction - Issues in Real Time Computing, Structur		
	Task classes, Performance Measures for Real time Sy		
	and Scheduling – Classical uniprocessor scheduling a	gorithms, RM algorithm	
	with different cases.		
II	UNI AND MULTI PROCESSOR SCHEDULING :	8	
	Uniprocessor scheduling of IRIS tasks, Task assignmen		
	Next fit- Bin packing- Myopic off-line - Focused addre		
	strategy- Fault Tolerant, Scheduling-Aperiodic scheduli		
III	REAL TIME COMMUNICATION :	8	
	Introduction – VTCSMA – PB CSMA- Determin		
	protocol-DCR for multipacket messages- dyna	mic planning based-	
	Communication with periodic and aperiodic messages.		
IV	REAL TIME DATABASES :	8	
	Basic Definition, Real time Vs General purpose d		
	Databases, Transaction priorities, Transaction Abor		
	issues, Disk Scheduling Algorithms, Maintaining S	erialization Consistency,	
X 7	Databases for Hard Real Time System.		
V	REAL-TIME MODELING AND CASE STUDIES :	8	
V	REAL-TIME MODELING AND CASE STUDIES : Petri nets and applications in real-time modeling, Air t	_	
	REAL-TIME MODELING AND CASE STUDIES : Petri nets and applications in real-time modeling, Air t Distributed airdefense system.	_	
Text B	REAL-TIME MODELING AND CASE STUDIES : Petri nets and applications in real-time modeling, Air t	raffic controller system –	



Sons,2004.

3. C. Siva Ram Murthy, G. Manimaran, "Resource management in real-time systems and networks", PHI, 2009.

Reference

- 1. C.M. Krishna, Kang G. Shin, "Real Time Systems", Tata Mc. Graw Hil, 2010.
- 2. Giorgio C. Buttazzo, "Hard real-time computing systems: predictable scheduling algorithms and applications", Springer, 2008.

Evaluation/Assessment Methodology		
	Max. Marks 100	
1) Class tasks/ Sessional Examination	15	
2) Presentations /Seminar		
3) Assignments		
4) Research Project Report	10	
Seminar On Research Project Report		
5) ESE	75	
Total:	100	
Prerequisites for the course: NIL		
Course Learning Outcomes:		
CO1: Understand the features and structures of practical Operating System implementations.		
CO2: Acquire practical knowledge Real Time Operating Systems used in embedded system.		

- CO3: Understand the use of multitasking techniques in Real Time Systems.
- CO4: Compare different scheduling algorithms and the schedule ability criteria.
- CO5: Analyze real time systems with regard to keeping time and resource restrictions.



IIMTU-NEP IMPLEMENTATION Year-III /Semester- VI

Programme:UC	Y	ear: III		
Class:BCA(C & CS)		emester: VI		
Credits:		mputer Forensics Lab (SPT- VII)		
Practical: 2	U			
Course Code:	Title:Advanced Comp	uter Forensics Lab (SPT- VII)		
BCA-NEP-612P				
Course Objectiv	es:			
CO1: To learn al	out practices of digital inv	restigation.		
1	digital evidence collection	1		
CO3: Analyze ad	quisition methods for digit	tal evidence analysis and acquisitic	on of artifac	ts
Nature of Paper	Core			
Minimum Passi	g Marks/Credits: 50% N	Marks		
L:0				
T:0				
P:4(In Hours/We	· · · · · · · · · · · · · · · · · · ·			
Theory - $1 \text{ Hr.} =$				
	1Credit(4Hrs./Week=4Cre	edits)		
Unit Con	ents			No. of
				Lectures
				Allotted
	ce routes followed by e-m			2
	entify the IP address of the			2
		chniques using cryptographic PGP		2
	entify encrypted files.			2
	entify hidden files.			2
	<u> </u>	curing e-mail and online transaction		2
		ps/HDDs/USBs, pen drives, memo	ory cards	2
	IM cards			
	<u> </u>	tric keys for protection of digital re	cord.	2
Reference / Tex				
		n, Prentice Hall, New Jersey (2004	·	
2. E. Casey, Di		ter Crime, Academic Press, London	n (2000).	
	Evaluation	/Assessment Methodology		
				ax. Marks:50
,	essional Examination		25	
2) Presentations /Seminar				
, 0	3) Assignments			
4) Research Pro	-			
	esearch Project Report		25	
5) ESE			25	
		Total:	50	



Course Learning Outcomes:

Student will be able to :

CO1: Ensure the development of students applied skills in computer forensics related areas.

CO2: Able to identify the elements involved in investigation of digital crimes

CO3: Students will gain knowledge in apply a number of different computer forensic tools to a given scenario.

CO4: Able to implement digital evidence collection and preservation.

CO5: Able to analyze acquisition methods for digital evidence preservation, analysis and acquisition of artifacts.



School of Computer Science & Applications ACADEMIC HANDBOOK



Ordinance & Academic Regulations Bachelor of Computer Science (B.Sc.-CS)



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1. **PREAMBLE**

As the technological enhancement and availability of technology to every person of world a huge demand of computer skilled professional is ample. In this world of opportunities, impact of higher education is so inevitable for getting desired guidance to secure, right kind of employment. It is compulsory to pursue higher related education in the best institutes. In this direction major reforms are to opt Learning Outcomes-based Curriculum Framework (LOCF), specially, in the undergraduate education (UG) program, that ensure student centric, interactive and outcome-oriented goals, objectives and skill enhancement to acquire. LOCF along with National Education Policy (NEP) in this regard ensure uniform education fabric of standard and content delivery education all over the nation. This syllabus development is a step to ensure development of the undergraduates for both, academia and employability. Latest technical trends, industry standards, market needs, and interests of students, future expectations the need has been taken into consideration while developing the syllabus.

The LOCF inculcation is to build up a comprehensive course structure with detailed syllabus. This is an effort to develop a student centric framework where they are expected to have a concrete understanding of fundamentals of computer science along with the latest trends and techniques like Artificial Intelligence, Internet of Things (IoT), Machine Learning (ML) with advanced skill sets that include Mobile Application environment, Object Oriented Programming (OOPs) among many courses. Each course aims to present learning targets and objectives, and thus provide learning and teaching strategies, assessment and resources. The students shall be equipped with the latest trends in computer science, after completion of the programme.

With this an education temple of nation should ensure an environment, which should be bias free, irrespective of cast, religion, races, sex difference and easily available to youths of the nation. The human value, ethics and environmental teaching is also introduced with this.

2. DEFINITIONSANDNOMENCLATURE

In these Regulations, unless the context otherwise requires:

- 1. "Programme" means Degree Programme like Bachelor of Computer Science (B.Sc.-CS). Hence further B.Sc.-CS and B.Sc.-CS (Data Science) will call B.Sc.-CS in this document.
- 2. "GPA" means Grade Point Average.
- 3. "Course" means a theory or practical subjects that are normally studied in a semester.
- 4. "VC, Vice-Chancellor of IIMT-University" means the Head of the University.
- 5. "Registrar" is the Head of all Academic and General Administration of the University.
- 6. "Dean" means the authority of the school who is responsible for all academic activities of various programmes and implementation of relevant rules of these Regulations pertaining to the Academic Programmes.
- 7. "COE, Controller of Examinations" means the authority of the University who is responsible for all activities related to the University Examinations, publication of results, award of grade sheets and degrees.
- 8. "Dean Student Welfare" is responsible for all student related activities including student discipline, extra and co–curricular activities, attendance and meetings with class representatives, Student Council, and parent–teacher meeting.
- 9. "HoD" means the Head of the Department concerned.
- 10. "University" means IIMT-University, Meerut.
- 11. "TCH" means Total Contact Hours–refers to the teaching–learning periods.
- 12. "DEC" means Department Exam Committee.



- 13. "BoS" means Board of Studies.
- 14. "ACM" means Academic Council Meeting the highest authoritative body for approval for all Academic Policies.
- 15. "Class Coordinator" is a faculty of the class who takes care of the attendance, academic performance, and the general conduct of the students of that class.
- 16. "IA" is Internal Assessment which is assessed for every student for every course during the semester.
- 17. "ESE" is End Semester Examination conducted by the University at the End of the Semester for all the courses of that semester.
- 18. "UGC" means University Grants Commission.
- 19. "MHRD" means Ministry of Human Resource Development, Govt. of India.
- 20. "AICTE" means All India Council of Technical Education.
- 21. "HEI" means Higher Education Institutions.
- 22. "PRN" means Permanent Registration Number.
- 23. "CGPA" means Cumulative GPA.
- 24. "SGPA" means Semester GPA.
- 25. "NC" means Non-Credit.

3. VISION AND MISSION OF THE SCHOOL VISION

To achieve heights in computer education domain by creating appropriate environment for students, faculties and staff with availability of latest technological infrastructure.

MISSION

- 1. To dissipate appropriate all types of practical and theoretical computer science knowledge to our young students.
- 2. Inculcate professional efficiency in the students for brighter career opportunity as per industry latest requirement.
- 3. To provide learning environment for students with our reputed academics partner in the field of computer science.
- 4. To prepare our student as an IT professional with full of ethics and human values.

4. **PROGRAM EDUCATIONAL OBJECTIVES (PEO)**

- **PEO1:** The graduates are designed to produce skill graduates who will be competent professionals in academics, industry and organizations of government and private sector.
- **PEO2:** The pass out graduates will be able to handle the fast-changing world requirements and will become effective professionals.
- **PEO3:** The successful Graduates will be a good team leader and will be able to lead the team to find optimal solutions and achieve expertise in their field or become entrepreneurs and play the leading roles in all types of organizations.

5. **PROGRAM OUTCOMES (PO'S)**

- **PO1**: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **PO2:** Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.



- **PO3:** Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **PO4:** Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **PO5:** Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools prediction and modeling to complex engineering activities with an understanding of the limitations.
- **PO6:** The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- **PO7:** Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and the need for sustainable development.
- **PO8:** Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **PO9:** Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **PO10:** Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and receive clear instructions.
- **PO11:** Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in team, to manage projects and in multidisciplinary environments.
- **PO12:** Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

6. **PROGRAM SPECIFIC OUTCOMES (PSO'S)**

- **PSO1:** To equip the graduates with practical knowledge and give hands on experience to them.
- **PSO2:** To expose the students to the basic concepts of integration, differentiation, vector calculus, probability & statistics, and discrete mathematics.
- **PSO3:** To equip graduates with the study of design, development and analysis of software.
- **PSO4** To aware graduates about the benefits of data storage and create awareness of new trends in database management system.

7. ADMISSION

Hence further B.Sc.-CS and B.Sc.-CS (Data Science) will be called B.Sc.-CS in this document. The admission policy and procedure shall be decided from time to time by the University based on the guidelines issued by the UGC/ Ministry of Education, Government of India. Seats are also made available for Non-Resident Indians and foreign nationals, who satisfy the admission eligibility norms of the University as per the UGC Norms.



8. ELIGIBILITYIN ALL YEARS AS PER NEP (ENTRY)

- 8.1 Candidate should have passed "10+2" exam (recognized board) in any stream with at least 40% in aggregate.
- 8.2 Admission will be based on academic record.
- 8.3 The Academic Council shall have power to amend or repeal the eligibility criteria laid down at clause 8.1& 8.2, if required.

9. **CURRICULUM**

The curriculum for Bachelor of Computer Science Programme is designed to have minimum and maximum credits as per the scheme of 120-160 credits that are distributed across six semesters of study for the award of degree.

10. **MEDIUM OF INSTRUCTION**

The medium of instruction is ENGLISH for all courses, examinations, seminar presentations and project reports.

11. CHOICE BASED CREDIT SYSTEM (CBCS)/ LOCF/ OBE

- The three-year curriculum has been divided into six semesters. Semester Ist to VIth shall include 11.1 lectures, tutorials, practical, seminars and project work as defined in the scheme of instruction and examination issued by the University from time to time.
- 11.2 The curriculum will be also including such other curricular, co-curricular and extra- curricular activities as may be prescribed by the University from time to time. Credit System BCA programme will have a curriculum in which every course will be assigned certain credits reflecting its weight and contact periods per week, as given below:

6 6	
1 Lecture period (L) per week	= 1 Credit
1 Tutorial period (T) per week	= 1 Credit
1 Practical period (P) per week	= 0.5 Credit

In addition to theory and laboratory courses there may be other courses such as seminar, project etc., which will be assigned credits as per their contribution in the programme without regard to contact periods.

11.3 **Minimum Credit Requirements**

The minimum credit required for award of a B.Sc.-CS degree is 120. This is normally divided into theory courses, tutorials, laboratory courses, seminars and projects in duration of six semesters. The credits are distributed semester wise as shown in the structure and syllabus manual of the programme. Courses generally progress in sequences, building competencies and their positioning indicates certain academicmaturity on the part of the learners. Learners are expected to follow the semester wise schedule of courses given in the syllabus manual of the programme.

11.4 **Course Categories**

Under CBCS, the degree programme will consist of the following categories of courses as per following table:



S. No.	Category	
1.	Core Course (Theory)-CC	
2.	Core Course (Practical)-CC(P)	
3.	Discipline Specific Elective (Theory)- DSE	As per Format 1 &
4.	Generic Elective (Theory)-GE	2 of CBCS
5.	Ability Enhancement Compulsory Courses-AECC	
6.	Skill Enhancement Courses-SEC	
7.	Research Project (RP)	

Table 11.4 - Distribution of Credits (Evaluation Scheme)

11.5 Curriculum Structure

The curriculum for B.Sc.-CS will contain a listing of all courses, with each course having a course category, course number, course title, number of contact periods per week, number of credits assigned, and the marks assigned to various components of evaluation.

11.6 Approval of the Curriculum

The curriculum for B.Sc.-CSprogramme will be prepared by the Department concerned and will be approved by the Board of Studies of the Department. The Academic Council for final approval and then the Curriculum will be implemented. Same procedure shall be used for any modification in the Curriculum.

12. REGISTRATION FOR A COURSE IN A SEMESTER

A student will be eligible for registration of courses only if he/she satisfies the regulation (progression), and has cleared all dues to the University, Hostel and Library up to the end of the previous semester if student is not debarred from enrolment on disciplinary grounds.

The university follows a flexible Choice Based Credit System and slot-based table. Accordingly, the students shall be given the option for selecting their courses, credits, teachers, slots and create their timetable. The student is given the option of selecting the number of credits to undergo in a semester, subject to the curriculum requirements.

Except for the first-year courses, registration for a semester will be done during a specified week before the start of the semester as per the academic calendar.

Late registration /enrolment will be permitted by the Dean of the School for genuine cases, on recommendation by the Head of the respective department, with a late fee as decided from time to time.

The student shall make the choice of course in consultation with the Class Coordinator and as stipulated from time to time.

Students shall have to pay additional fee as prescribed, for registering in certain elective courses under Generic Electives courses offered by certain specific departments and for higher level Foreign Languages, as decided from time to time.

13. ATTENDENCE

The faculty handling a course must finalize the attendance, three calendar days before the last instructional day of the course and submit to the HoD through the class teacher.



13.1 Condonation of Medical Cases

- a. A student with less than 75% attendance (Total Contact Hours -"TCH") in any course, will not be permitted to appear for the end-semester examination in that course, irrespective of the reason for the shortfall of the attendance. The student is however permitted to avail Academic Leave up to 10% for attending academic related activities like, Industrial Visits, Seminars, Conferences, Competitions etc., with the prior approval of the HoD. After the event, the student should submit the relevant documents for proof to the HoD for approval of the Academic Leave.
- b. The remaining 25% allowance in attendance is given to account for activities under NCC / NSS / Cultural / Sports/ Minor Medical exigencies etc.
- c. Students under "CO (Carry Over)" category in any course shall attend, the immediately following Summer / Winter course. The detailed schedule of the Summer / Winter courses offered in every semester will be announced during the end of that semester. The students who have obtained "CO (Carry Over)" has to select their appropriate slots and courses, optimally to attend the courses.

13.2 Additional Condonation

Additional Condonation may be considered in rare and genuine cases which includes, approved leave for attending select NCC / Sports Camps, cases requiring prolonged medical treatment and critical illness involving hospitalization. For such select NCC / Sports Camps prior permission for leave shall be obtained by the respective Dean / Director of sports from the designated authority, before deputing the students.

For medical cases, submission of complete medical history and records with prior information from the parent / guardian to Dean (Students Welfare) DSW is mandatory. The assessment of such cases will be done by the attendance sub – committee on the merit of the case and put-up recommendations to the Vice – Chancellor. Such condonation is permitted only twice for a student in the entire duration of the programme.

The Vice-Chancellor, based on the recommendation of the attendance sub-committee may then give condonation of attendance, only if the Vice-Chancellor deems it fit and deserving. But in any case, the condonation cannot exceed 10%.

14. ASSESMENT PROCEDURE

- 14.1 Internal Assessment (IA) 25 Marks & External Assessment (EA) 75 Marks
- **14.2** Practical Assessment (as per format 1 and 2)

15. RESEARCH PROJECT/SEMESTER PROJECT – ASSESMENT CRITERIA The general guidelines for assessment of Project are given in Table 15.1

S. No.	Review / Examination scheme	Broad Guidelines	Weightage
1	First Review	Concept	10%
2	Second Review	Design	10%
3	Third Review	Experiment/Analysis	20%
4	Final Review/ESM	Project report and Viva – Voce, Results and Conclusion	60%

Table 15.1: Assessment pattern for Research Project / Semester Project



16. INTERNSHIP – RESEARCH/INDUTRIAL INTERNSHIP

A student has to compulsorily attend summer internship at the end of 4th semester for a minimum period of 30 days. In lieu of Summer-Winter internship, the student is permitted to register for undertaking project work under a faculty of the University and carry out the project for minimum period of 30 days. In both the cases, the internship report in the prescribed format duly certified by the faculty in-charge shall be submitted to the HoD. The evaluation will be done through presentation and viva. The course will have a weight age as defined in the respective curriculum.

For the final year project and viva-voce end semester examination, the student shall submit a project report in the prescribed format issued by the University. The reviews will be conducted by a committee constituted by the HoD. The end semester assessment will be based on the project report and a viva on the project conducted by a committee constituted by controller of examination. This may include an external expert.

17. FOR NON – CGPA COURSES/AUDIT COURSES

The Assessment will be done based on the respective assessment as per rubrics issued by the HoD.

A student securing less than the minimum specified internal assessment marks in any course will not be permitted to appear for the end-semester examination in that course and will be graded under "CO (Carry Over)" category for that course. This will be denoted in the grade sheet as "CO (Carry Over)", till the course is successfully completed in the subsequent semester(s).

18. CREDIT WEIGHTAGE

Credits are the weightage, assigned to the courses based on the following general pattern:One Hour1 creditsTwo Hour Practical0.5 credits

19. MAXIMUM DURATION OF THE PROGRAMME//PROMOTION POLICY

A student may complete the programme at a slower pace than the regular pace, but in any case, in not more than **N+2 years**.

A student completing the degree programmes in the extended period will not be eligible for university ranking.

20. MAXIMUM GAPS BETWEEN SEMESTER/YEAR

A student may be permitted by the Vice-Chancellor to withdraw from the entire programme for amaximum of two semesters for reasons of ill health, start – up venture or other valid reasons asrecommendedbyacommitteeconsistingofHeadofDepartment,DeanofSchool,andDean(Student Welfare).

21. CREDIT SYSTEM & GRADING CGPA/SGPA

Introduction

IIMT University implemented the UGC guidelines to implement of the choice-based credit system with a view to offer student's choice of courses within a programme with a flexibility to complete the programme by earning credits at a pace decided by the students themselves. The system allowed students to choose inter-disciplinary, intra-disciplinary courses according to their learning needs, interest and aptitude. It was considered as a cafeteria approach and was expected to provide mobility to students.



21.1 Credit System

As per the current credit system practiced in institutions needs comprehensive reforms as they offer very little flexibility, choice and are less learner centric. Degrees offered today are more self-contained focusing on a specialization area and depend a lot on knowledge available with the faculty from the department only. Though the most requisite credit system does exist, wherein students are given a wide choice and flexibility, these exist as small islands in the vast ocean of thousands of educational institutes in India. In such institutions, the curriculum is frequently designed which is learner centric and offering a wide specialization area for students to pick and choose courses from.

The institutions shall make attempts wherein the design of the credit system and the teaching and evaluation modes shall be the responsibility of individual course teachers. The students should have the freedom to opt for courses from other specializations and not just from their core specialization. For this there has to be stronger collaborations between departments of the University and outside.

21.2 Grading system

Most institutions follow the absolute grading system which is a simple procedure wherein the marks obtained by students correspond to a specific grade and grade point. It reflects the individual performance in a particular subject without any reference to the group/class. The absolute grading system has limitations and may be susceptible to some inconsistencies.

The relative grading system on the other hand provides relative performance of a student to a group/class wherein the student is ranked in a group/class on basis of relative level of achievement. In this system decisions are made in advance by the faculty members as to what proportion of students would be awarded a particular grade on the basis of their relative performance and which is done by assigning grades on basis of a normal curve. This facilitates comparative performance and eliminates negative effect of pass or fail.

Relative grading system may be used if the number of students registered for the course is at least 30. For a class of smaller size, an absolute grading scheme may be used. The statistical method may be used with adjustments to calculate the mean (M), median (Md) and standard deviation (SD) of the total marks (TM) obtained by the students registered for the course. If the mean and median coincide, the mean may be used for further computations, otherwise the median may be used. If suppose the mean is used, then the letter grades may be awarded based on the ranges specified in table below:

A grading system as shown in given table-

Letter Grade	Range
A+	TM>M+1.75SD
A	$M+1.25 SD \leq TM < M+1.75SD$
B+	M+0.75 SD ≤TM <m+1.25sd< td=""></m+1.25sd<>
В	$M+0.25 \text{ SD} \le TM \le M+0.75 \text{ SD}$
C+	$M-0.25 \text{ SD} \le TM \le M-0.25 \text{ SD}$
С	$M-0.75 \text{ SD} \le TM \le M-0.25 \text{ SD}$
D+	$M-1.25 \text{ SD} \le TM \le M-0.75 \text{ SD}$
D	$M-1.75 \text{ SD} \le TM \le M-1.25 \text{ SD}$
E+	$M-2.0 \text{ SD} \le TM \le M-1.75 \text{ SD}$

Table 21.2: Grading system



Е	$M-2.25 \text{ SD} \le TM \le M-2.0 \text{ SD}$
F	M-2.25 SD > TM
	Carry Over (Summer / Winter) due to Attendance deficiency (between 40% and
CO	75%)and/or
	I. Lack of minimum IA marks as specified in clause 10.0 Table 3.
RA	Repeat the course due to (i) Lack of minimum attendance (below 40%) in regular
KA	course.
	DETAINED "RC" or "RA" or both in all registered theory courses of a semester.
	The student is detained and has to repeat the entire semester. Clause 12.3

Letter grades may be improved based on the following scheme: Use the table above to determine grade boundaries. Look for natural gaps in the neighborhood of grade boundaries. Choose the largest gap in the neighborhood and make this as the grade boundary.

An 'E', 'E+' and 'F' grade may not be a purely relative grade. These may be assigned on the following basis:

- A minimum, say 30/100, may be set as pass marks for the course. A fail grade may then be awarded only if the Total Marks for the course are less than 30. Otherwise, the students may be awarded the Just Pass Grade D.
- A fail grade may be awarded to students whose marks are below the prescribed minimum even if the table above leads to a pass grade.

Similarly, a lower limit may be set for the A grade also, for instance greater than or equal to 86. Students not achieving the prescribed minimum may be awarded a lower letter grade even if the table above indicates otherwise. A pass grade may be made mandatory for both internal as well as external examinations in the case of a separate internal and external assessment,

- a. Internal and External marks may be summed up with appropriate weightage to compute a total out of 100 marks. The letter grade may be assigned on this computed total.
- b. Internal and external marks may be graded separately and then the assigned grade points may be used, with appropriate weightage, to compute a final grade point and letter grade.

Grading in the case of Re-evaluations, Retests and Remedial Examinations may be based on the following guidelines:

- a. The ranges of marks once computed for awarding letter grades the first time, called the First Distribution (FD), will not be modified.
- b. If a re-evaluation leads to a change in marks, then FD will be used to award an appropriate letter grade.
- c. A retest may be permitted, if
- i. A student gets a letter grade of E+ or E. In this case, irrespective of the marks obtained, at most D grade may be awarded.
- ii. A student is unable to complete course requirements because of certified illness or tragedy. In this case FD will be used to award an appropriate letter grade.

The use of relative grading system may be recommended in autonomous institutions, institutes of national importance and institutions with high ranking. The results of the relative grading system may be shared by such institutions later with other interested institutions to implement the same.

21.3 GPA and CGPA

GPA is the ratio of the sum of the product of the number of credits Ci of course "i "and the grade points Pi earned for that course taken over all courses "i" registered and successfully Academic Hand Book (School of Computer Sciences & Application)



completed by the student to the sum of Ci for all "i". That is,

$$GPA = \frac{\sum_{i} C_{i} P_{i}}{\sum_{i} C_{i}}$$

CGPA will be calculated in a similar manner, in any semester, considering all the courses enrolled from the first semester onwards.

- **21.2** The Grade card will not include the computation of GPA and CGPA for courses with letter grade CO, RC and U until those grades are converted to the regular grades.
- **21.3** A course successfully completed cannot be repeated.

Grade Sheet

Letter grade

Based on the performance, each student is awarded a final letter grade at the end of the semester in each course. The letter grades and corresponding grade points are given in Table 8. A student is considered to have completed a course successfully and earned credits if he/she secures a letter grade other than F, CO, RA in that course.

After results are declared, grade sheet will be issued to each student which will contain the following details:

- a. Program and discipline for which the student has enrolled.
- b. Semester of registration.
- c. The course code, name of the course, category of course and the credits for each course registered in that semester
- d. The letter grade obtained in each course
- e. Semester Grade Point Average (GPA)
- f. The total number of credits earned by the student up to the end of that semester in each of the course categories.
- g. The Cumulative Grade Point Average (CGPA) of all the courses taken from the first semester.
- h. Credits earned under Non CGPA courses.

22. CLAS/DIVISION

22.1 Classification is based on CGPA and is as follows:

$CGPA \ge 8.0$: First Class with distinction
$6.5 \le CGPA < 8.0$: First Class
$5.0 \le CGPA \le 6.5$: Second Class

- 22.2 (i) Further, the award of 'First class with distinction' is subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses in his/her first appearance with effect from II semester, within the minimum duration of the programme.
 - (ii) The award of 'First Class' is further subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses within 3 years for Bachelor of Computer Application.
 - (iii) The period of authorized break of the programme (vide clause 11.0) will not be counted for the purpose of the above classification.



23. TRANFER OF CREDITS/ACEDIMIC CREDIT BANK

- **23.1** "Credit-transfer" means the mechanism by which the eligible HEIs registered with ABC are able to receive or provide prescribed 'credits' to individual registered ABC account in adherence to the UGC credit norms for the 'course/s' registered by the desirous students in any eligible higher education institution within India
- **23.2** Within the broad framework of these regulations, the Academic Council, based on the recommendation of the Credit Transfer Committee so constituted may permit students to transfer part of the credit earned in other approved Universities of repute & status in the India or abroad.
- **23.3** The Academic Council may also approve admission of students who have completed a portion of course work in another approved Institute of repute under Multiple entry &Exit system, based on the recommendation of the credit transfer committee on a case-to-case basis.
- **23.4** Students who have completed coursework, at least first year, at some university other than the university to which transfer is to be sought, may request for transfer of admission to this university. A student may be granted admission only through an admission process that will follow the same policy as for fresh admissions. However, a uniform credit system must be followed by all universities to effect transfer of credits.
- 23.5 Credit Transfer request can be submitted only after the student has been admitted in the concerned program and the following conditions are met: University Grants Commission initiated the concept of National Academic Credit Bank (NAC-Bank) which will be a digital / virtual / online entity to be established and managed by UGC. The main objective of the NAC-Bank would be to facilitate student mobility across the education system wherein the credits can be accumulated and be used at alter point of time for the requirements of partial fulfillment of a degree program.
 - i. The course work has been completed at a UGC approved and accredited University through fulltime formal learning mode.
 - ii. The university accreditation grade/ ranking is not lower than that of the university to which the transfer is sought.
 - iii. The courses prescribe to the common minimum syllabus under UGC CBCS system.
 - iv. The letter grade obtained in the courses is "B" or better.
 - v. The number of credits to be transferred does not exceed the prescribed limit.
 - vi. The program in question must have a similar credit system, in particular, modular or semester and the same numeric and letter grading system along with common meaning of the term "credit" in numerical terms.

The aspect of shelf life of courses needs to be considered while accepting credits as obsolescence of knowledge of certain field in terms of its current relevance needs to be investigated. The time elapsed between successful completion of certain courses of the program and the admission to which program transfer is sought needs to be considered. The maximum number of credit points that may be considered under a credit transfer needs to be specified. Contextual variables such as teaching-learning approach adopted, learning facilities offered, use of evaluation modes may also be considered while preparing the credit transfer policy.



Moderation

Moderation of assessment is an organized procedure which ensures use of valid assessment material and consistent application of criteria, to provide fair academic judgment and reliable outcome in the form of marks or grades. It assures appropriate designing and implementation of assessment activities along with generation of valid and reliable results.

Integration of moderation process with assessment system is imperative for the development of academic quality in higher educational institutions as :

- It addresses any difference in individual judgments of different evaluators.
- It ensures that all achievements in the form of marks and grades across courses reflect achievement of same level of standard.
- It is also carried out to develop a common understanding of the standards and criteria and to recognize performance which demonstrates that standard or fulfilsthose criteria.

Moderation may be conducted in case there are large number of fail grades or high grades, or when large numbers of students who have received the same grade or clustering of students on letter grades, or when there are discrepancies between grades allocated to individual students in different courses, or to find out the difficulty level of the question paper or whether the assessments modes used cover the entire syllabus or not.

Applicability - Moderation will be made applicable to both external and internal modes of assessment. All programs and courses will indicate, as part of their statements on assessment, arrangements for the moderation of assessed work. This can be done through formulation of a moderation policy and implemented across all programs and courses of instruction and delivery. The time frame for the moderation will be linked with the time frame for assessment. In the event moderation is triggered, an evaluation will begin with a discussion on the

following (though not exhaustive) lines:

- a. What are the rubrics used for each of the different types of assessment in the course? Is a standardized/ prescribed rubric used or has the instructor developed his/ her own rubric. If the instructor is using a personally framed rubric, or if there is no identified rubric, then how does the assessment map to learning outcomes?
- b. The difficulty level of the questions included in the assessments, i.e., is the difficulty level on the extremes, very easy or very hard.
- c. The manner of awarding marks, i.e., has the correction been at the extremes, liberal or tough.

Each department will establish a committee and designate roles and responsibilities at different levels for smooth working of the moderation process. In order to maintain neutrality, it will be ensured that moderator should not be the assessor. Staff members will be trained professionally in assessment techniques and moderation procedures. All assessment material produced by learner including examination sheets, assignments, project reports, research reports etc. will be examined.

Institutions will be encouraged to make the moderation process online. In this system, assessment plans, moderation plans, assessment tools, samples of which may be submitted online. Moderation reports will be generated online so that progress can be tracked and submitted to the CoE after the approval of Dean and HoD. The moderation will not be restricted to just assessment but also include moderation of content and assessment design.

24. CHANGE OF DISCIPILINE

"Academic Flexibility" is the provision for innovative and interchangeable curricular structures to enable creative combinations of Courses/Programmes in Disciplines of study leading to Degree/Diploma/PG Diploma/Certificate of Study offering multiple entry and multiple exit facilities in tune with National Education Policy-2020, while removing the rigid curricular



boundaries and creating new possibilities of life-long learning.

25. USE OF TECNOLOGICAL INTERVENTIONS

With the proliferation of different types of access devices, especially mobile access devices, technology has the potential to augment traditional classroom practices and revolutionize learning and evaluation methods. Technology, in fact can be an important driver to enable lifelong learning. Learning and engagement of students is facilitated by use of technology through several modes such as synchronous learning, semi-synchronous learning, blended learning, collaborative learning, flipped classroom etc. MOOC's, especially provided through SWAYAM, are a window of opportunity for lifelong learning and are offered through technology-based platforms. Learning management systems (LMS) may be used by institutions to integrate the entire teaching, learning and evaluation process. The Learning Management System may be used by institutions to deliver academic content in blended form and to assess learning through thesis, assignments etc. Open-source learning management systems such as *Moodle, Edmodo* may be used for posting content in the form of videos, audios, e-learning modules, live class sessions etc. Use of plagiarism detection software will be highly recommended to check originality of the content.

In the conduct of examinations, universities face tremendous challenges such as need for trained manpower, distribution of question paper without delays and errors, delays in evaluation of answer scripts, lack of infrastructure to conduct examinations at a large scale, non-availability of faculty members for assessment, security issues faced during paper setting and paper distribution, tampering of certificates and answer scripts etc.

For a typical examination department of an institution will be an autonomous body right from registration of student to convocation through an integrated system. In fact, steps must be taken to implement a complete examination management system that considers the complete life cycle of examination process. The use of technology will reduce dependency on human intervention and be error free. The following functions will be automated:

- i. Registration of students and generating unique PRN,
- ii. Filling up of examination form,
- iii. Generation of seat numbers and admit cards/hall tickets,
- iv Preparation of list of paper setter,
- v. Use of question bank system to draw question sets, question paper generation,
- vi. Online distribution of question papers on the day of examination with system of encryption,
- vii. Barcode system for answer books (this will eliminate issues related to errors, avoid malpractices etc.),
- viii. Digitization of answer scripts and onscreen evaluation of answer sheets,
- ix. Tracking of student's performance,
- x. Marks submission through online software,
- xi. Viewing of result through online system,
- xii. Online verification and revaluation system,
- xiii. Digitization of certificates and marksheets (to avoid tampering and easy retrieval),
- xiv. Certificate authentication system,
- xv. Submission of various other applications through online system.

The above will lead to conduct of functions of the examination system in an efficient and transparent manner and timely availability of information to students.

26. STUDENT DESCIPILINE

Every student is required to observe utmost discipline and decorum both inside and outside the



campus and not to indulge in any activity which may affect adversely the prestige reputation of the University and School.

27. STUDENT WELFARE

Any act of indiscipline of a student reported to the Dean (Students Welfare) and Head of the Department will be referred to a Discipline Committee constituted for the purpose. The Committee will enquire into the charges and decide on a suitable punishment if the charges are substantiated. The committee will also authorize the Dean (Students Welfare) to recommend to the Vice-Chancellor for the implementation of the decision. The student concerned may appeal to the Vice-Chancellor, whose decision will be the final.

28. RAGGING

Ragging in any form is a criminal and non-bailable offence in our country. The current State andCentrallegislationsprovidestringentpunishmentsincludingimprisonment.Oncetheinvolvemen tofastudent(s) is established in ragging, offending fellow students/staff, harassment of any nature to the fellow students/staff etc. the student(s) will be liable to be dismissed from the University, as per thelaid down procedures of the UGC / Govt. /Institute. Every senior student at the University, along with their parent, shall give an undertaking every year in this regard and the same should be submitted at the time of Registration.

29. POWER TO MODIFY

Not with standing all that has been stated above, the Academic Council is vested with powers to modify any or all the above regulations from time to time, if required, subject to the approval by the Board of Studies and final approval by Vice-Chancellor.

30. EXIT POINT

Exit point will be governed as per format 1 and format 2.

31. NC/CREDIT COURSE

For non-credit courses 'Satisfactory' or 'Unsatisfactory' shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.



Evaluation Scheme



		B.Sc	(COMPUTER SCIEN Semester - I	ICE)						
						Ev	aluation Scl	neme		
S.	Subject Code	Subject Name	Course Type		Periods		Internal	External	Total	~
No.				L	Т	Р	Marks	Marks	Marks	Credits
1	BCS-NEP-101	Problem Solving using C	C1	4	0	0	25	75	100	4
2	BCS-NEP-102	Fundamentals of Computer and IT	C2	4	0	0	25	75	100	4
3	BCS-NEP-104	 Mathematics-I Discrete Mathematics 	DSE	4	0	0	25	75	100	4
4	NHU-111	English Communication	AECC	3	0	0	15	35	50	3
5	BCS-NEP-105P	Problem Solving using C Lab	CORE LAB 1	0	0	4	25	25	50	2
6	BCS-NEP-106P	Fundamentals of Computer and IT Lab	CORE LAB 2	0	0	4	25	25	50	2
		Grand Total		15	0	8	140	310	450	19
		ore Course 2, DSE – Discipline Specific Elective,	AECC – Ability Enhand	cement Con	npulsory Co	ourse, GE -	Generic Ele	ctive, SEC-	Skill Enhan	cement
	se, RP – Research Projec									
L-	Lecture, T- tutorials, P-	Practical (Labs), NC- Non Credit Course								
	D TE: STUDENT CAN T CC COURSE.	TAKE NCC (GENCC-101) AS A GENERAL ELEC	CTIVE/OPTIONAL CO	OURSE AN	D CERTIFI	CATE WI	LL BE PROV	VIDED AFT	ER COMP	LETION



			Semester - II			Evalua	tion Schem	e		
S.	Subject Code	Subject Name	Course Type		Periods		Internal Exter		Total	
No.	Subject Souc	Subject Mane		L	Т	Р	Marks	nal Marks	Marks	Credits
1	BCS-NEP-201	Data Structure and Algorithms using C	C1	4	0	0	25	75	100	4
2	BCS-NEP-202	Digital Electronics	C2	4	0	0	25	75	100	4
3	BCS-NEP-204	 Mathematics-II Optimization Techniques 	DSE	4	0	0	25	75	100	4
4	*Code will be decided by parent department	GE-I (To be opted by the students as per the given electives in the list attached)	GE (Mandatory)	4	0	0	25	75	100	4
5	NHU-112	Environmental & Ecology	AECC	3	0	0	15	35	50	3
6	BCS-NEP-205P	Data Structure and Algorithms using C	CORE LAB 1	0	0	4	25	25	50	2
7	BCS-NEP-206P	Digital Electronic Lab	CORE LAB 2	0	0	4	25	25	50	2
8	BCS-NEP-207P	MOOC	SEC	4	0	0	50	0	50	4
		Grand Total		23	0	8	215	385	600	27
Cour	se, RP – Research Project	bre Course 2, DSE – Discipline Specific Elective, t Practical (Labs), NC- Non Credit Course	AECC – Ability Enhanc	ement Con	npulsory Co	urse, GE –	Generic Ele	ctive, SEC-	Skill Enhar	icement



				Evaluation Scheme							
S.	Subject Code	Subject Name	Course Type		Periods		Internal	Exter	Total	Credits	
No.	9			L	Т	Р	Marks	nal Marks	Marks		
1	BCS-NEP-301	OOPS using JAVA	C1	4	0	0	25	75	100	4	
2	BCS-NEP-304	DBMS	C2	4	0	0	25	75	100	4	
3	BCS-NEP-302	 Computer System Architecture Data Analytics 	DSE	4	0	0	25	75	100	4	
4	BCS-NEP-303	Communication Skill & Personality Development	AECC	3	0	0	15	35	50	3	
5	BCS-NEP-305P	OOPS using JAVA Lab	CORE LAB 1	0	0	4	25	25	50	2	
6	BCS-NEP-307P	DBMS Lab	CORE LAB 2	0	0	4	25	25	50	2	
		Grand Total		15	0	8	140	310	450	19	
Cours	e, RP – Research Proje	Core Course 2, DSE – Discipline Specific Electiv ct Practical (Labs), NC- Non Credit Course	e, AECC – Ability Enhand	cement Com	pulsory Co	ourse, GE –	Generic Ele	ctive, SEC-	Skill Enha	ncement	



		B.Sc	(COMPUTER SCIEN Semester - IV	(CE)							
				Evaluation Scheme							
S.	Subject Code	Subject Name	Course Type		Periods		Internal Exter		Total		
No.	5	0		L	Т	Р	Marks	nal Marks	Marks	Credits	
1	BCS-NEP-401	Software Engineering	C1	4	0	0	25	75	100	4	
2	BCS-NEP-402	Operating System	C2	4	0	0	25	75	100	4	
3	BCS-NEP-404	 Data Mining Numerical Analysis 	DSE	4	0	0	25	75	100	4	
4	*Code will be decided by parent department	GE-II (To be opted by the students as per the given electives in the list attached)	GE-II (Mandatory)	4	0	0	25	75	100	4	
5	UVE-401	Human Values and Professional Ethics	AECC	3	0	0	15	35	50	3	
6	BCS-NEP-405P	Software Engineering Lab	CORE LAB 1	0	0	4	25	25	50	2	
7	BCS-NEP-406P	Operating System Lab	CORE LAB 2	0	0	4	25	25	50	2	
8	BCS-NEP-407P	MOOC	SEC	4	0	0	50	0	50	4	
		Grand Total		23	0	8	215	385	600	27	
Cour	se, RP – Research Project	bre Course 2, DSE – Discipline Specific Elective, A t Practical (Labs), NC- Non Credit Course	AECC – Ability Enhand	cement Con	npulsory Co	urse, GE –	Generic Ele	ctive, SEC-	Skill Enhar	icement	



			Semester - V	Evaluation Scheme								
S.	Subject Code	Subject Name	Course Type		Periods		Internal	Exter	Total			
No.				L	Т	Р	Marks	nal Marks	Marks	Credits		
1	BCS-NEP-501	Computer Graphics	C1	4	0	0	25	75	100	4		
2	BCS-NEP-502	Python Programming	C2	4	0	0	25	75	100	4		
3	BCS-NEP-503	 Data Communication Network ERP Big Data 	DSE	4	0	0	25	75	100	4		
4	RP-1 AUDIT	Research Project-I [@]	AUDIT	0	0	0	50	0	50	NC		
5	BCS-NEP-IP-I	Internship	Industrial Internship (Mandatory)	0	0	10	50	50	100	5		
6	BCS-NEP-504P	Computer Graphics Lab	CORE LAB 1	0	0	4	25	25	50	2		
7	BCS-NEP-505P	Python Programming Lab	CORE LAB 2	0	0	4	25	25	50	2		
		Grand Total		12	0	18	225	325	550	21		
Cours L-	se, <u>RP</u> – Research Proje Lecture, T- tutorials, P-	Core Course 2, DSE – Discipline Specific Elective ct Practical (Labs), NC- Non Credit Course DECT – I is a Noncredit courses (Audit Courses)							Skill Enhar	icement		



		B.Sc	COMPUTER SCIEN	CE)						
	1		Semester - VI				1 4 6 1			
S.	Subject Code	Subject Name	Course Type		Periods	Ev	aluation Sch	neme Exter	Total	<u></u>
No.	Subject Code	Subject Maine	Course Type	L	Т	Р	Marks	nal Marks	Marks	Credits
1	BCA-NEP-601	Cyber Security	C1	4	0	0	25	75	100	4
2	BCA-NEP-602	Artificial Intelligence	C2	4	0	0	25	75	100	4
3	BCA-NEP-603	 Mobile Computing E-Commerce Real Time System 	DSE	4	0	0	25	75	100	4
4	BCA-NEP-IP-II	Industrial Project	Minor Industrial Project	0	0	10	100	0	100	5
5	BCS-NEP-605P	Cyber Security Lab	CORE LAB 1	0	0	4	25	25	50	2
6	BCA-NEP-606P	AI Lab	CORE LAB 2	0	0	4	25	25	50	2
7	BCS-NEP-607	Research Project-II [@]	AUDIT	0	0	0	50	0	50	NC
8	BCA-NEP-607P	MOOC	SEC	4	0	0	50	0	50	4
9	*Code will be decided by parent department	GE-III (To be opted by the students as per the given electives in the list attached)	GE3 (Mandatory)	4	0	0	25	75	100	4
		Grand Total		20	0	18	350	350	700	29
Cou	rse, RP – Research Project	pre Course 2, DSE – Discipline Specific Elective, A Practical (Labs), NC- Non Credit Course	AECC – Ability Enhanc	ement Con	npulsory Co	urse, GE –	- Generic Ele	ctive, SEC-	Skill Enhar	icement
		VE TO BE DECIDED BY CBCS COMMITTEE								
		dit courses (Audit Courses) and Student needs to qu	alify it but the marks w	vill not be a	dded in tota	1 marks				





<u>IIMTU-NEP IMPLEMENTATION</u> CBCS: Statement of Credit Distribution

College/School:SCHOOL OF COMPUTER SCINECE AND	Credit Range: 120 - 160
APPLICATIONSProgramme: B.Sc. [COMPUTER SCIENCE]	(Suggested by CBCS Committee)
Duration: 3 YEARS	
Annual/Semester: SEMESTER	

Minimum Credit Score Required for Certificate (40)	First Year	Sem.	Core Course/ Foundation Course (Th. 4 Cr.)	Ability Enhancement Compulsory Course (AECC)	Skill Enhancement Course (SEC)	Discipline Specific Elective (DSE)	(GE)	Research Project (RP)/ Internship/ Industrial Project	Prerequisite
CERTIFICATE	First Year Credit (46)	I	Problem Solving using C (Th. 4 Cr.+ P 2Cr.) Fundamentals of Computers and IT (Th. 4 Cr.+ P 2Cr.)	English Communication(Th. 3Cr.)		 Mathematics Discrete Mathematics (Th. 4 Cr.) 			
		II		&Ecology (Th. 3 Cr)	MOOCS/NPTEL 4 Cr.	 Mathematics II Optimization Techniques (Th. 4 Cr.) 	GE-I (Mandatory) (Th. 4 Cr.)		Problem Solving using C Mathematics I

Note: - Students can take NCC (GENCC-101) as a General Elective/Optional course and certificate will be provided after competition of NCC Course.



College/School:SCHOOL OF COMPUTER SCINECE AND APPLICATIONSProgramme: B.Sc. [COMPUTER SCIENCE] Duration: 3 YEARS Annual/Semester - SEMESTER Credit Range: 120 - 160 (Suggested by CBCS Committee) Provision to change the stream onwards

Minimum Credit			Core Course/	Ability	Skill	Discipline Specific	Generic	Research	Prerequisite
Score Required for	Year	ч	Foundation	Enhancement	Enhancement	Elective	Elective	Project	
Diploma (80)		ste	Course	Compulsory	Course (SEC)	(DSE)	(GE)	(RP)	
	Second	Semester		Course (AECC)			(From other	/Industrial	
	ecc	Se					Faculty)	Internship	
	S						•	/Industrial	
								Project	
			OOPS using JAVA	Communication Skill		1. Computer			
		III	(Th. 4 Cr.+ P 2Cr.)	& Personality		System			
	.Ħ			Development		Architecture			
	Credit		DBMS	(Th. 3 Cr.)	•	2. Data Analytics			
MA	L C		(Th. 4 Cr.+ P 2Cr.)			(Th. 4 Cr)			
DIPLOMA	Year 46		Software Engineering	Human Values	MOOCS/NPTEL	1. Data Mining	GE-II		
Idi			(Th. 4 Cr. + P 2Cr.)	and Professional	4 Cr.	2. Numerical	(Mandatory)		
D	son			Ethics		Analysis	4 Cr.		
	Second		OPERATING	(Th. 3 Cr.)					DBMS
		IV	SYSTEM			(Th. 4 Cr.)			
			(Th. 4 Cr. + P 2Cr.)						

Note: - Students can take NCC (GENCC-101) as a General Elective/Optional course and certificate will be provided after competition of NCC Course.



College/School:SCHOOL OF COMPUTER SCINECE AND APPLICATIONSProgramme: B.Sc. [COMPUTER SCIENCE] Duration: 3 YEARS Annual/Semester - SEMESTER

Credit Range: 120 - 160 (Suggested by CBCS Committee) Provision to change the Core Papers (Main Subject)

Minimum Credit Score Required for Degree (120)	Third Year	Semester	Core Course/ Foundation Course	Ability Enhancement Compulsory Course (AECC)	Skill Enhancement Course (SEC)	Discipline Specific Elective (DSE)	Generic Elective (GE) (From other Faculty)	Research Project (RP) /Industrial Internship /Industrial	Prerequisite
DEGREE	Third Year Credit 50	V VI	Computer Graphics (Th. 4 Cr. + P 2Cr.) Python Programming (Th. 4 Cr. + P 2Cr.) Cyber Security (Th. 4 Cr. + P 2Cr.) Artificial Intelligence (Th. 4 Cr. + P 2Cr.)		MOOCS/NPTEL 4 Cr.	 Data Communication Network ERP BIG Data (Th. 4 Cr.) Mobile Computing E-Commerce Real Time System (Th. 4 Cr.) 	GE 3 (Mandatory) (Th. 4 Cr.)	Project RP-I (AUDIT) Non-Credit Research Project-I Internship (5 Cr.) RP-II (AUDIT) Non-Credit Research Project-II Industrial Project (5 Cr.)	Data Structure Algorithms using C





IIMTU-NEP Implementation:B.Sc. (Computer Science)

Program	Year	Semester (15 weeks)	Paper	Credit	Periods per Week	Periods (Hours) per Semester	Paper Title	Unit (Periods per semester)	Prerequisite	Elective (For other faculty)
			i) C1 (Th. 4 Cr. +	4	4	45	Problem Solving using C	5		
		(19	P 2 Cr.)	2	4	10	Problem Solving using C lab	5		
		-1 (1	ii) AECC-I	3	3	40	English Communication	5		
			iii) DSE-I	4	4	45	1. Mathematics-I			
E		STEI Cr.)					2. Discrete Mathematics			
COURSE	Cr.)	SEMESTER Cr.)	ii) C2(Th.4 Cr.+P 2Cr)	4	4	45	Fundamentals of Computers &IT	5		
DC		W		2	4	10	Fundamentals of Computers & IT Lab			
	(46	E								
ATE	YEAR(46	•1	Note: - Students can take	NCC (GI	ENCC-101)	as a General El	ective/Optional course and certificate will be p	provided after co	ompetition of N	CC Course.
CA	YE	_	i) C3 (Th. 4 Cr. +	4	4	45	Data Structure Algorithms using C Data	5		
CERTIFIC	,	II(27	P 2 Cr.)	2	4	10	Structure Algorithms using C Lab			
E	FIRST	II.	ii) AECC-II	3	3	40	Environment&Ecology	5		
E	H	× -	iii) SEC-I & II	4	4	40	MOOCS (NPTEL)	5		
D D		TER Cr.)	iv) DSE-II	4	4	45	1. Mathematics-II	5		
		ES					2. Optimization Techniques			
		SEMESTER Cr.)	v)GE-I	4	4	45	[#] To be selected from other School	5		
		E	ii) C4 (Th.4Cr.+P 2	4	4	45	Digital Electronics Digital	5		
		G 1	Cr.)	2	4	10	Electronics Lab			

Format-2



Programme Outcome:

- PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools prediction and modeling to complex engineering activities with an understanding of the limitations.

Programme Specific Outcome:

- PSO1: To equip the graduates with practical knowledge and give hands on experience to them.
- PSO2: To expose the students to the basic concepts of integration, differentiation, vector calculus, probability & statistics, and discrete mathematics.
- PSO3: To equip graduates with the study of design, development and analysis of software.
- PSO4: To aware graduates about the benefits of data storage and create awareness of newtrends in database management system.



Programme	Year	Semester (15 weeks)	Paper	Credit	Periods per Week	Periods (Hours) per Semester	Paper Title	Unit (Periods per semester)	Prerequisite	Elective (For other faculty)
			i) C5 (Th. 4 Cr. +	4	4	45	OOPS using Java	5		
		6	P 2 Cr.)	2	4	10	OOPS using Java Lab			
		-III(19	ii) AECC-III	3	3	40	Communication Skill & Personality Development	5		
		SEMESTER - Cr.)	iii) DSE-III	4	4	45	1. Computer System Architecture 2. Data Analytics	5		
E	Cr.)	ES	i) C6 (Th. 4 Cr. +	4	4	45	Database Management System	5		
R		M	P 2 Cr.)	2	4	10	Database Management System Lab			
COURSE	YEAR(46	IS	Note:- Students can take Course.	NCC (GE	ENCC-101) a	as a General Elec	ctive/Optional course and certificate will	be provided after	r competition o	of NCC
DIPLOMA	X		i) C7 (Th. 4 Cr. +	4	4	45	Software Engineering	5		
lo Io	P	5	P 2 Cr.)	2	4	10	Software Engineering Lab			
PL	SECOND	-IV(27	ii) AECC-IV	3	3	40	Human values and Professional	5		
DI	EC	Π	iii) SEC-III& IV	4	4	40	Ethics	5		
	\mathbf{S}	ER r.)	iv) DSE-IV	4	4	45	MOOCS (NPTEL)	5		
		C					1. Data Mining			
		E	v) GE-II	4	4	45	2. Numerical Analysis	5		
		SEMESTER Cr.)					[#] To be opted from otherSchool			
		S	ii) C8 (Th. 4 Cr. +	4	4	45	Operating System	5		
			P 2 Cr.)	2	4	10	Operating System Lab			



Programme	Year	Semester (15 weeks)	Paper	Credit	Periods per Week	Periods (Hours) per Semester	Paper Title	Unit (Periods per semester)	Prerequisite	Elective (For other faculty)
			i) C9 (Th. 4 Cr. +	4	4	45	Computer Graphics	5		
			P 2 Cr.)	2	4	10	Computer Graphics Lab			
		Cr.)	ii) DSE-V	4	4	45	1. Data Communication	5		
							Network			
		(21					2. ERP			
		\mathbf{N}_{-}					3. BIG Data			
		X	ii) C10 (Th. 4 Cr. +P 2	4	4	45	Python Programming	5		
		SEMESTER	Cr.)	2	4	10	Python Programming Lab			
E	Cr.)	IE	iii) Research Project	NC						
R.	(50 (EN	iv) Internship	5	5	10	Internship			
DEGREE COURSE	3 (;	\mathbf{S}	(Mandatory)				_			
Ŭ	YEAR		i) C11 (Th. 4 Cr. +	4	4	45	Cyber Security	5		
E	YE		P 2 Cr.)	2	4	10	Cyber Security Lab			
R		Cr.)	ii) SEC-V & VI	4	4	40	MOOCS (NPTEL)	5		
E	Ĕ		iii) DSE-VI	4	4	45	1.Mobile Computing			
Q	THIRD	-VI (29					2. E-Commerce	5		
		-					3. Real Time System			
			iv) GE-III	4	4	45	[#] To be opted from another	5		
		LE					School			
		S	ii) C12 (Th. 4 Cr. +	4	4	45	Artificial Intelligence	5		
		W	P 2Cr.)	2	4	10	Artificial Intelligence Lab			
		SEMESTER	iii) Research Project	NC						
			iv) Industrial Project	5	5	10	Industrial Project			
			(Mandatory)							



Academic Hand Book (School of Computer Sciences & Application)



IIMTU-NEPIMPLEMENTATION Year-I / Semester-I

Class:BSC CS Semester: I Credits Subject: Discrete Mathematics Theory:4Cr Title: Discrete Mathematics BCS-NEP-104 Title: Discrete Mathematics								
Theory:4Cr Course Code: Title: Discrete Mathematics								
Course Code: Title: Discrete Mathematics								
BCS-NFP-104								
CourseObjectives:								
CO1: Identify and prove properties of Algebraic Structures like Groups, Rings and F	Fields.							
	Formulate and solve recurrences and recursive functions.							
	Apply the concept of combinatorics to solve basic problems in discrete mathematics.							
CO4: Use mathematical and logical notation to define and formally reason about	basic discrete							
structures such as Sets, Relations and Functions.								
CO5: Apply mathematical arguments using logical connectives and quantifiers								
validity of an argument through truth tables and propositional and predicate lo	gic.							
Nature of Paper: DSE								
Minimum Passing Marks/Credits:40% Marks (ISE+ESE)								
L:4								
Т:0								
P:0(In Hours/Week)								
Theory-1Hr.=1Credit								
Practical-2Hrs.=1Credit								
(4Hrs./Week=4Credits)								
Unit Contents	No.							
	ofLectures							
	Allotted							
I Set Theory: Introduction, Size of sets and Cardinals, Venn diagrams,	8							
Combination of sets, Multi sets, ordered pairs and Set Identities.								
Functions: Definition, Types of functions, Operations on functions,								
recursively defined functions.								
Relation: Definition, Operations on relations, Composite relations,								
Properties of relations, Equality of relations, Partial order relation.								
II Posets, Hasse Diagram and Lattices: Introduction, Partial ordered sets,	8							
Combination of Partial ordered sets, Hasse diagram, Introduction on								
flattices, Properties of lattices-Bounded, Complemented, Modular and								
Completelattice.								
Boolean Algebra: Introduction, Axioms and Theorems of Boolean algebra,								
Boolean functions. Simplification of Boolean functions, Karnaugh maps,								
Logic gates.								
III Predicate Logic: Theory of Predicates, First order predicate, Predicate	8							
formulas, Quantifiers, Inference theory of predicate logic.								
Propositional: Propositions, Truth tables, Tautology, Contradiction,								
Algebra of Propositions, Theory of Inference and Natural Detection.								
IV Algebraic Structures: Introduction to algebraic Structures and properties.	8							
Types of algebraic structures: Semi group, Monoid, Group, Abelian group								
and Properties of group. Subgroup, Cyclic group, Cosets, Permutation								
groups, Homomorphism and Isomorphism of groups.								



	Transforming Education S	ystem, Transforming Lives	Section 2f & 12B	
	Rings and Fields: Definition and elementary properties of	of Rings and		
	Fields.	-		
V	Natural Numbers: Introduction, Piano's axioms, Mathematic	cal Induction,	8	
	Strong Induction and Induction with Nonzero Base cases.			
	Recurrence Relation & Generating functions: Intro	duction and		
	properties of Generating Functions. Simple Recurrence	relation with		
	constant coefficients and Linear recurrence relation with	nout constant		
	coefficients. Methods of solving recurrences.			
	Combinatorics: Introduction, counting techniques and	Pigeonhole		
	principle, Polya's Counting theorem.			
Fext Bo	ook:			
	nneth H. Rosen, "Discrete Mathematics and Its Applications", Mc.			
2. B. I	Kolman, R.C. Bus by and S.C. Ross, "Discrete Mathematics Struct	ures", Prentice	Hall, 2004.	
Referer	nce Book:			
	P. Grimaldi, "Discrete and Combinatorial Mathematics", Addison V			
2. Y.N	N. Singh, "Discrete Mathematical Structures", Wiley-India, First ed	lition, 2010.		
	Evaluation/Assessment Methodology			
		Max. Ma		
/	ss tasks/ Sessional Examination	1:	5	
/	sentations /Seminar			
· ·	signments			
	tesearch Project 10			
-	port			
	ninar On Research Project Report	7.	5	
5) ES				
	Total	10	00	
-	uisites for the course: NIL			
	e Learning Outcomes:			
CO1				
CO1	1 1 1			
CO3	5 6 6			
CO4		torics.		
COS	5: Able to analyze preposition and predicate logics.			



IIMTU-NEP IMPLEMENTATION Year-I/ Semester-I

Program	me: Certificate	Year: I						
Class:BS	C (CS)	Semester: I						
Credits		Subject:Mathematics-I						
Theory:4								
Course (Code:	Title:Mathematics-I						
BCS-NEI	P-104							
Course (Objectives:							
CO1:	Compute the rank a	Compute the rank and inverse of a matrix and solve system of linear equations.						
CO2:	Computation of Limits of Various Types of Functions, Continuity over an Interval, to find							
	Intermediate Value	Theorem and type of Discontinuities.						
CO3:		rivatives, Chain Rule, Derivatives of Composite Fund	ctions, Logarithmic					
	Differentiation, Suc	ccessive Differentiation.	-					
CO4:	Use of different the	eorems like Rolle's Theorem, Mean Value Theorem,	Leibnitz Theorem,					
	Partial Differentiati	ion, Euler's Theorem.						
CO5:	Understanding of	Integral as Limit of Sum, Riemann Sum, Fundan	nental Theorem of					
	Calculus, Indefinite	e Integrals, Methods of Integration Substitution.						
Nature o	f Paper: DSE							
Minimur	n Passing Marks/Ci	redits:40% Marks (Internal +ESE)						
L:4								
T:0								
P:0(In Ho	ours/Week)							
Theory -	1 Hr. = 1 Credit							
Practical-	2 Hrs.=1Credit(4Hrs	s./Week=4Credits)						
Unit		Contents	No. of Lectures Allotted					
Ι	Determinants: I	Definition, Minors, Cofactors, Properties of	8					
	Determinants,	-						
	Matrices: Definition	on, Types of Matrices, Addition, Subtraction, Scalar						
	Multiplication and	d Multiplication of Matrices, Adjoint, Inverse,						
	Cramer's Rule, Ra	ink of Matrix, Eigen Vectors of a Matrix, Cayley-						
	Hamilton Theorem	(without proof)						
II	Limits & Conti	nuity: Limit at a Point, Properties of Limit,	8					
	Computation of Lin	mits of Various Types of Functions, Continuity at a						
	_	Over an Interval, Intermediate Value Theorem, Type						
	of Discontinuities.							
III	Differentiation: D	Perivative, Derivatives of Sum, Differences, Product	8					
	& quotients, Cha	ain Rule, Derivatives of Composite Functions,						
	I	entiation, Successive Differentiation.						
	Logarithmic Differ	cillution, Successive Differentiation.						
IV		Differentiation: Rolle's Theorem, Mean Value	8					
IV	Application of I		8					
IV	Application of I Theorem, Expans	Differentiation: Rolle's Theorem, Mean Value	8					
IV	Application of I Theorem, Expans Indeterminate Form	Differentiation: Rolle's Theorem, Mean Value sion of Functions (Maclaurin's & Taylor's),	8					
IV V	Application of I Theorem, Expans Indeterminate Form Theorem, Partial D	Differentiation: Rolle's Theorem, Mean Value sion of Functions (Maclaurin's & Taylor's), ns, L' Hospitals Rule, Maxima & Minima, Leibnitz ifferentiation, Euler's Theorem.	8					
	Application of I Theorem, Expans Indeterminate Form Theorem, Partial D Integration: Integ	Differentiation: Rolle's Theorem, Mean Value sion of Functions (Maclaurin's & Taylor's), ns, L' Hospitals Rule, Maxima & Minima, Leibnitz ifferentiation, Euler's Theorem. ral as Limit of Sum, Riemann Sum, Fundamental						
	Application of I Theorem, Expans Indeterminate Form Theorem, Partial D Integration: Integ Theorem of Calcu	Differentiation: Rolle's Theorem, Mean Value sion of Functions (Maclaurin's & Taylor's), ns, L' Hospitals Rule, Maxima & Minima, Leibnitz ifferentiation, Euler's Theorem.						



Integral.						
Text Books:						
1. Babu Ram, "Engineering Mathematics", Pearson Education						
2. H.K. Dass, "Advanced Engineering Mathematics", S. Chand & Company						
Reference						
1. Erwin Klessig, "Advanced Engineering Mathematics", John Wiley &	k Sons.					
2. B. S. Grewal, "Elementary Engineering Mathematics", Khanna Publ	lishers.					
Evaluation/Assessment Methodology						
	Max. Marks 100					
1) Class tasks/ Sessional Examination	15					
2) Presentations /Seminar						
3) Assignments						
4) Research Project Report	10					
Seminar On Research Project Report						
5) ESE	75					
Total:	100					
Prerequisites for the course: NIL						
Course Learning Outcomes:						
CO1: Compute the rank and inverse of a matrix and solve system of	-					
CO2: Computation of Limits of Various Types of Functions, Cont	inuity over an Interval, to find					
Intermediate Value Theorem and type of Discontinuities.						
CO3: Understand the Derivatives, Chain Rule, Derivatives of Com	posite Functions, Logarithmic					
Differentiation, Successive Differentiation.						
CO4: Use of different theorems like Rolle's Theorem, Mean Value	e Theorem, Leibnitz Theorem,					
Partial Differentiation, Euler's Theorem.						
CO5: Understanding of Integral as Limit of Sum, Riemann Su						
Calculus, Indefinite Integrals, Methods of Integration Substitu	tion.					



IIMTU-NEPIMPLEMENTATION Year-I / Semester-I

Progran	me:Certificate Year: I	
Class: B		
Credits	Subject: English communication	
Theory:	• •	
Course		
NHU-1		
Course	Objectives:	
CO1: I	t aims to improve English communication skills i.e., Listening, speaking, reading	, & writing.
CO2: 7	To develop potential skills to deal confidently in English with diverse situat	tions in the
	xternal world.	
	o work in a collaborative manner & communicate effectively in English.	
	To get exposure to various activities related to English Communication which with	
	earners to take initiative, solve problems, and demonstrate a positive work ethics.	
	of Paper: AECC	
	um Passing Marks/Credits: 40% Marks	
L: 3		
T: 0		
	Hours/Week)	
-	1 Hr. = 1 Credit	
Unit	Contents	No. of
		Lectures
I	English Communication skills:	Allotted 8
1	English Communication skills:	8
	listening skills,	
	• speaking skills,	
	• reading skills,	
	• Writing skills.	
	• Starting and sustaining a conversation.	
	Process of Communication, Essential of effective Communication, Barriers	
тт	to Communication, Role of Communication	8
II	Public Speech, Delivering skills, Group discussion, Communication in	ð
	seminars, Conferences and Committees Parts of Speech- Noun, Pronoun, Adjective, Verb, Adverb, Conjunction, Preposition, Interjection, Articles,	
	Common errors in English	
III		
		8
111	Presentation: Features, Styles, Use of visual aids, Creating a Dynamic	8
	Presentation: Features, Styles, Use of visual aids, Creating a Dynamic Presentation, Presentation and interaction, Telephonic conversation & Basic	8
	Presentation: Features, Styles, Use of visual aids, Creating a Dynamic Presentation, Presentation and interaction, Telephonic conversation & Basic Etiquette.	8
	Presentation: Features, Styles, Use of visual aids, Creating a Dynamic Presentation, Presentation and interaction, Telephonic conversation & Basic Etiquette. Non-Verbal Communication: Meaning, Types and Importance. Listening:	8
	Presentation: Features, Styles, Use of visual aids, Creating a Dynamic Presentation, Presentation and interaction, Telephonic conversation & Basic Etiquette. Non-Verbal Communication: Meaning, Types and Importance. Listening: Difference between Listening and Hearing	8
IV	Presentation: Features, Styles, Use of visual aids, Creating a Dynamic Presentation, Presentation and interaction, Telephonic conversation & Basic Etiquette. Non-Verbal Communication: Meaning, Types and Importance. Listening:	_
	Presentation: Features, Styles, Use of visual aids, Creating a Dynamic Presentation, Presentation and interaction, Telephonic conversation & Basic Etiquette. Non-Verbal Communication: Meaning, Types and Importance. Listening: Difference between Listening and Hearing Word Skills-Synonyms, Antonyms, Words often Confused, Idioms, Phrases, Phrasal Verbs	
IV	 Presentation: Features, Styles, Use of visual aids, Creating a Dynamic Presentation, Presentation and interaction, Telephonic conversation & Basic Etiquette. Non-Verbal Communication: Meaning, Types and Importance. Listening: Difference between Listening and Hearing Word Skills-Synonyms, Antonyms, Words often Confused, Idioms, Phrases, Phrasal Verbs Drafting of Notices, Agendas, Minutes, Job Application letter, CV, Business 	8
IV	Presentation: Features, Styles, Use of visual aids, Creating a Dynamic Presentation, Presentation and interaction, Telephonic conversation & Basic Etiquette. Non-Verbal Communication: Meaning, Types and Importance. Listening: Difference between Listening and Hearing Word Skills-Synonyms, Antonyms, Words often Confused, Idioms, Phrases, Phrasal Verbs	8



Press and a second statement of the second statement o	fandroming Lives Section 21 & 12B				
Text Books:					
 English Grammar and Composition by Wren & Martin 					
Effective Communication and Soft Skills by Nitin Bhatnagar					
• The ACE of Soft Skills: Attitude, Communication and Etiquette for Success by Gopalaswamy					
Ramesh and Mahadevan Ramesh.					
Reference					
English Grammar in Use by Raymond Murphy					
• English Grammar Composition and Usage by J.C. Nesfield					
Evaluation/Assessment Methodology					
	Max. Marks 50				
1) Class tasks/ Sessional Examination	15				
2) Presentations /Seminar/Attendance					
3) Assignments/TA					
4) Research Project Report	Nil				
5) Seminar On Research Project Report					
6) ESE	35				
Total:	50				
Prerequisites for the course: Nil					
Course Learning Outcome					
CO1: To get knowledge about communication skills.					
CO2: To understand about use of grammar.					
CO3: To understand about presentation.					
CO4: To get information about how to face interview and public.					
CO5: To get knowledge about telephonic conversation & etiquette.					



IIMTU-NEP IMPLEMENTATION Year-I / Semester-I

Program	ma. Cor	tificate	Year: I					
Class:BS		uncate	Semester: I					
Class: DS Credits		Subject: Fundamental						
Theory:4	Cr	Subject. Fundamental	s of computers and T					
Course C		Title: Fundamentals of	f Computers and IT					
BCS-NEI		The Fundamentals 0.	Computers and Tr					
Course C		PC•						
COULSE C	•		matical software and solve simple mathematical p	roblems				
CO 2:		xplain the needs of hardware and software required for a computation task.						
CO 3:	1	tate typical provisions of cyber law that govern the proper usage of Internet and computing						
	resourc			8				
CO 4:			portant application software and their use to	perform any				
	-	ering activity.	11					
CO 5:	Demon	strate the use of Operat	ting system commands and shell script.					
Nature o								
Minimur	n Passin	ng Marks/Credits:40%	Marks (Internal +ESE)					
L:4								
T:0								
P:0(In Ho		,						
Theory -								
	2 Hrs.=	1Credit(4Hrs./Week=4						
Unit			Contents	No. of				
				Lectures				
т	T 4 J		Later lastice Characteristics of Commuter	Allotted				
Ι		–	: Introduction, Characteristics of Computers, , Generations, Types of Computers and Their	8				
			ing Languages, Types of Memory, RAM, ROM,					
			(FD, CD, HD, Pen drive), Input and Output					
	Device		(1D, CD, 1D, 1Ch unve), input and output					
II			tion to Binary, Octal, Decimal, Hexadecimal	8				
		·	a, Simple Addition, Subtraction, Multiplication	~				
	and div	-	, , , , , , , , , , , , , , , , , , ,					
			: Definition, Characteristics, Advantages and					
	U	antages, Symbols of Fle						
III	Opera	ting System and Serv	vices: Types of Operating System, Features of	8				
	-	• •	s and Services of Operating System. DOS -					
	-		, Internal and External Commands, Batch Files.					
		•	Files and Folders, Control Panel, Task Bar,					
	Deskto	•						
IV		Tools: Basic Concepts		8				
			bmenus, Tool Bar, Tools, Customizing Toolbar,					
	U		Saving Documents, working with an Existing					
			Complete and Auto Correct; Formatting a					
			ng Tables and Columns-Table Creation and					
		-	o Auto-Fit, Auto-Format; Object Linking and					
	Embed	ding, Inserting and Si	zing Graphics, Hyperlink, Envelopes & Label					



ystem, Transforming Lives	Section 2/ & 12B
cuments, Mail	
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Working with	
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ser, Websites.	
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Max. Ma	rks 100
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nathematical pro	blems.
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	d computing
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	A presentation, eets and Files,



IIMTU-NEP IMPLEMENTATION Year-I / Semester-I

Programme:Certificate Year: I	
Class:BSC(CS) Semester: I	
Credits Subject:Fundamental of Computer and IT LAB	
Practical: 2Cr	
Course Code: Title:Fundamental of Computer and IT LAB	
BCS-NEP-106P	
Course Objectives:	
CO1: Understand Computer Fundamentals – hardware and Software	
CO2: Understand computer retworks	
CO3: Study Office automation tools	
CO4: Email and search engines	
Nature of Paper: Core	
Minimum Passing Marks/Credits:40% Marks	
L:0	
T:0	
P:4(In Hours/Week)	
Theory - 1 Hr. = 1 Credit	
Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)	
Unit Contents	No. of
	Lectures
	Allotted
I Identify the internal and external hardware/peripheral components	2
II Identify the internal and external hardware/peripheral components	2
III Prepare and print Bio-data with a covering letter using word processor.	2
IV Calculation of Total mark, grade based on boundary conditions for n number	2
of students using Spread sheet.	
V Preparation of presentation (with transition and animations, insertion of	2
scanned images and internet contents)	
VI Email id creation, sending and receiving of email with attachments.	2
VII Demonstrate how to create email-id and uploading and downloading files.	2
VIII Identify various operating system file management commands (create, copy,	2
move, delete and rename folders and files)	
Evaluation/Assessment Methodology	
	. Marks:50
1) Class tasks/ Sessional Examination25	
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	
Seminar On Research Project Report	
5) ESE 25	
Total: 50	



Course Learning Outcomes: Student will be able to: CO1: Converse in basic computer terminology CO2: Formulate opinions about the impact of computers on society

CO3: Possess the knowledge of basic hardware peripherals



IIMTU-NEP IMPLEMENTATION Year-I / Semester-I

Programme: Certificate		Year: I			
Class: BSC(CS)	C-L- A Duchleur Coloine and	Semester: I			
Credits	Subject: Problem Solving using	C			
Theory:4Cr					
Course Code:	Title: Problem Solving using C				
BCS-NEP-101					
Course Objectiv			-		
of C Lang CO2: Students v and Iterati CO3: Students v and recurs CO4: Students v Operation CO5: Students v Nature of Paper	uage. vill be able to learn and understand ve Control statements. will be familiar with concept of A ion. will be able to develop Program s. vill be familiar with File handling p Core g Marks/Credits: 40% Marks (I	programming language and Fundame d Concepts of basic programming wit Arrays, Pointers, Functions, categorie with Structure; learn Union and Co programs to perform read write opera	h Condition es of function mplete Strir		
Theory - 1 Hr. = 1	Credit				
Theory - 1 Hr. = 2 Practical- 2 Hrs.=	Credit 1 Credit				
Theory - 1 Hr. = 1	Credit 1 Credit	ts	No. of Lectures Allotted		
Theory - 1 Hr. = Practical- 2 Hrs.= 4Hrs./Week=4Ct Unit I Introdu Keywor Structur #include	Content action to 'C' Language: Hist ds, Constants, Identifiers, Vari es of 'C' Program, Introducti e, #define, printf (), scanf (), De	tory, C Character Set, Tokens, iables, Data Types, Comments, ion to Pre-processor Directives: eclaration, Assignment, Operators,	Lectures		
Theory - 1 Hr. = Practical- 2 Hrs.= 4Hrs./Week=4Cr Unit I Introdu Keywon Structun #include Express II Branch cascade	Content action to 'C' Language: Hist ds, Constants, Identifiers, Vari- es of 'C' Program, Introducti e, #define, printf (), scanf (), De- ions, Statements, Arithmetic Expre- ing and Looping: Two Way Se	tory, C Character Set, Tokens, iables, Data Types, Comments, ion to Pre-processor Directives: eclaration, Assignment, Operators, essions. election (if, if-else, Nested if-else, hary Operator, got Statement, loops	Lectures Allotted		
Theory - 1 Hr. = Practical- 2 Hrs.= 4Hrs./Week=4Cr Unit I Introdu Keywor Structur #includ Express II Branch cascade (for, wh III Arrays Data fro Pointer Storage Functio	Content Con	tory, C Character Set, Tokens, iables, Data Types, Comments, ion to Pre-processor Directives: eclaration, Assignment, Operators, essions. election (if, if-else, Nested if-else, ary Operator, got Statement, loops inue Statements, Nested Loops. ion, Array Initialization, Accessing tions, Multi-Dimensional Arrays. rray of Pointers. atic & Register. declaring a Function, defining a Passing – Call by Value, Call by	Lectures Allotted 8		



	of Stanotyres Deinter to Stanotyre Union		Second Second Second		
X 7	of Structures, Pointer to Structure, Union.				
V	V File Handling: Introduction, File Types- Text, Binary, The File Pointer, 8				
	Opening a File, Closing a File, Reading and Writing a File, File Handling				
	Functions: fetch (), put(), puts(), frets(), printf(), fscanf(), fwrite(), fread(),				
	fseek(), ftell(), feof(), etc.				
Text Bo					
	alaguruswamy, "Programming in ANSI C", Tata McGraw-Hill Ec	lucation.			
	wantKanetkar, "Let us C", BPB Publications				
Referen	ce				
1. V Ra	jaraman, "Computer Basics and C Programming", PHI Learning				
2. Ashc	k N. Kamthane, "Programming in C", Pearson Education.				
	Evaluation/Assessment Methodology				
		Ma	x. Marks 100		
1) Class	s tasks/ Sessional Examination	15			
2) Prese	entations /Seminar				
3) Assig	gnments				
4) Rese	arch Project Report	10			
Semi	nar On Research Project Report				
5) ESE	5	75			
,	Total:	100			
Droroqui	sites for the course: NIL	100			
-	g Outcomes:				
CO 1:		concents of m	o ano na min a in		
01	Students will be able to develop programs based on fundamental C.	concepts of pr	ogramming m		
CO 2:	Students will be able to solve problems based on Condit	ional and Iter	ative Control		
	Statements.				
CO 3:	Students will be able to learn Complete Programming Concepts	s of Arrays, Po	inters and get		
	familiar with modular programming Concepts of C using Function	ons.	2		
CO 4:	Students will be able to learn conceptual programming with		cture and its		
	differentiation with Union.	U,			
CO 5:	Students will be able to perform File handling programs with rea	d and write co	ncepts.		
	I		T		



IIMTU-NEP IMPLEMENTATION Year-I / Semester-I

1 1 1 1 2 1 2	m:Certificat	e Year: I			
	B.SC.(CS)	Semester: I			
Credits Subject: Problem-Solving using C Lab					
	Practical: 2Cr				
	Course Code: Title: Problem-Solving using C Lab				
BCS-NEP-105P					
Course	e Objectives				
CO1:	•	Il be able to learn the basics of programming language and Fundame	ental concepts		
0011	of C Language.				
CO2:	-	ill be able to learn and understand Concepts of basic progra	amming with		
		and Iterative Control statements.	U		
CO3:	Students w	ill be familiar with the concept of Arrays, Pointers, Functions,	categories of		
		id recursion.	C		
CO4:	Students w	ill be able to develop a Program with Structure; learn Union and Co	mplete String		
	Operations.				
CO5:	Students wi	Il be familiar with File handling programs to perform read-write oper	ations.		
Nature	e of Paper: (Core			
Minim	um Passing	Marks/Credits:40% Marks			
L:0					
T:0					
P:4(In	Hours/Week				
Theory	-1 Hr. $= 1$ C	Credit			
Practic	Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)				
		Credit(4Hrs./Week=4Credits)			
Unit			No. of		
Unit			Lectures		
	Conten	ts	Lectures Allotted		
Unit I	Content Write a	program to display "hello world" in C.	Lectures Allotted 02		
Ι	Content Write a Write a	program to display "hello world" in C. program to find the largest and smallest among three entered	Lectures Allotted		
	Write a Write a numbers	program to display "hello world" in C. program to find the largest and smallest among three entered and also display whether the identified largest/smallest number is	Lectures Allotted 02		
I	Write a Write a Numbers even or	program to display "hello world" in C. program to find the largest and smallest among three entered s and also display whether the identified largest/smallest number is odd.	Lectures Allotted 02 02		
Ι	ContentWrite aWrite anumberseven orWrite a	program to display "hello world" in C. program to find the largest and smallest among three entered s and also display whether the identified largest/smallest number is odd. program to check whether the entered year is a leap year or not (a	Lectures Allotted 02		
I II III	ContentWrite aWrite anumberseven orWrite ayear is a	program to display "hello world" in C. program to find the largest and smallest among three entered and also display whether the identified largest/smallest number is odd. program to check whether the entered year is a leap year or not (a leap if it is divisible by 4 and divisible by 100 or 400.)	LecturesAllotted020202		
I	ContentWrite aWrite anumberseven orWrite ayear is aWrite a	program to display "hello world" in C. program to find the largest and smallest among three entered s and also display whether the identified largest/smallest number is odd. program to check whether the entered year is a leap year or not (a leap if it is divisible by 4 and divisible by 100 or 400.) program to read a string and check for palindrome without using	Lectures Allotted 02 02		
I II III	ContentWrite aWrite anumberseven orWrite ayear is aWrite astring-red	program to display "hello world" in C. program to find the largest and smallest among three entered and also display whether the identified largest/smallest number is odd. program to check whether the entered year is a leap year or not (a leap if it is divisible by 4 and divisible by 100 or 400.)	Lectures Allotted 02 02 02 02		
I II III IV	ContentWrite aWrite anumberseven orWrite ayear is aWrite astring-reitself.	program to display "hello world" in C. program to find the largest and smallest among three entered and also display whether the identified largest/smallest number is odd. program to check whether the entered year is a leap year or not (a leap if it is divisible by 4 and divisible by 100 or 400.) program to read a string and check for palindrome without using elated functions (a string is a palindrome if its half is mirror by	Lectures Allotted 02 02 02 02 02		
I II III IV V	ContentWrite aWrite anumberseven orWrite ayear is aWrite astring-reitself.Write a	program to display "hello world" in C. program to find the largest and smallest among three entered s and also display whether the identified largest/smallest number is odd. program to check whether the entered year is a leap year or not (a leap if it is divisible by 4 and divisible by 100 or 400.) program to read a string and check for palindrome without using elated functions (a string is a palindrome if its half is mirror by program to find the biggest among three numbers using a pointer.	Lectures Allotted 02 02 02 02 02 02		
I II III IV	ContentWrite aWrite anumberseven orWrite ayear is aWrite astring-reitself.Write aCreate a	program to display "hello world" in C. program to find the largest and smallest among three entered s and also display whether the identified largest/smallest number is odd. program to check whether the entered year is a leap year or not (a leap if it is divisible by 4 and divisible by 100 or 400.) program to read a string and check for palindrome without using lated functions (a string is a palindrome if its half is mirror by program to find the biggest among three numbers using a pointer.	Lectures Allotted 02 02 02 02 02		
I II III IV V	ContentWrite aWrite anumberseven orWrite ayear is aWrite astring-reitself.Write aCreate aas mem	program to display "hello world" in C. program to find the largest and smallest among three entered and also display whether the identified largest/smallest number is odd. program to check whether the entered year is a leap year or not (a leap if it is divisible by 4 and divisible by 100 or 400.) program to read a string and check for palindrome without using elated functions (a string is a palindrome if its half is mirror by program to find the biggest among three numbers using a pointer. a structure named company which has a name, address, phone, and ber variables. Read the name of the company, its address, phone,	Lectures Allotted 02 02 02 02 02 02		
I II III IV V VI	ContentWrite aWrite anumberseven orWrite ayear is aWrite astring-recitself.Write aCreate aas memand no (program to display "hello world" in C. program to find the largest and smallest among three entered and also display whether the identified largest/smallest number is odd. program to check whether the entered year is a leap year or not (a leap if it is divisible by 4 and divisible by 100 or 400.) program to read a string and check for palindrome without using elated functions (a string is a palindrome if its half is mirror by program to find the biggest among three numbers using a pointer. structure named company which has a name, address, phone, and ber variables. Read the name of the company, its address, phone, Df Employee. Finally display these members' values.	Lectures Allotted 02 02 02 02 02 02 02 02 02 02 02 02		
I II III IV V VI VI	ContentWrite aWrite anumberseven orWrite ayear is aWrite astring-reitself.Write aCreate aas memand no GThe BC	program to display "hello world" in C. program to find the largest and smallest among three entered and also display whether the identified largest/smallest number is odd. program to check whether the entered year is a leap year or not (a leap if it is divisible by 4 and divisible by 100 or 400.) program to read a string and check for palindrome without using elated functions (a string is a palindrome if its half is mirror by program to find the biggest among three numbers using a pointer. structure named company which has a name, address, phone, and ber variables. Read the name of the company, its address, phone, Df Employee. Finally display these members' values. T class and display the details from the function.	Lectures Allotted 02 02 02 02 02 02 02 02 02		
I II III IV V VI	ContentWrite aWrite anumberseven orWrite ayear is aWrite astring-reitself.Write aCreate aas memand no GThe BC	program to display "hello world" in C. program to find the largest and smallest among three entered s and also display whether the identified largest/smallest number is odd. program to check whether the entered year is a leap year or not (a leap if it is divisible by 4 and divisible by 100 or 400.) program to read a string and check for palindrome without using elated functions (a string is a palindrome if its half is mirror by program to find the biggest among three numbers using a pointer. structure named company which has a name, address, phone, and ber variables. Read the name of the company, its address, phone, <u>Df Employee. Finally display these members' values.</u> <u>T class and display the details from the function.</u>	Lectures Allotted 02 02 02 02 02 02 02 02 02 02 02 02		



Reference / Text Books:			
The C Programming Language" by Brian W. Kernighan and Dennis M. Ritchie.			
C Programming: A Modern Approach" by K. N. King.			
Evaluation/Assessment Methodology			
	Max. Marks:50		
1) Class tasks/ Sessional Examination	25		
2) Presentations /Seminar			
3) Assignments			
4) Research Project Report			
Seminar On Research Project Report			
5) ESE	25		
Total:	50		
Course Learning Outcomes:			
CO1: Students will be able to develop programs based on fundamenta	concepts of programming in		
C.			
CO2: Students will be able to solve problems based on Condit	ional and Iterative Control		
Statements.			
CO3: Students will be able to learn Complete Programming Concept	s of Arrays, Pointers and get		
familiar with modular programming Concepts of C using Function	18.		
CO4: Students will be able to learn conceptual programming wit	h String, Structure, and its		
CO5: differentiation with Union.			
Students will be able to perform File handling programs with read	and write concepts.		



IIMTU-NEP IMPLEMENTATION Year-I/ Semester-II

Programme		
Class:B.SC.		
Credits	Subject:Data Structure Algorithms using C	
Theory:4Cr		
Course Code: Title:Data Structure Algorithms using C		
BCS-NEP-2	01	
Course Obj	ectives:	
CO1: Dem	ionstrate familiarity with major algorithms and data structures.	
CO2: Anal	lyze performance of algorithms and choose the appropriate data structure and	algorithm
desig	gn method for a specified application.	-
CO3: Dete	rmine which algorithm or data structure to use in different scenarios and be far	miliar with
writi	ng recursive methods.	
CO4: Dem	ionstrate understanding of the abstract properties of various data structures such	n as stacks,
	es, lists, trees and graphs and use various data structures effectively in a	
prog	rams.	
CO5: Dem	onstrate understanding of various sorting algorithms, including bubble sort, inst	ertion sort,
selec	ction sort, heap sort and quick sort.	
Nature of P	aper: Core	
Minimum P	Passing Marks/Credits:40% Marks (ISE +ESE)	
L:4		
T:0		
T:0 P:0(In Hours	s/Week)	
P:0(In Hours	s/Week) Ir. = 1 Credit	
P:0(In Hours Theory - 1 H		
P:0(In Hours Theory - 1 H	Ir. = 1 Credit	No. of
P:0(In Hours Theory - 1 H Practical- 2	Ir. = 1 Credit Hrs.=1Credit(4Hrs./Week=4Credits)	No. of Lectures
P:0(In Hours Theory - 1 H Practical- 2	Ir. = 1 Credit Hrs.=1Credit(4Hrs./Week=4Credits)	
P:0(In Hours Theory - 1 H Practical- 2	Ir. = 1 Credit Hrs.=1Credit(4Hrs./Week=4Credits) Contents	Lectures
P:0(In Hours Theory - 1 H Practical- 2 D Unit	Ir. = 1 Credit Hrs.=1Credit(4Hrs./Week=4Credits)	Lectures Allotted
P:0(In Hours Theory - 1 H Practical- 2 D Unit	Ir. = 1 Credit Hrs.=1Credit(4Hrs./Week=4Credits) Contents Introduction: Basic Terminology, Data Structures, Classification of Data Structures, Data Structure Operations, Complexity.	Lectures Allotted
P:0(In Hours Theory - 1 H Practical- 2 D Unit	Ir. = 1 Credit Hrs.=1Credit(4Hrs./Week=4Credits) Contents Introduction: Basic Terminology, Data Structures, Classification of Data	Lectures Allotted
P:0(In Hours Theory - 1 H Practical- 2 D Unit	Ir. = 1 Credit Hrs.=1Credit(4Hrs./Week=4Credits) Contents Introduction: Basic Terminology, Data Structures, Classification of Data Structures, Data Structure Operations, Complexity. Array: Definition, Declaration, Initialization of Array, Accessing Elements	Lectures Allotted
P:0(In Hours Theory - 1 H Practical- 2 D Unit	Ir. = 1 Credit Hrs.=1Credit(4Hrs./Week=4Credits) Contents Introduction: Basic Terminology, Data Structures, Classification of Data Structures, Data Structure Operations, Complexity. Array: Definition, Declaration, Initialization of Array, Accessing Elements of Array, Multidimensional Arrays, Sparse Matrix, Lower and Upper	Lectures Allotted
P:0(In Hours Theory - 1 H Practical- 2 D Unit	Introduction: Basic Terminology, Data Structures, Classification of Data Structures, Data Structure Operations, Complexity. Array: Definition, Declaration, Initialization of Array, Accessing Elements of Array, Multidimensional Arrays, Sparse Matrix, Lower and Upper Triangular Matrices, Vector, Memory Representation of Array- Row Major	Lectures Allotted
P:0(In Hours Theory - 1 H Practical- 2 D Unit	Ir. = 1 Credit Hrs.=1Credit(4Hrs./Week=4Credits) Contents Introduction: Basic Terminology, Data Structures, Classification of Data Structures, Data Structure Operations, Complexity. Array: Definition, Declaration, Initialization of Array, Accessing Elements of Array, Multidimensional Arrays, Sparse Matrix, Lower and Upper Triangular Matrices, Vector, Memory Representation of Array- Row Major and Column Major, Address Calculation of Array, Insertion and Deletion on	Lectures Allotted
P:0(In Hours Theory - 1 H Practical- 2 J Unit	Introduction: Basic Terminology, Data Structures, Classification of Data Structures, Data Structure Operations, Complexity. Array: Definition, Declaration, Initialization of Array, Accessing Elements of Array, Multidimensional Arrays, Sparse Matrix, Lower and Upper Triangular Matrices, Vector, Memory Representation of Array- Row Major and Column Major, Address Calculation of Array, Insertion and Deletion on Array	Lectures Allotted 8
P:0(In Hours Theory - 1 H Practical- 2 J Unit	Introduction: Basic Terminology, Data Structures, Classification of Data Structures, Data Structure Operations, Complexity. Array: Definition, Declaration, Initialization of Array, Accessing Elements of Array, Multidimensional Arrays, Sparse Matrix, Lower and Upper Triangular Matrices, Vector, Memory Representation of Array- Row Major and Column Major, Address Calculation of Array, Insertion and Deletion on Array Linked List: Introduction, Dynamic Memory Allocation, Singly Linked	Lectures Allotted 8
P:0(In Hours Theory - 1 H Practical- 2 J Unit	Introduction: Basic Terminology, Data Structures, Classification of Data Structures, Data Structure Operations, Complexity. Array: Definition, Declaration, Initialization of Array, Accessing Elements of Array, Multidimensional Arrays, Sparse Matrix, Lower and Upper Triangular Matrices, Vector, Memory Representation of Array- Row Major and Column Major, Address Calculation of Array, Insertion and Deletion on Array Linked List: Introduction, Dynamic Memory Allocation, Singly Linked Lists, Operations on Linked List Such as Traversal, Insertion, Deletion and	Lectures Allotted 8
P:0(In Hours Theory - 1 H Practical- 2 J Unit	Ir. = 1 Credit Hrs.=1Credit(4Hrs./Week=4Credits) Contents Introduction: Basic Terminology, Data Structures, Classification of Data Structures, Data Structure Operations, Complexity. Array: Definition, Declaration, Initialization of Array, Accessing Elements of Array, Multidimensional Arrays, Sparse Matrix, Lower and Upper Triangular Matrices, Vector, Memory Representation of Array- Row Major and Column Major, Address Calculation of Array, Insertion and Deletion on Array Linked List: Introduction, Dynamic Memory Allocation, Singly Linked Lists, Operations on Linked List Such as Traversal, Insertion, Deletion and Searching, Use of Headers, Introduction to Circularly Linked Lists and	Lectures Allotted 8
P:0(In Hours Theory - 1 H Practical- 2 I Unit I	Introduction: Basic Terminology, Data Structures, Classification of Data Structures, Data Structure Operations, Complexity. Array: Definition, Declaration, Initialization of Array, Accessing Elements of Array, Multidimensional Arrays, Sparse Matrix, Lower and Upper Triangular Matrices, Vector, Memory Representation of Array- Row Major and Column Major, Address Calculation of Array, Insertion and Deletion on Array Linked List: Introduction, Dynamic Memory Allocation, Singly Linked Lists, Operations on Linked List Such as Traversal, Insertion, Deletion and Searching, Use of Headers, Introduction to Circularly Linked Lists and Doubly Linked Lists, Two-Way Lists. Stacks and Queues: Introduction and Primitive Operations on Stack, Stack	Lectures Allotted 8
P:0(In Hours Theory - 1 H Practical- 2 I Unit I	Ir. = 1 Credit Hrs.=1Credit(4Hrs./Week=4Credits) Contents Introduction: Basic Terminology, Data Structures, Classification of Data Structures, Data Structure Operations, Complexity. Array: Definition, Declaration, Initialization of Array, Accessing Elements of Array, Multidimensional Arrays, Sparse Matrix, Lower and Upper Triangular Matrices, Vector, Memory Representation of Array- Row Major and Column Major, Address Calculation of Array, Insertion and Deletion on Array Linked List: Introduction, Dynamic Memory Allocation, Singly Linked Lists, Operations on Linked List Such as Traversal, Insertion, Deletion and Searching, Use of Headers, Introduction to Circularly Linked Lists and Doubly Linked Lists, Two-Way Lists. Stacks and Queues: Introduction and Primitive Operations on Stack, Stack Applications; Infix, Postfix, Prefix Expressions; Evaluation of Postfix	Lectures Allotted 8
P:0(In Hours Theory - 1 H Practical- 2 I Unit I	Ir. = 1 Credit Hrs.=1Credit(4Hrs./Week=4Credits) Contents Introduction: Basic Terminology, Data Structures, Classification of Data Structures, Data Structure Operations, Complexity. Array: Definition, Declaration, Initialization of Array, Accessing Elements of Array, Multidimensional Arrays, Sparse Matrix, Lower and Upper Triangular Matrices, Vector, Memory Representation of Array- Row Major and Column Major, Address Calculation of Array, Insertion and Deletion on Array Linked List: Introduction, Dynamic Memory Allocation, Singly Linked Lists, Operations on Linked List Such as Traversal, Insertion, Deletion and Searching, Use of Headers, Introduction to Circularly Linked Lists and Doubly Linked Lists, Two-Way Lists. Stacks and Queues: Introduction and Primitive Operations on Stack, Stack Applications; Infix, Postfix, Prefix Expressions; Evaluation of Postfix Expression; Conversion among Prefix, Infix and Postfix; Recursion;	Lectures Allotted 8
P:0(In Hours Theory - 1 H Practical- 2 I Unit I	Ir. = 1 Credit Hrs.=1Credit(4Hrs./Week=4Credits) Contents Introduction: Basic Terminology, Data Structures, Classification of Data Structures, Data Structure Operations, Complexity. Array: Definition, Declaration, Initialization of Array, Accessing Elements of Array, Multidimensional Arrays, Sparse Matrix, Lower and Upper Triangular Matrices, Vector, Memory Representation of Array- Row Major and Column Major, Address Calculation of Array, Insertion and Deletion on Array Linked List: Introduction, Dynamic Memory Allocation, Singly Linked Lists, Operations on Linked List Such as Traversal, Insertion, Deletion and Searching, Use of Headers, Introduction to Circularly Linked Lists and Doubly Linked Lists, Two-Way Lists. Stacks and Queues: Introduction and Primitive Operations on Stack, Stack Applications; Infix, Postfix, Prefix Expression; Evaluation of Postfix Expression; Conversion among Prefix, Infix and Postfix; Recursion; Introduction and Primitive Operation on Queues, Deques, Priority Queues,	Lectures Allotted 8
P:0(In Hours Theory - 1 H Practical- 2 I Unit I	Ir. = 1 Credit Hrs.=1Credit(4Hrs./Week=4Credits) Contents Introduction: Basic Terminology, Data Structures, Classification of Data Structures, Data Structure Operations, Complexity. Array: Definition, Declaration, Initialization of Array, Accessing Elements of Array, Multidimensional Arrays, Sparse Matrix, Lower and Upper Triangular Matrices, Vector, Memory Representation of Array- Row Major and Column Major, Address Calculation of Array, Insertion and Deletion on Array Linked List: Introduction, Dynamic Memory Allocation, Singly Linked Lists, Operations on Linked List Such as Traversal, Insertion, Deletion and Searching, Use of Headers, Introduction to Circularly Linked Lists and Doubly Linked Lists, Two-Way Lists. Stacks and Queues: Introduction and Primitive Operations on Stack, Stack Applications; Infix, Postfix, Prefix Expressions; Evaluation of Postfix Expression; Conversion among Prefix, Infix and Postfix; Recursion; Introduction and Primitive Operation on Queues, Deques, Priority Queues, Applications of Queue.	Lectures Allotted 8
P:0(In Hours Theory - 1 H Practical- 2 I Unit I I II	Ir. = 1 Credit Hrs.=1Credit(4Hrs./Week=4Credits) Contents Introduction: Basic Terminology, Data Structures, Classification of Data Structures, Data Structure Operations, Complexity. Array: Definition, Declaration, Initialization of Array, Accessing Elements of Array, Multidimensional Arrays, Sparse Matrix, Lower and Upper Triangular Matrices, Vector, Memory Representation of Array- Row Major and Column Major, Address Calculation of Array, Insertion and Deletion on Array Linked List: Introduction, Dynamic Memory Allocation, Singly Linked Lists, Operations on Linked List Such as Traversal, Insertion, Deletion and Searching, Use of Headers, Introduction to Circularly Linked Lists and Doubly Linked Lists, Two-Way Lists. Stacks and Queues: Introduction and Primitive Operations on Stack, Stack Applications; Infix, Postfix, Prefix Expression; Evaluation of Postfix Expression; Conversion among Prefix, Infix and Postfix; Recursion; Introduction and Primitive Operation on Queues, Deques, Priority Queues,	Lectures Allotted 8 8 8



	Famourning Loucasi	on System, Transforming Lives So	ction 2f & 12B
	Binary Search Tree (BST), Insertion and Deletion in BST,		
V	Searching & Sorting Techniques: Bubble Sort, Insertion	sort, Selection	8
	sort, Merge Sort, Heap Sort, Linear Search, Binary Search	and Hashing	
Text l	Books:		
	enenbaum, "Data Structures Using C", Pearson Education.		
2. Sa	mir Kumar Bandyopadhyay, K. N. Dey, "Data Structures Using C	C", Pearson Education	on.
3. Li	pschutz (Schaum's Series), "Data Structure with C", Tata McGrav	w Hill Education	
Refer	ence:		
1. Ro	obert Kruse, C. L.Tondo, "Data Structures and Program Design in	C", Pearson Education	tion.
2. E.	Horowitz, S. Sahni& D. Mehta, "Fundamentals of Data Structure	s", Galgotia Publica	tions.
3. R.	S. Salaria, "Data Structures & Algorithms", Khanna Book Publish	ning Co. (P) Ltd.	
	Evaluation/Assessment Methodology		
		Max. I	Marks 100
1) Cl	ass tasks/ Sessional Examination	15	
2) Pr	esentations /Seminar		
3) As	ssignments		
4) Re	esearch Project Report	10	
Se	eminar On Research Project Report		
5) ES	SE	75	
	Total:	100	
Prerec	uisites for the course: Problem Solving using C		
	se Learning Outcomes:		
CO1:	Demonstrate familiarity with major algorithms and data structure	es.	
CO2:	Analyze performance of algorithms and choose the appropriate	e data structure and	algorithm
	design method for a specified application.		-
CO3:	Determine which algorithm or data structure to use in different	scenarios and be fai	miliar with
	writing recursive methods.		
CO4:	Demonstrate understanding of the abstract properties of various	data structures such	n as stacks,
	queues, lists, trees and graphs and use various data structu	res effectively in a	application
	programs.		
CO5:	Demonstrate understanding of various sorting algorithms, include	ling bubble sort, ins	ertion sort,
	selection sort, heap sort and quick sort.		



IIMTU-NEPIMPLEMENTATION Year-I/ Semester-II

Progra	mme: Certificate		Year: I	
U	B.Sc.(CS)		Semester: II	
Credit		: Digital Elect	tronic	
Theory	•	e		
		igital Electror	nic	
BCS-N	EP-202	C		
Course	Objectives:			
CO1:	To know the conc	epts of combi	national circuits.	
CO2:	To understand Bo	olean algebra	and minimization techniques.	
CO3:	Able to understan	d sequential c	ircuits.	
CO4:	Able to understan	d computer bu	uses and input/output peripherals.	
CO5:	To know the conc	epts of logic g	gates.	
	of Paper: Core C			
	um Passing Mark	s/Credits:40	% Marks (ISE+ESE)	
L:4				
T:0				
	Hours/Week)			
	-1Hr.=1Credit			
Unit			Contents	No. of
				Lectures
-				Allotted
Ι	-		umber System: Binary, Octal, Decimal,	10
		1	entation for Computation; r's and r-1's	
	1	-	ment, Arithmetic Operation on Binary Numbers,	
	1		mputers: BCD, Gray codes and Excess-3 codes;	
	-	<u>.</u>	Error-Detection and Correction Codes	10
II	0		Gates, Boolean Algebra, Laws of Boolean	10
			ns, Minterms, Maxterms, SOP Form and POS	
			Form, Conversion of SOP/POS Expression to	
			Simplifications of Logic Equations Using Laws	
			augh Map, Universal Gates, Implementation of	
TTT			nplementation using NAND and NOR Gates.	10
III			efinition, Design of Combinational Circuits,	10
		-	arator, Decoder, Encoder, Code Convertor,	
	T	T .	Parity Bit Checker and Generators, Parallel ad Only Memory and Programmable Logic	
	•	ubtractor, Re	ad Only Memory and Programmable Logic	
IV	Array.	uite I. Dafinit	tion, Flip-Flops, Latch, Race Around Condition,	10
11	-		R Gates, Clocked RS, JK Flip-flop, D Flip-flop,	10
		-	, Master Slave Flip-Flop, Edge Triggered Flip-	
			s, Sequential Circuit Design.	
		or r np-r tops	, oquentiai encun Design.	



Text Books:

- 1. Morris Mano, "Digital Logic and Computer Design", PHI.
- 2. Morris Mano, "Computer Architecture", PHI.

Reference

- 1. R.P.Jain, "Modern Digital Electronics", Tata McGraw Hill.
- 2. Malvino and Leach, "Digital Principles and Application", Tata Mc. Graw Hill.
- 3. A. Anand Kumar, "Switching Theory and Logic Design", PHI.

Evaluation/Assessment Methodology			
	Max. Marks 100		
1) Class tasks/Sessional Examination	15		
2) Presentations/Seminar			
3) Assignments			
4) Research Project Report	10		
5) Seminar On Research Project Report			
6) ESE	75		
Total	100		
Prerequisites for the course: Core			
Course Learning Outcomes:			
CO1: Able to understand and design small signal amplifier circuit.			
CO2: Able to understand and analyze combinational and sequential circuits.			
CO3: Able to understand logic gates.			
CO4: Able to understand Boolean algebra and to minimize combinational funct	tions.		

CO5: Able to apply techniques for the design of digital circuits.



IIMTU-NEPIMPLEMENTATION Year-I/ Semester-II

Program	me: Certificate	Year:I		
Class:BSC(CS)		Semester: II		
Credits Subject: Environment		t and Ecology		
Theory:3Cr				
Course C		nd Ecology		
NHU-112				
Course O	bjectives:			
CO1: Cre	eating the awareness about en	vironmental problems among people.		
CO2: Imp	parting basic knowledge abou	t the environment and its allied problems.		
	veloping an attitude of concer			
		n environment protection and environment improv		
		s related to ecosystems, biodiversity and natural re-	sources.	
	'Paper: AECC			
	Passing Marks/Credits:40	% Marks (ISE+ESE)		
L:4				
T:0				
	urs/Week)			
	Ir.=1Credit	Constants	N f	
Unit		Contents	No. of Lectures	
			Allotted	
	The Multidisciplinery Net	ure of Environmental Studies:	8	
Ι	1	rtance, Need for Public Awareness.	0	
I		vable And Non-Renewable Resources;	8	
	Natural Resources and As	,	0	
		and Over-Exploitation, Deforestation, Case		
		ion, Mining, Dams and Their Effects on Forests		
	and Tribal People.			
	B. Water Resources: Use	and Over-Utilization of Surface and Ground		
	Water, Floods, Drough	nt, Conflicts Over Water, Dams-Benefits and		
	Problems.			
		e and Exploitation, Environmental Effects of		
		ineral Resources, Case Studies.		
		orld Food Problems, Changes Caused by		
	e	azing, Effects of Modern Agriculture, Fertilizer-		
		ter Logging, Salinity, Case Studies.		
		owing Energy Needs, Renewable and Non-		
	Studies	rces, Use of Alternate Energy Sources, Case		
		as a Resource, Land Degradation, Man Induced		
	Landslides, Soil Erosior	-		
		1 Conservation of Natural Resources; Equitable		
	Use of Resources for Su	-		
III	Ecosystems:	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	8	
	•	; Structure and Function of an Ecosystem;	0	
	concept of an Leosystem	, succure and remember of an Leosystem,		



	Transforming Education System	Transforming Lives	Section 2f & 12B
	Producers, Consumers and Decomposers; Energy Flow in the	Ecosystem;	
	Ecological Succession; Food Chains, Food Webs and Ecological	ll Pyramids;	
	Introduction, Types, Characteristic Features, Structure and Fun	ction of the	
	Following Ecosystem: -		
	A. Forest Ecosystem		
	B. Grassland Ecosystem		
	C. Desert Ecosystem		
	D. Aquatic Ecosystems (Ponds, Streams, Lakes, Rivers, Oceans,	Estuaries)	
IV	Biodiversity and Its Conservation:		8
	Introduction – Definition: Genetic, Species and Ecosystem Di	versity; Bio	
	geographical Classification of India; Value of Biodiversity: C	•	
	Use, Productive Use, Social, Ethical, and Aesthetic and Opt	-	
	Biodiversity at Global, National and Local Levels; India a		
	Diversity Nation; Hot-Sports of Biodiversity; Threats to E	-	
	Habitat Loss, Poaching of Wildlife, Man-Wildlife Conflicts;	•	
	and Endemic Species of India; Conservation of Biodiversity:	U	
	Ex-Situ Conservation of Biodiversity.	in Situ ulu	
V	Environmental Pollution:		8
•	Definition, Causes, Effects and Control Measures of Air Pollution, Water		Ũ
	Pollution, Soil Pollution, Marine Pollution, Noise Pollutio	,	
	Pollution, Nuclear Pollution; Solid Waste Management: Causes,		
	Control Measures of Urban and Industrial Wastes; Role of an I		
	Prevention of Pollution; Pollution Case Studies; Disaster M		
	Floods, Earthquake, Cyclone and Landslides.	lunugement.	
Text Bo			
	asak, "Environmental Studies", Pearson Education.		
	Kumar De, " <i>Environmental Studies</i> ", New Age International		
Referen			
	Sharma, "Environmental Studies", University Science Press.		
1. 5.1.	Evaluation/Assessment Methodology		
	Evaluation/Assessment Methodology	Max M	larks 50
1) $Class$	tasks/Sessional Examination		.5
	ntations /Seminar	1	5
· ·	gnments		
· ·	archProjectReport		
	narOnResearchProjectReport		
5) ESE	naronkesearen rojeetkeport	3	5
J) LOL	Total		5 <u>0</u>
Droroau	Total:	J	U U
-	sites for the course: nil		
	Learning Outcomes:	nonte of cont	'a avetam
	Student will be able to recognize the physical and biological compo	onents of earth	i s system.
CO2:	Student will be able to examine all environmental issues.		
CO3:	Student will be able to do independent research on human interaction	on with the en	vironment.

CO3: Student will be able to do independent research on human interaction with the environment.

CO4: Student will be able to develop and attitude of concern for the environment.

CO5: Student will be able to motivate public to participate in environmental protection.



IIMTU-NEP IMPLEMENTATION Year-I/ Semester-II

Progra	amme: Cei	rtificate	Year: I	
Class:B.Sc. (CS)		linouto	Semester: II	
Credits Subject: Optimization		Subject: Optimization		
	Theory:4Cr			
-	Course Code: Title: Optimization Techniques			
BCS-N	3CS-NEP-204			
Cours	e Objectiv	es:		
CO1:	Enumerat problems.		nowledge of Linear Programming and DynamicPro	ogramming
CO2:	-	Operation research models using optimization techniques based upon the fundamentals of engineering mathematics (minimization and Maximization of objective function).		
CO3:	•	6	ising linear, dynamic programming, game theory an	nd queuing
CO4:		hastic models for d	liscrete and continuous variables to control inve	entory and
			odels for the production decision making.	
CO5:		on of mathematical	models for quantitative analysis of managerial pr	roblems in
	industry.			
	e of Paper			
	num Passir	ng Marks/Credits:40	% Marks (ISE +ESE)	
L:4				
T:0	TT / T	1 \		
	Hours/We			
	y - 1 Hr. =	I Cledit		
			Contonto	No of
Unit			Contents	No. of Lectures Allotted
	LINEA	R PROGRAMMIN		Lectures Allotted
Unit I			Contents G (L.P): Revised Simplex Method, Dual simplex	Lectures
	Method	R PROGRAMMIN , Sensitivity Analysis MIC PROGRAMM	G (L.P): Revised Simplex Method, Dual simplex	Lectures Allotted
	Method DYNA	, Sensitivity Analysis MIC PROGRAMM	G (L.P): Revised Simplex Method, Dual simplex	Lectures Allotted
	Method DYNAI Concep	, Sensitivity Analysis MIC PROGRAMM	G (L.P): Revised Simplex Method, Dual simplex AING (D.P): Multistage decision processes.	Lectures Allotted
	Method DYNAI Concep method CLASS	, Sensitivity Analysis MIC PROGRAMM ts of sub optimizati , LP as a case of D.P. SICAL OPTIMIZAT	G (L.P): Revised Simplex Method, Dual simplex AING (D.P): Multistage decision processes. on, Recursive Relation-calculus method, tabular TION TECHNIQUES:	Lectures Allotted
Ι	Method DYNAI Concep method Single v	, Sensitivity Analysis MIC PROGRAMM ts of sub optimizati , LP as a case of D.P. SICAL OPTIMIZAT variable optimization	G (L.P): Revised Simplex Method, Dual simplex AING (D.P): Multistage decision processes. on, Recursive Relation-calculus method, tabular TON TECHNIQUES: without constraints,	Lectures Allotted 8
Ι	Method DYNAI Concep method Single v Multi v	, Sensitivity Analysis MIC PROGRAMM ts of sub optimizati , LP as a case of D.P. SICAL OPTIMIZAT variable optimization v ariable optimization v	G (L.P): Revised Simplex Method, Dual simplex MING (D.P): Multistage decision processes. on, Recursive Relation-calculus method, tabular TION TECHNIQUES: without constraints, without constraints, multivariable optimization with	Lectures Allotted 8
Ι	Method DYNAI Concep method CLASS Single v Multi v constrai	, Sensitivity Analysis MIC PROGRAMM ts of sub optimizati , LP as a case of D.P. SICAL OPTIMIZAT variable optimization v ariable optimization v nts –method of Lagra	G (L.P): Revised Simplex Method, Dual simplex AING (D.P): Multistage decision processes. on, Recursive Relation-calculus method, tabular TON TECHNIQUES: without constraints, vithout constraints, multivariable optimization with nge multipliers, Kuhn-Tucker conditions.	Lectures Allotted 8
Ι	Method DYNAI Concep method CLASS Single v Multi v constrai NUME	, Sensitivity Analysis MIC PROGRAMM ts of sub optimizati , LP as a case of D.P. SICAL OPTIMIZAT variable optimization v ariable optimization v nts –method of Lagra RICAL METHODS	G (L.P): Revised Simplex Method, Dual simplex AING (D.P): Multistage decision processes. on, Recursive Relation-calculus method, tabular TION TECHNIQUES: without constraints, without constraints, multivariable optimization with nge multipliers, Kuhn-Tucker conditions. FOR OPTIMIZATION:	Lectures Allotted 8
Ι	Method DYNAI Concep method Single v Multi v constrai NUME Nelder	, Sensitivity Analysis MIC PROGRAMM ts of sub optimizati , LP as a case of D.P. TICAL OPTIMIZAT variable optimization v ariable optimization v nts –method of Lagra RICAL METHODS Mead's Simplex search	G (L.P): Revised Simplex Method, Dual simplex AING (D.P): Multistage decision processes. on, Recursive Relation-calculus method, tabular TON TECHNIQUES: without constraints, vithout constraints, multivariable optimization with nge multipliers, Kuhn-Tucker conditions.	Lectures Allotted 8
I	Method DYNAI Concep method CLASS Single v Multi v constrai NUME Nelder method	, Sensitivity Analysis MIC PROGRAMM ts of sub optimizati , LP as a case of D.P. SICAL OPTIMIZAT variable optimization v ariable optimization v nts –method of Lagra RICAL METHODS Mead's Simplex searco , Newton's method.	G (L.P): Revised Simplex Method, Dual simplex AING (D.P): Multistage decision processes. on, Recursive Relation-calculus method, tabular TON TECHNIQUES: without constraints, without constraints, multivariable optimization with nge multipliers, Kuhn-Tucker conditions. FOR OPTIMIZATION: ch method, Gradient of a function, Steepest descent	Lectures Allotted 8
Ι	Method DYNAI Concep method Single v Multi v constrai NUME Nelder method	, Sensitivity Analysis MIC PROGRAMM ts of sub optimizati , LP as a case of D.P. FICAL OPTIMIZAT variable optimization v ariable optimization v nts –method of Lagra RICAL METHODS Mead's Simplex searc , Newton's method. RN METHODS OF	G (L.P): Revised Simplex Method, Dual simplex MING (D.P): Multistage decision processes. on, Recursive Relation-calculus method, tabular TION TECHNIQUES: without constraints, without constraints, multivariable optimization with nge multipliers, Kuhn-Tucker conditions. FOR OPTIMIZATION: ch method, Gradient of a function, Steepest descent OPTIMIZATION:	Lectures Allotted 8
I	Method DYNAI Concep method Single v Multi v constrai NUME Nelder method GENE	, Sensitivity Analysis MIC PROGRAMM ts of sub optimizati , LP as a case of D.P. GICAL OPTIMIZAT variable optimization v ariable optimization v nts –method of Lagra RICAL METHODS Mead's Simplex searce , Newton's method. RN METHODS OF GIC ALGORITHM (G (L.P): Revised Simplex Method, Dual simplex MING (D.P): Multistage decision processes. on, Recursive Relation-calculus method, tabular TON TECHNIQUES: without constraints, without constraints, multivariable optimization with nge multipliers, Kuhn-Tucker conditions. FOR OPTIMIZATION: ch method, Gradient of a function, Steepest descent OPTIMIZATION: (GA):	Lectures Allotted 8
I	Method DYNAI Concep method Single v Multi v constrai NUME Nelder method GENE Differen working	, Sensitivity Analysis MIC PROGRAMM ts of sub optimizati , LP as a case of D.P. FICAL OPTIMIZAT variable optimization variable	G (L.P): Revised Simplex Method, Dual simplex MING (D.P): Multistage decision processes. on, Recursive Relation-calculus method, tabular TION TECHNIQUES: without constraints, multivariable optimization with nge multipliers, Kuhn-Tucker conditions. FOR OPTIMIZATION: ch method, Gradient of a function, Steepest descent OPTIMIZATION: (GA): between conventional and evolutionary algorithms, perators- reproduction, crossover, mutation	Lectures Allotted 8
I	Method DYNAI Concep method Single v Multi v constrai NUME Nelder method GENE Differen working GENE	, Sensitivity Analysis MIC PROGRAMM ts of sub optimizati , LP as a case of D.P. SICAL OPTIMIZAT variable optimization variable	G (L.P): Revised Simplex Method, Dual simplex AING (D.P): Multistage decision processes. on, Recursive Relation-calculus method, tabular TON TECHNIQUES: without constraints, without constraints, multivariable optimization with nge multipliers, Kuhn-Tucker conditions. FOR OPTIMIZATION: ch method, Gradient of a function, Steepest descent OPTIMIZATION: (GA): between conventional and evolutionary algorithms, perators- reproduction, crossover, mutation NG (GP):	Lectures Allotted 8
I	Method DYNAI Concep method CLASS Single v Multi v constrai NUME Nelder MODE GENET Differen working GENET Principl betweer	, Sensitivity Analysis MIC PROGRAMM ts of sub optimizati , LP as a case of D.P. FICAL OPTIMIZAT variable optimization v ariable optimization v ariable optimization v nts –method of Lagra RICAL METHODS Mead's Simplex searce , Newton's method. RN METHODS OF FIC ALGORITHM (nces and similarities b g principle, Genetic O FIC PROGRAMMIN es of genetic program	G (L.P): Revised Simplex Method, Dual simplex AING (D.P): Multistage decision processes. on, Recursive Relation-calculus method, tabular TON TECHNIQUES: without constraints, multivariable optimization with nge multipliers, Kuhn-Tucker conditions. FOR OPTIMIZATION: ch method, Gradient of a function, Steepest descent OPTIMIZATION: (GA): between conventional and evolutionary algorithms, perators- reproduction, crossover, mutation NG (GP): mming, terminal sets, functional sets, differences a population generation. Fuzzy Systems: Fuzzy set	Lectures Allotted 8



IV	Queuing Model, poison and exponential distributions -Queues with combin				
	arrivals and departures-random and series queues.				
V	INTEGER PROGRAMMING:		8		
	Graphical Representation, Gomory's Cutting Plane Method, Balas' Algorithm				
	for Zero–One Programming, Branch-and-Bound Method.				
	APPLICATIONS OF OPTIMIZATION IN DI	ESIGN AND			
	MANUFACTURING SYSTEMS:				
	Formulation of model- optimization of path synthesis of a four-bar mechanism,				
	minimization of weight of a cantilever beam, general optimization	ation model of a			
	machining process, optimization of arc welding paramete	rs, and general			
	procedure in optimizing machining operations sequence.				
	Books:				
1. J. I	K. Sharma, "Operations Research", Macmillan, 5 th Edition, 2012.				
	Pannerselvan, "Operations Research", 2 nd Edition, PHI Publications	s, 2006.			
Refere					
	M. Natarajan, P. Balasubramani, A. Tamilarasi, "Operations Re	esearch", Pearson	Education,		
201					
	urice Saseini, ArhurYaspan, Lawrence Friedman, "Operation	ons Research: M	ethods &		
Pro	blems",1 st Edition, 1959.				
	Evaluation/Assessment Methodology				
1) (1)			Marks 100		
	ss tasks/ Sessional Examination	15			
	sentations /Seminar				
,	signments	10			
· · · ·	search Project Report	10			
	ninar On Research Project Report	75			
6) ES	5E	75			
	Total:	100			
-	uisites for the course: Problem Solving using C				
	e Learning Outcomes:				
CO1:	Identify appropriate optimization method to solve complex prindustries.	oblems involved	in various		
CO2:	Demonstrate the optimized material distribution schedule us minimize total distribution cost.	ing transportation	model to		
CO3:	Find the appropriate algorithm for allocation of resources assignment.	to optimize the j	process of		
CO4:	Apply the knowledge of game theory concepts to articulate real- to identify strategic decisions to counter the consequences.	world competitive	e situations		
CO5:	Develop a suitable queuing system to control important performan	nce measures dyna	micallv.		
	1 1 1 1 1 1 0 J 1 1 1 0 J 1 1 1 1 1 1 1		J.		



IIMTU-NEP IMPLEMENTATION Year-I/ Semester-II

Progran	nme: Certificate	Year: I	
0	SC. (CS)	Semester: II	
Credits		t:Mathematics-II	
Theory:	v		
Course		athematics-II	
BCS-NE			
Course	Objectives:		
CO 1:	Apply mathematical	concepts and principles to perform computations.	
CO 2:	Apply mathematics	to solve problems.	
CO 3:	Create, use and analy	yse graphical representations of mathematical relationships.	
CO 4:	Communicate mathe	ematical knowledge and understanding.	
CO 5:		ols to solve problems.	
Nature of	of Paper: DSE		
Minimu	m Passing Marks/Cr	redits:40% Marks (Internal +ESE)	
L:4			
T:0			
	ours/Week)		
	1 Hr. = 1 Credit		
Unit		Contents	No. of
			Lectures
			Allotted
Ι		ons: Linear differential equations of nth order with constant	8
	coefficients, Complementary function and Particular integral, Simultaneous		
		quations, Solution of second order differential equations by	
		& independent variables, Normal form, Method of variation	
II		cations (without derivation).	8
11		nd Special Functions: Series solution of second order l equations with variable coefficient (Frobenius method),	0
	•	e equations and their series solutions, Properties of Bessel	
	function and Legend		
III		: Laplace transform, Existence theorem, Laplace transforms	8
111		itegrals, Initial and final value theorems, Unit step function,	0
		n, Laplace transform of periodic function, Inverse Laplace	
		ition theorem, Application to solve simple linear and	
	simultaneous differe		
IV		er's Formulae, Functions having arbitrary periods, Periodic	8
± 1		series of period 2π , Change of interval, Even and odd	5
	functions, Fourier series of period 2π , Change of interval, Even and odd functions, Half range sine and cosine series		
V		I Equations: Solution of first order partial differential	8
•		ange's method, Solution of second order linear partial	5
		is with constant coefficients, Classification of second order	
	-	equations, Method of separation of variables for solving	
	-	equations, Solution of one- and two-dimensional wave and	
		uations, Laplace equation in two-dimension, Equation of	
	transmission lines.		
			L



Text Books:

- 1. E. Kreyszig, "Advanced Engineering Mathematics", John Wiley& Sons
- 2. B. V. Ramana, "Higher Engineering Mathematics", Tata McGraw-Hill Publishing Company Ltd
- 3. R.K.Jain&S.R.K.Iyengar, "Advance Engineering Mathematics", Narosa Publishing House.

Reference:

- 1. H. K. Dass, "Introduction to Engineering Mathematics", S. Chand, New Delhi
- 2. R. Wylie, "Advanced Engineering Mathematics", McGraw-Hill.

Evaluation/Assessment Methodology				
	Max. Marks 100			
1) Class tasks/ Sessional Examination	15			
2) Presentations /Seminar				
3) Assignments				
4) Research Project Report	10			
Seminar On Research Project Report				
5) ESE	75			
Total:	100			
Prerequisites for the course: Mathematics-I				
Course Learning Outcomes:				
CO 1: Apply mathematical concepts and principles to perform computations.				
CO 2: Apply mathematics to solve problems.				
CO 3: Create, use and analyse graphical representations of mathematical relatio	nships.			

- CO 4: Communicate mathematical knowledge and understanding.
- CO 5: Apply technology tools to solve problems.



IIMTU-NEP IMPLEMENTATION Year-I/ Semester-II

Program	me:Certif	cate Yea	r: I		
Class:B.			nester: II		
Credits		Subject:Data Structure a	nd algorithm using C Lab		
Practical	: 2Cr	U	0		
Course (Code:	Title:Data Structure and	algorithm using C Lab		
BCS-NE	P-205P		6 6		
Course (Objectives				
CO1: To	Understan	d and Implement basic Da	ta Structure using C		
CO2: To	apply Line	ear and Non-Linear Data S	Structure in Problem Solving.		
CO3: To	Implemen	t Searching and Sorting A	lgorithm.		
Nature o	of Paper: (Core			
Minimu	m Passing	Marks/Credits:40% Ma	rks		
L:0					
T:0					
	ours/Week				
•	1 Hr. = 1				
	-2 Hrs.=10	Credit(4Hrs./Week=4Cred			
Unit		C	Contents		No. of
					Lectures
					Allotted
I			Looping, DataManipulation, array	у.	2
II		using Structures and dyna			2
III		plementation of Stacks an			2
IV		ist Implementation of Stat	cks and Queues		2
V	11	on of Stacks and Queues	-		2
VI	-	ntation of Trees, Tree Trav			2
VII	-	ntation of Binary Search T			2
VIII		ntation of Linear search ar			2
IX	Impleme		BubbleSort, Quick Sort and Merge	e Sort.	2
		Evaluation/A	ssessment Methodology		
		· · - · · ·			lax. Marks:5
/		sional Examination		25	
/	entations /S	eminar			
· ·	gnments	(D)			
	arch Projec	-			
	nar On Re	earch Project Report		25	
5) ESE			T . 4. 1	25	
Course)	Total:	50	
	Learning (will be able	Dutcomes:			
			using Linear and Non Linear De	to Stanot	Iro
		ata Structure using C.	using Linear and Non-Linear Da	ia suucii	uc.
-	L	e	an application and implement it in	a modular	ized wow
			ations such as Stacks, Queues at		
		their Applications such as	-	ing Listoa	



IIMTU-NEP IMPLEMENTATION Year-I/ Semester-II

logic gates,
ultiplexers,
its to solve
f Lectures llotted
2
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2
i



Evaluation/Assessment Methodology			
	Max. Marks:50		
1) Class tasks/ Sessional Examination	25		
2) Presentations /Seminar			
3) Assignments			
4) Research Project Report			
Seminar On Research Project Report			
5) ESE	25		
Total:	50		
Course Learning Outcomes:			
Student will be able to:			
CO1: Understand the basic principles and concepts of digital electronics	s, including logic gates,		
Boolean algebra, and binary number systems.			
CO2: Demonstrate proficiency in designing, building, and testing digital circ	uits using various digital		
components.			
CO3: Analyze and troubleshoot digital circuits using appropriate testing and	measurement tools, such		
as oscilloscopes and logic analyzers.			
CO4: Design and implement combinational circuits, such as adders, multiplement	plexers, and encoders, to		
solve specific problems.			
CO5: Design and implement sequential circuits, such as flip-flops, counter	s, and shift registers, for		
various applications.			



IIMTU-NEP IMPLEMENTATION Year-II/ Semester-III

Programme:Diploma		ur: II	
Class:BSC(CS)		nester:III	
Credits Subject:Object Oriented Programming Using Java			
Theory:4Cr	T:4 - Olis - Olis - A Dus	and the trained the	
	Course Code: Title:Object Oriented Programming Using Java		
BCS-NEP-3			
Course Obj			
	to understand the use of OOPs co	1	
	to solve real world problems usin to understand the use of abstracti	0 1	
	to understand the use of Package		tions with
	-	exception handling, multithreaded applica	uons with
	nronization.		
Nature of P			
	assing Marks/Credits:40% Ma	rks (ISE +ESE)	
L:4			
T:0 D:0/La Llaura	(Wester)		
P:0(In Hours			
Theory - 1 H			
	Hrs.=1Credit(4Hrs./Week=4Credit	lts)	
Unit	Contents		No. of
			Lectures
т	Letre heating to OODs and Lese	OOD Constants Ton Doors Annual and	Allotted
Ι		: OOPs Concepts, Top-Down Approach and	12
	1 11	ction to Java, History of Java, Features of	
		DK, JIT, Java Applications, Character Set,	
		ents, Keyword, Data Type, Operators,	
	-	ng Statements, Array Declaration, Creation, g- Predefined Functions in String, String	
	Methods, Vectors, Command-L		
II		0	12
11		ls: Object Class, Defining Class, Adding Creating Objects, Constructors, Types of	12
		vord, Garbage Collection, Inheritance, Types	
		level Hierarchy, Method Over Loading &	
	-	Dispatching, final keyword, Abstract Class.	
	Overhanig, Dynamic Wethou I	Sispatening, markeyword, Abstract Class.	
III	Interfaces and Packages, Defin	ing Interfaces, Extending and Implementing	12
111	e	, Access Protection, Importing Packages,	14
		Types, Multiple Catch Clauses, Nested Try	
	1 0 1		
Statements, Throw, Throws, Finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses. Multithreaded Programming: Thread Life			
	Cycle, Creating Threads, Threa	e e	
IV	· · · · · · · · · · · · · · · · · · ·	tion, Streams, Stream Classes, File Class,	12
1 V			12
Creation of Files, Reading and Writing to File, Buffering Files, Random Access Files, Interactive I/O. GUI Programming: GUI Components, AWT,			
	Swings, Event Handling.	tor riogramming. Gor Components, AW I,	
	Swings, Event Handling.		



		2013-318 TO 5700-43
V	Introduction to Applet Programming: Introduction to Applet, Applet	12
	Architecture, Applet Life Cycle, Applet Class, Applet Tag, Applet	
	Methods, Running the Applet. JDBC: Accessing Databases with Java	
	Database Connectivity	

Text Books:

- 1. Patrick Naughton and Herbertz Schildt, "Java-2 The Complete Reference", McGraw Hill.
- 2. Ivor Horton, "Beginning Java-2", Wiley Publishing.
- 3. Balaguruswamy, "Programming with Java: A Primer", Tata McGraw Hill Education.

Reference:

- 1. Horetmann Cay and Cornell Gary, "Core Java Volume I", Pearson Education.
- 2. Horetmann Cay and Cornell Gary, "Core JavaTM 2, Volume II Advanced Features", Pearson Education.

Evaluation/Assessment Methodology			
	Max. Marks 100		
1) Class tasks/ Sessional Examination	15		
2) Presentations /Seminar			
3) Assignments			
4) Research Project Report	10		
Seminar On Research Project Report			
5) ESE	75		
Total:	100		
Prerequisites for the course: NIL			
Course Learning Outcomes:			
CO 1: Able to understand the use of OOPs concepts.			
CO 2: Able to solve real world problems using OOP techniques.			

CO 3: Able to understand the use of abstraction.

CO 4: Able to understand the use of Packages and Interface in java.

CO 5: Able to develop and understand exception handling, multithreaded applications with synchronization.



IIMTU-NEP IMPLEMENTATION Year-II/ Semester-III

Program	ne: Diploma Year:II		
Class:B.S	1		
Credits	Subject:Communication Skill & Personality Development		
	Theory:4Cr		
	Course Code:Title:Communication Skill & Personality DevelopmentBCS-NEP-303		
Course O			
	inderstand the concept, process and importance of communication.		
	levelop skills of effective communication both written and oral.		
	help acquaint with application of communication skills in the world of business.		
	inderstand the concept of personality and personality development and its signific	anco	
		ance.	
	nderstand and develop various traits required for personality development.		
	Paper: AECC		
	Passing Marks/Credits:40% Marks (ISE +ESE)		
L:4			
T:0	and (Weals)		
P:0(In Hou			
2	Hr. = 1 Credit		
	2 Hrs.=1Credit(4Hrs./Week=4Credits)		
Unit	Contents	No. of	
		Lectures	
т		Allotted	
Ι	Introduction to Communication	8	
	Meaning and Definition, Process, Functions, Objectives, Importance,		
	Essentials of Good Communication, Communication Barriers, Overcoming		
	Communication Barriers.	0	
II	Written Communication: Need and functions of business letters, Planning	8	
	and layout of business letters, Advantages and limitations of written		
	communication.		
	Oral Communication: Meaning, nature and scope, Principles of Effective		
	Oral Communication, Techniques of Effective Speech, The Art of Listening,		
	Principles of Good Listening, Advantages and Limitations of Oral		
TTT	Communication.	0	
III	Personality Development: The concept of personality, Dimensions of	8	
	personality, Term personality development, Significance.		
	Attitude and Motivation: Attitude, Concept, Significance, Factors affecting		
	attitudes, Positive attitude, Advantages, Negative attitude, Disadvantages,		
	Ways to develop positive attitude, Difference between Personalities having		
	Positive and Negative Attitude, Concept of motivation, Significance, Internal		
	and external motives, Importance of self-motivation, Factors leading to		
	demotivation.		
	Self-Esteem: Term self-esteem, Symptoms, Advantages, Do's and Don'ts to	8	
IV		0	
IV	develop positive self esteem, Low self-esteem, Symptoms, Personality having	0	
IV	develop positive self esteem, Low self-esteem, Symptoms, Personality having low self-esteem, Positive and negative self-esteem.	0	
IV	develop positive self esteem, Low self-esteem, Symptoms, Personality having low self-esteem, Positive and negative self-esteem. Interpersonal Relationships :	0	
IV	develop positive self esteem, Low self-esteem, Symptoms, Personality having low self-esteem, Positive and negative self-esteem.	0	



	Analysis of strengths and weaknesses.				
V	V Goal-Setting: Concept of goal-setting, Importance of goals, Dream Vs goal,				
	why goal-setting fails- SMART (Specific, Measurable, Achiev				
	Time-bound) goals, Art prioritization, Do's and Don'ts about goals.				
	Essential soft skills Assertiveness - Lateral thinking - Work ethics, good				
	manners and etiquettes Concept, significance.				
-	t Books:				
	Cloninger, S.C., "Theories of Personality: Understanding Person", Pearsedition.	son, New York,	2008, 5th		
2. I	Luthans F, "Organizational Behaviour", McGraw Hill, New York, 2005	, 12th edition.			
3. I	Barron, R.A. & Brian D, "Social Psychology", Prentice Hall of India, 19	998, 8th edition			
Refe	erence				
	Adler R.B., Rodman G. & Hutchinson C.C., "Understanding Human	Communicatio	n", Oxford		
J	University Press: New York, 2011.				
	Evaluation/Assessment Methodology				
Max. Ma					
	Class tasks/ Sessional Examination	15			
	Presentations /Seminar				
	Assignments				
	Research Project Report				
	Seminar On Research Project Report				
5) H	ESE	35			
	Total: 100				
Prer	equisites for the course: Problem Solving using C				
Cou	rse Learning Outcomes:				
CO1	: Identify different concept of Personality.				
CO2	: Able to Compare and contrast different personal grooming pertains	5.			
CO3					
CO4	CO4: Able to manage oneself while communicating.				
CO5	: Able to acquire good communication skills and develop confidence	e			



IIMTU-NEP IMPLEMENTATION Year-II/ Semester-III

0	e: DIPLOMA	Year: II	
Class: B.S.		Semester:III	
Credits	Subject:Computer System	n Architecture	
Theory:4Cr			
Course Co	1 5	rchitecture	
BCS-NEP-			
Course Ob	,		
	1 0 0 1	processor with 8 bits. To learn the concepts rega	arding
Microproce	ssor with 16 bits.		
CO2: To	understand the programming	techniques of with the help of Assembly	Language
Programmi	ng.		
CO3: To ur	derstand the basic concept of par	rallel computing.	
CO4: To ur	derstand significance of pipelinin	ng and parallelism, so that the devices used to p	erform
According	o the need of the designer so as t	to have appropriate results.	
CO5: To ur	derstand the concepts of Pipeline	e scheduling theory	
Nature of I	Paper: DSE		
	Passing Marks/Credits:40% M	arks (Internal +ESE)	
L:4			
T:0			
P:0(In Hou	s/Week)		
•	Hr. = 1 Credit		
Unit		Contents	No. of
		Contents	INO. OI
		Contents	
		Contents	Lectures
	Basic Computer Organization		Lectures Allotted
Ι		n and Design: Instructions and Instruction	Lectures
	Codes, Computer Registers, Ti	n and Design: Instructions and Instruction iming and Control, Instruction Cycle, Register	Lectures Allotted
	Codes, Computer Registers, Ti Transfer and Micro Operation	n and Design: Instructions and Instruction iming and Control, Instruction Cycle, Register ns-Registration Transfer Language, Register	Lectures Allotted
	Codes, Computer Registers, Ti Transfer and Micro Operation Transfer Instructions, Bus and	n and Design: Instructions and Instruction iming and Control, Instruction Cycle, Register ns-Registration Transfer Language, Register d Memory Transfer Instructions, Arithmetic	Lectures Allotted
	Codes, Computer Registers, Ti Transfer and Micro Operation Transfer Instructions, Bus and and Logic Micro-Operations,	n and Design: Instructions and Instruction iming and Control, Instruction Cycle, Register ns-Registration Transfer Language, Register d Memory Transfer Instructions, Arithmetic , Shift Micro-Operations, Arithmetic Logic	Lectures Allotted
	Codes, Computer Registers, Ti Transfer and Micro Operation Transfer Instructions, Bus and and Logic Micro-Operations, Shift Unit; Memory-Reference	n and Design: Instructions and Instruction iming and Control, Instruction Cycle, Register ns-Registration Transfer Language, Register d Memory Transfer Instructions, Arithmetic , Shift Micro-Operations, Arithmetic Logic ce Instructions, Input-Output and Interrupts,	Lectures Allotted
	Codes, Computer Registers, Ti Transfer and Micro Operation Transfer Instructions, Bus and and Logic Micro-Operations, Shift Unit; Memory-Reference Complete Computer Descript	n and Design: Instructions and Instruction iming and Control, Instruction Cycle, Register ns-Registration Transfer Language, Register d Memory Transfer Instructions, Arithmetic , Shift Micro-Operations, Arithmetic Logic	Lectures Allotted
I	Codes, Computer Registers, Ti Transfer and Micro Operation Transfer Instructions, Bus and and Logic Micro-Operations, Shift Unit; Memory-Reference Complete Computer Descript Accumulator Logic.	n and Design: Instructions and Instruction iming and Control, Instruction Cycle, Register ns-Registration Transfer Language, Register d Memory Transfer Instructions, Arithmetic , Shift Micro-Operations, Arithmetic Logic ce Instructions, Input-Output and Interrupts, tion, Design of Basic Computer, Design of	Lectures Allotted 8
	Codes, Computer Registers, Ti Transfer and Micro Operation Transfer Instructions, Bus and and Logic Micro-Operations, Shift Unit; Memory-Reference Complete Computer Descript Accumulator Logic. Central Processing Unit:	n and Design: Instructions and Instruction iming and Control, Instruction Cycle, Register ns-Registration Transfer Language, Register d Memory Transfer Instructions, Arithmetic , Shift Micro-Operations, Arithmetic Logic ce Instructions, Input-Output and Interrupts, tion, Design of Basic Computer, Design of General Register Organization, Stacks	Lectures Allotted
I	Codes, Computer Registers, Ti Transfer and Micro Operation Transfer Instructions, Bus and and Logic Micro-Operations, Shift Unit; Memory-Reference Complete Computer Descript Accumulator Logic. Central Processing Unit: Organization, Instruction Form	n and Design: Instructions and Instruction iming and Control, Instruction Cycle, Register ns-Registration Transfer Language, Register d Memory Transfer Instructions, Arithmetic , Shift Micro-Operations, Arithmetic Logic ce Instructions, Input-Output and Interrupts, tion, Design of Basic Computer, Design of General Register Organization, Stacks nats, Addressing Modes, RISC, CISC, Parallel	Lectures Allotted 8
I	 Codes, Computer Registers, Ti Transfer and Micro Operation Transfer Instructions, Bus and and Logic Micro-Operations, Shift Unit; Memory-Reference Complete Computer Descript Accumulator Logic. Central Processing Unit: Organization, Instruction Form Processing, Pipelining, Inst. 	n and Design: Instructions and Instruction iming and Control, Instruction Cycle, Register ns-Registration Transfer Language, Register d Memory Transfer Instructions, Arithmetic , Shift Micro-Operations, Arithmetic Logic ce Instructions, Input-Output and Interrupts, tion, Design of Basic Computer, Design of General Register Organization, Stacks nats, Addressing Modes, RISC, CISC, Parallel ruction and Arithmetic Pipeline, Vector	Lectures Allotted 8
I	Codes, Computer Registers, Ti Transfer and Micro Operation Transfer Instructions, Bus and and Logic Micro-Operations, Shift Unit; Memory-Reference Complete Computer Descript Accumulator Logic. Central Processing Unit: Organization, Instruction Form Processing, Pipelining, Inst Processing, Matrix Multiplicat	n and Design: Instructions and Instruction iming and Control, Instruction Cycle, Register ns-Registration Transfer Language, Register d Memory Transfer Instructions, Arithmetic , Shift Micro-Operations, Arithmetic Logic ce Instructions, Input-Output and Interrupts, tion, Design of Basic Computer, Design of General Register Organization, Stacks nats, Addressing Modes, RISC, CISC, Parallel ruction and Arithmetic Pipeline, Vector ion, Array Processors.	Lectures Allotted 8
I	 Codes, Computer Registers, Ti Transfer and Micro Operation Transfer Instructions, Bus and and Logic Micro-Operations, Shift Unit; Memory-Reference Complete Computer Descript Accumulator Logic. Central Processing Unit: Organization, Instruction Form Processing, Pipelining, Inst Processing, Matrix Multiplicat Computer Arithmetic: Addi 	n and Design: Instructions and Instruction iming and Control, Instruction Cycle, Register ns-Registration Transfer Language, Register d Memory Transfer Instructions, Arithmetic , Shift Micro-Operations, Arithmetic Logic ce Instructions, Input-Output and Interrupts, tion, Design of Basic Computer, Design of General Register Organization, Stacks nats, Addressing Modes, RISC, CISC, Parallel ruction and Arithmetic Pipeline, Vector ion, Array Processors.	Lectures Allotted 8
I	Codes, Computer Registers, Ti Transfer and Micro Operation Transfer Instructions, Bus and and Logic Micro-Operations, Shift Unit; Memory-Reference Complete Computer Descript Accumulator Logic. Central Processing Unit: Organization, Instruction Form Processing, Pipelining, Inst Processing, Matrix Multiplicat Computer Arithmetic: Addi Algorithms: Shift and Add	n and Design: Instructions and Instruction iming and Control, Instruction Cycle, Register ns-Registration Transfer Language, Register d Memory Transfer Instructions, Arithmetic , Shift Micro-Operations, Arithmetic Logic ce Instructions, Input-Output and Interrupts, tion, Design of Basic Computer, Design of General Register Organization, Stacks nats, Addressing Modes, RISC, CISC, Parallel ruction and Arithmetic Pipeline, Vector ion, Array Processors.	Lectures Allotted 8
I	Codes, Computer Registers, Ti Transfer and Micro Operation Transfer Instructions, Bus and and Logic Micro-Operations, Shift Unit; Memory-Reference Complete Computer Descript Accumulator Logic. Central Processing Unit: Organization, Instruction Form Processing, Pipelining, Inst Processing, Matrix Multiplicat Computer Arithmetic: Addi Algorithms: Shift and Add Algorithms, Floating Point	n and Design: Instructions and Instruction iming and Control, Instruction Cycle, Register ns-Registration Transfer Language, Register d Memory Transfer Instructions, Arithmetic , Shift Micro-Operations, Arithmetic Logic ce Instructions, Input-Output and Interrupts, tion, Design of Basic Computer, Design of General Register Organization, Stacks nats, Addressing Modes, RISC, CISC, Parallel ruction and Arithmetic Pipeline, Vector tion, Array Processors. ition, Subtraction Algorithms; Multiplication Algorithms, Booth's Algorithm; Divisor Representations, Arithmetic Operations on	Lectures Allotted 8
I	 Codes, Computer Registers, Ti Transfer and Micro Operation Transfer Instructions, Bus and and Logic Micro-Operations, Shift Unit; Memory-Reference Complete Computer Descript Accumulator Logic. Central Processing Unit: Organization, Instruction Form Processing, Pipelining, Inst Processing, Matrix Multiplicat Computer Arithmetic: Addi Algorithms: Shift and Add Algorithms, Floating Point Floating-Point Numbers, Decin 	n and Design: Instructions and Instruction iming and Control, Instruction Cycle, Register ns-Registration Transfer Language, Register d Memory Transfer Instructions, Arithmetic , Shift Micro-Operations, Arithmetic Logic ce Instructions, Input-Output and Interrupts, tion, Design of Basic Computer, Design of General Register Organization, Stacks nats, Addressing Modes, RISC, CISC, Parallel ruction and Arithmetic Pipeline, Vector ion, Array Processors. ition, Subtraction Algorithms; Multiplication Algorithms, Booth's Algorithm; Divisor Representations, Arithmetic Operations on mal Arithmetic Operations.	Lectures Allotted 8 8 8
I	 Codes, Computer Registers, Ti Transfer and Micro Operation Transfer Instructions, Bus and and Logic Micro-Operations, Shift Unit; Memory-Reference Complete Computer Descript Accumulator Logic. Central Processing Unit: Organization, Instruction Form Processing, Pipelining, Inst Processing, Matrix Multiplicat Computer Arithmetic: Addi Algorithms: Shift and Add Algorithms, Floating Point Floating-Point Numbers, Decin 	n and Design: Instructions and Instruction iming and Control, Instruction Cycle, Register ns-Registration Transfer Language, Register d Memory Transfer Instructions, Arithmetic , Shift Micro-Operations, Arithmetic Logic ce Instructions, Input-Output and Interrupts, tion, Design of Basic Computer, Design of General Register Organization, Stacks hats, Addressing Modes, RISC, CISC, Parallel ruction and Arithmetic Pipeline, Vector ion, Array Processors. ition, Subtraction Algorithms; Multiplication Algorithms, Booth's Algorithm; Divisor Representations, Arithmetic Operations on mal Arithmetic Operations.	Lectures Allotted 8
I	 Codes, Computer Registers, Ti Transfer and Micro Operation Transfer Instructions, Bus and and Logic Micro-Operations, Shift Unit; Memory-Reference Complete Computer Descript Accumulator Logic. Central Processing Unit: Organization, Instruction Form Processing, Pipelining, Inst Processing, Matrix Multiplicat Computer Arithmetic: Addi Algorithms: Shift and Add Algorithms, Floating Point Floating-Point Numbers, Decin Input-Output Organization: Asynchronous Data Transfer, 	n and Design: Instructions and Instruction iming and Control, Instruction Cycle, Register ns-Registration Transfer Language, Register d Memory Transfer Instructions, Arithmetic , Shift Micro-Operations, Arithmetic Logic ce Instructions, Input-Output and Interrupts, tion, Design of Basic Computer, Design of General Register Organization, Stacks nats, Addressing Modes, RISC, CISC, Parallel ruction and Arithmetic Pipeline, Vector tion, Array Processors. ition, Subtraction Algorithms; Multiplication Algorithms, Booth's Algorithm; Divisor Representations, Arithmetic Operations on mal Arithmetic Operations. Peripheral Devices, Input-Output Interface, Mode of Transfer, Priority Interrupts, Direct	Lectures Allotted 8 8 8
I	 Codes, Computer Registers, Ti Transfer and Micro Operation Transfer Instructions, Bus and and Logic Micro-Operations, Shift Unit; Memory-Reference Complete Computer Descript Accumulator Logic. Central Processing Unit: Organization, Instruction Form Processing, Pipelining, Inst Processing, Matrix Multiplicat Computer Arithmetic: Addi Algorithms: Shift and Add Algorithms, Floating Point Floating-Point Numbers, Decin Input-Output Organization: Asynchronous Data Transfer, Memory Address (DMA), 	n and Design: Instructions and Instruction iming and Control, Instruction Cycle, Register ns-Registration Transfer Language, Register d Memory Transfer Instructions, Arithmetic , Shift Micro-Operations, Arithmetic Logic ce Instructions, Input-Output and Interrupts, tion, Design of Basic Computer, Design of General Register Organization, Stacks hats, Addressing Modes, RISC, CISC, Parallel ruction and Arithmetic Pipeline, Vector ion, Array Processors. ition, Subtraction Algorithms; Multiplication Algorithms, Booth's Algorithm; Divisor Representations, Arithmetic Operations on mal Arithmetic Operations.	Lectures Allotted 8 8 8
I II III IV	 Codes, Computer Registers, Ti Transfer and Micro Operation Transfer Instructions, Bus and and Logic Micro-Operations, Shift Unit; Memory-Reference Complete Computer Descript Accumulator Logic. Central Processing Unit: Organization, Instruction Form Processing, Pipelining, Inst Processing, Matrix Multiplicat Computer Arithmetic: Addi Algorithms: Shift and Add Algorithms, Floating Point Floating-Point Numbers, Decin Input-Output Organization: Asynchronous Data Transfer, Memory Address (DMA), Communication. 	n and Design: Instructions and Instruction iming and Control, Instruction Cycle, Register ns-Registration Transfer Language, Register d Memory Transfer Instructions, Arithmetic , Shift Micro-Operations, Arithmetic Logic ce Instructions, Input-Output and Interrupts, tion, Design of Basic Computer, Design of General Register Organization, Stacks hats, Addressing Modes, RISC, CISC, Parallel ruction and Arithmetic Pipeline, Vector tion, Array Processors. ition, Subtraction Algorithms; Multiplication Algorithms, Booth's Algorithm; Divisor Representations, Arithmetic Operations on mal Arithmetic Operations. Peripheral Devices, Input-Output Interface, Mode of Transfer, Priority Interrupts, Direct Input/ Output Processor (IOP), Serial	Lectures Allotted 8 8 8 8 8 8 8
I	 Codes, Computer Registers, Ti Transfer and Micro Operation Transfer Instructions, Bus and and Logic Micro-Operations, Shift Unit; Memory-Reference Complete Computer Descript Accumulator Logic. Central Processing Unit: Organization, Instruction Form Processing, Pipelining, Inst Processing, Matrix Multiplicat Computer Arithmetic: Addi Algorithms: Shift and Add Algorithms, Floating Point Floating-Point Numbers, Decin Input-Output Organization: Asynchronous Data Transfer, Memory Address (DMA), Communication. Memory Organization: Metal 	n and Design: Instructions and Instruction iming and Control, Instruction Cycle, Register ns-Registration Transfer Language, Register d Memory Transfer Instructions, Arithmetic , Shift Micro-Operations, Arithmetic Logic ce Instructions, Input-Output and Interrupts, tion, Design of Basic Computer, Design of General Register Organization, Stacks nats, Addressing Modes, RISC, CISC, Parallel ruction and Arithmetic Pipeline, Vector tion, Array Processors. ition, Subtraction Algorithms; Multiplication Algorithms, Booth's Algorithm; Divisor Representations, Arithmetic Operations on mal Arithmetic Operations. Peripheral Devices, Input-Output Interface, Mode of Transfer, Priority Interrupts, Direct	Lectures Allotted 8 8 8



Management Hardware.	
Text Books:	
1. Morris Manno, "Computer System Architecture", Pearson Education.	
2. W. Stallings, "Computer Organisation and Architecture", Pearson Edu	ucation.
Reference	
1. Rao, "Prospective in Computer Architecture", Prentice Hall of India	
2. John P. Hayes, "Computer Architecture and Organization", McGraw-	Hill
Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO1: For a microprocessor system, student should be able to deal wit	
bits and 16-bit microprocessor to analyze the working ope	-
configuration for the respective microprocessor. A student shoul	d be good enough to deal with
interrupts internally or externally.	
CO2: He/she should be able to understand the basic concepts of Asse	
For a particular data instruction set, student should be having a	-
language programs using kit. He/she shall be having an idea to	tackle with counter delays and
subroutines.	
CO3: He/she should be able to know the concept of pipelining an	
system for hazard detection. Understand the basic concept of Par	allel computing.

- A student should have a basic idea of job levels that are governed by an organization on CO4: priority basis. He/she should know the Pipeline scheduling theory.
- For good networking, a student should be able to draw SIMD interconnections and FFT
- CO5: or a butterfly method system for collision prevention and vector dispatching. He/she should be able to make Cube Interconnection Network, Shuffle-Exchange and Omega Network.



IIMTU-NEP IMPLEMENTATION Year-II/ Semester-III

Program	me:Certific	ate V	ear: II	
Class:B.SC. (CS)			emester: III	
Credits	0.(05)		MANAGEMENT SYSTEM	
Theory:40	<u>Cr</u>	Susjeen Dinise		
Course C		Title:DATA BASE M	ANAGEMENT SYSTEM	
BCS-NEP				
	bjectives:			
	U	concept of features of a	database system and its application and compa	re various
	types of data	-		
CO 2:	Describe the	E-R Models and Relati	ional Database.	
CO 3:	Explain the	concept of SQL Comma	ands, relational algebra, tuple calculus and dom	ain
	calculus.			
	-		nd normalize a given relation to the desired nor	
			transaction processing and concurrency contro	1.
	<u> </u>	RE COURSE		
	n Passing M	arks/Credits:40% Ma	rks (ISE +ESE)	
L:4				
T:0				
	urs/Week)	1.		
	Hr. = 1 Cro		:>	
	$\frac{2 \text{ Hrs.}=1 \text{ Cr}}{1}$	edit(4Hrs./Week=4Cred		N C
Unit			Contents	No. of
				Lectures Allotted
Ι	Introduct	on Overview Databa	se System vs File System, Database System	Anotteu 8
1			ata Model Schema and Instances, Data	0
			anguage and Interfaces, Data Definitions	
			se Structure. Data Modelling Using the Entity	
	0 0		Concepts, Notation for ER Diagram, Mapping	
		1	Super Key, Candidate Key, Primary Key,	
			eduction of an ER Diagrams to Tables,	
		ER Model, Relationship		
II			anguage: Relational Data Model Concepts,	8
			grity, Referential Integrity, Keys Constraints,	
			Algebra, Relational Calculus, Tuple and	
			SQL: Characteristics of SQL, Advantage of	
		• 1	s. Types of SQL Commands. SQL Operators	
			ews and Indexes. Queries and Sub Queries.	
		-	date and Delete Operations, Joins, Unions,	
			gers, Procedures in SQL/PL SQL.	C C
III		8	tion: Functional dependencies, normal forms,	8
			BCNF, inclusion dependence, loss less join	
	-		using FD, MVD, and JDs, alternative	
TX 7		s to database design.		0
IV		on Processing Con		8
	I Nerializah	IIIV Serializability of	Schedules, Conflict & View Serializable	



Transforming Educat	on System, Transforming Lives Section 2f & 12B
Schedule, Recoverability, Recovery from Transaction Fa	uilures, Log Based
Recovery, Checkpoints, Deadlock Handling. Distributed Da	atabase: Distributed
Data Storage, Concurrency Control, Directory System	
	Control, Locking 8
Techniques for Concurrency Control, Time Stampi	ng Protocols for
Concurrency Control, Validation Based Protocol, Multiple	6
Version Schemes, Recovery with Concurrent Transaction	•
Oracle.	•
Text Books:	
1. Korth, Silbertz, Sudarshan," Database Concepts", Mc. Graw Hill.	
2. Date C J, "An Introduction to Database Systems", Addision Wesley	
3. Elmasri, Navathe, "Fundamentals of Database Systems", Addision	
4. O'Neil, "Databases", Elsevier Pub.	
Reference	
1. Ramakrishnan, "Database Management Systems", McGraw Hill.	
2. Leon & Leon, "Database Management Systems", Vikas Publishing	House.
3. Bipin C. Desai, "An Introduction to Database Systems", Gagotia Pu	blications.
4. Majumdar& Bhattacharya, "Database Management System", Mc. G	raw Hill.
Evaluation/Assessment Methodology	
	Max. Marks100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
5) Seminar On Research Project Report	
6) ESE	75
Total:	100
Prerequisites for the course: SQL	
Course Learning Outcomes:	
CO1: Describe the features of a database system and its application	and compare various types o
data models.	
CO2: Construct an ER Model for a given problem and transform it int	o a relation database schema.
Formulate solution to a query problem using SQL Comma	unds, relational algebra, tuple
CO3: calculus and domain calculus.	
CO4: Explain the need of normalization and normalize a given relation	n to the desired normal form.

CO4: Explain the need of normalization and normalize a given relation to the desired normal form.

CO5: Explain different approaches of transaction processing and concurrency control.



IIMTU-NEP IMPLEMENTATION Year-II/ Semester-III

Programn	ne:UG	Year:II		
Class:BSC		Semester: III		
Credits		Subject:OOPS USING JAVA LAB		
Practical: 2	2Cr			
Course Co		Title:OOPS USING JAVA LAB		
BCS-NEP				
Course Ol		:		
	0	programs using swing in java.		
		grams implementing OOPS concepts.		
		rams based on real world problems using java collection	frame work.	
Nature of				
		Marks/Credits:40% Marks		
L:0				
T:0				
P:4(In Hou	ırs/Week)		
Theory - 1				
Practical-2				
(4Hrs./We	ek=2Crea	dits)		
Unit	Conten	ts		No. of
				Lectures
				Allotted
Ι	Write a	program to enter a number from user and print the oc	d numbers	2
	between	n 1 to that number.		
II	Write a	Program to find perimeter of square if area is entered by	user.	2
III	Write a	program to handle ArrayindexOutofBounds exception.		2
IV	Write a	Java program to copy an array by iterating the array.		2
V	Write a	program to demonstrate a divide by zero program except	on.	2
VI	Write a	Java program to get the character at the given index	within the	2
	String.			
VII	Write a	program to find the sum of each row of a matrix.		2
VIII	Write a	program to find area of rectangle using parameterized con	nstructor.	2
Reference	/ Text B	ooks:		
1. Patrick	Naughto	on and HerbertzSchildt, "Java-2 The Complete Reference"	', McGraw H	Hill.
2. Balagu	ruswamy	, "Programming with Java: A Primer", Tata Mc. Graw H	Il Education	•
		Evaluation/Assessment Methodology		
			Ma	ax. Marks:50
1) Class t	asks/ Ses	sional Examination	25	
2) Present	tations /S	leminar		
3) Assign	ments			
	ch Projec	-		
	ar On Res	search Project Report		
5) ESE			25	
		Total:	50	
			1	



Course Learning Outcomes: Student will be able to:

CO1: Write programs based on real world problems using java collection frame work...

CO2: Write GUI programs using swing in java.

CO3: Implement OOPS concepts.



IIMTU-NEP IMPLEMENTATION Year- II / Semester –III

Programme:UG	Year:II		
Class: BSC(CS)	Semester:III		
Credits	Subject: Operating System Lab		
Practical: 2Cr			
Course Code:	Title: Operating System Lab		
BCS-NEP-406P			
Course Objectives			
CO1: To Implement	t the paging Technique using C program		
CO2: To implement	t various Page Replacement Algorithms.		
CO3: To implement	t CPU Scheduling Algorithms and memory management a	lgorithms.	
Nature of Paper:	Core	-	
Minimum Passing	Marks/Credits:40% Marks		
L:0			
T:0			
P:4(In Hours/Week			
Theory - 1 Hr. = 1	Credit		
Practical- 2 Hrs.=1			
(4Hrs./Week=2 Cr	edits)		
Unit Contents			No. of
			Lectures
			Allotted
	orograms to implement the various Page Replacement Algo	orithms	2
	rograms to demonstrate various process related concepts.		2
	rograms to implement the various CPU Scheduling Algorithm		2
IV Write C Round R	programs to simulate CPU scheduling algorithms: FCFS bbin.	S, SJF, and	2
V Implement	nt the following File Allocation Strategies using C program	ıs	2
VI Write C	programs to simulate solutions to Classical Process Sync	hronization	2
Problems			
VII Write C	programs for the implementation of various disk	scheduling	2
algorithm	S		
VIII Write a C	program to simulate Bankers Algorithm for Deadlock Av	oidance.	2
Reference / Text I			.*
	rschatz, Peter Baer Galvin, Greg Gagne (2006), Operatin	ng System P	rinciples, 7 th
edition, Wiley	ndia Private Limited, New Delhi.		
	Evaluation/Assessment Methodology		
		1	x. Marks:50
/	sional Examination	25	
2) Presentations /S	Seminar		
3) Assignments			
4) Research Proje	-		
Seminar On Re	search Project Report		
		1.05	
5) ESE		25	



Course Learning Outcomes: Student will be able to:

CO1: Identify the performance of various page replacement algorithms.

CO2: Develop algorithm for deadlock

CO3: Choose the best CPU scheduling algorithm for a given problem instance.



IIMTU-NEP IMPLEMENTATION Year-II/ Semester-III

	me:UG Year:II	
Class:B.S		
Credits	Subject: Data Base Management System Lab	
Practical:		
Course C		
BCS-NEP		
	bjectives:	
	he student should be made to:	
	ndation knowledge in database concepts, technology and practice to groor	n students into
	med database application developers.	
	familiarized with a query language	
	e hands on experience on DDL Commands	
	e a good understanding of DML Commands and DCL commands	
	niliarize advanced SQL queries and exposed to different applications	
	Paper: Core	
	n Passing Marks/Credits:40% Marks	
L:0		
T:0		
•	ours/Week)	
•	Hr. = 1 Credit	
	2 Hrs.=1Credit(4Hrs./Week=4Credits)	
Unit	Contents	No. of Lectures Allotted
Ι	Creation of a database and writing SQL queries to retrieve information	2
	from the database.	
II	Performing Insertion, Deletion, Modifying, Altering, Updating and	
		2
ш	Viewing records based on conditions.	
III	Viewing records based on conditions. Perform the following:	2
III	Viewing records based on conditions.Perform the following:a. Viewing all databases, creating a Database, viewing all Tables in a	2
III	 Viewing records based on conditions. Perform the following: a. Viewing all databases, creating a Database, viewing all Tables in a Database, Creating Tables (With and Without Constraints). 	2
III	 Viewing records based on conditions. Perform the following: a. Viewing all databases, creating a Database, viewing all Tables in a Database, Creating Tables (With and Without Constraints). Inserting/Updating/DeletingRecords in a Table, Saving (Commit) 	2
	 Viewing records based on conditions. Perform the following: a. Viewing all databases, creating a Database, viewing all Tables in a Database, Creating Tables (With and Without Constraints). Inserting/Updating/DeletingRecords in a Table, Saving (Commit) and Undoing (rollback). 	2
III IV	 Viewing records based on conditions. Perform the following: a. Viewing all databases, creating a Database, viewing all Tables in a Database, Creating Tables (With and Without Constraints). Inserting/Updating/DeletingRecords in a Table, Saving (Commit) and Undoing (rollback). Perform the following: 	2
	 Viewing records based on conditions. Perform the following: a. Viewing all databases, creating a Database, viewing all Tables in a Database, Creating Tables (With and Without Constraints). Inserting/Updating/DeletingRecords in a Table, Saving (Commit) and Undoing (rollback). Perform the following: a. Altering a Table, Dropping/Truncating/Renaming Tables, backing 	2
IV	 Viewing records based on conditions. Perform the following: a. Viewing all databases, creating a Database, viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/DeletingRecords in a Table, Saving (Commit) and Undoing (rollback). Perform the following: a. Altering a Table, Dropping/Truncating/Renaming Tables, backing up / Restoring a Database. 	2
	 Viewing records based on conditions. Perform the following: a. Viewing all databases, creating a Database, viewing all Tables in a Database, Creating Tables (With and Without Constraints). Inserting/Updating/DeletingRecords in a Table, Saving (Commit) and Undoing (rollback). Perform the following: a. Altering a Table, Dropping/Truncating/Renaming Tables, backing up / Restoring a Database. For a given set of relation schemes, create tables and perform the 	
IV	 Viewing records based on conditions. Perform the following: a. Viewing all databases, creating a Database, viewing all Tables in a Database, Creating Tables (With and Without Constraints). Inserting/Updating/DeletingRecords in a Table, Saving (Commit) and Undoing (rollback). Perform the following: a. Altering a Table, Dropping/Truncating/Renaming Tables, backing up / Restoring a Database. For a given set of relation schemes, create tables and perform the following simple Queries, Simple Queries with Aggregate functions. 	
IV	 Viewing records based on conditions. Perform the following: a. Viewing all databases, creating a Database, viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/DeletingRecords in a Table, Saving (Commit) and Undoing (rollback). Perform the following: a. Altering a Table, Dropping/Truncating/Renaming Tables, backing up / Restoring a Database. For a given set of relation schemes, create tables and perform the following Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregatefunctions (group by and having clause), Queries 	
IV	 Viewing records based on conditions. Perform the following: a. Viewing all databases, creating a Database, viewing all Tables in a Database, Creating Tables (With and Without Constraints). Inserting/Updating/DeletingRecords in a Table, Saving (Commit) and Undoing (rollback). Perform the following: a. Altering a Table, Dropping/Truncating/Renaming Tables, backing up / Restoring a Database. For a given set of relation schemes, create tables and perform the following Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregatefunctions (group by and having clause), Queries involving- Date Functions, String Functions, Math Functions Joint 	
IV	 Viewing records based on conditions. Perform the following: a. Viewing all databases, creating a Database, viewing all Tables in a Database, Creating Tables (With and Without Constraints). Inserting/Updating/DeletingRecords in a Table, Saving (Commit) and Undoing (rollback). Perform the following: a. Altering a Table, Dropping/Truncating/Renaming Tables, backing up / Restoring a Database. For a given set of relation schemes, create tables and perform the following Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregatefunctions (group by and having clause), Queries involving- Date Functions, String Functions, Math Functions Joint Queries- Inner Join, Outer JoinSubqueries- With IN clause, With 	
IV V	 Viewing records based on conditions. Perform the following: a. Viewing all databases, creating a Database, viewing all Tables in a Database, Creating Tables (With and Without Constraints). Inserting/Updating/DeletingRecords in a Table, Saving (Commit) and Undoing (rollback). Perform the following: a. Altering a Table, Dropping/Truncating/Renaming Tables, backing up / Restoring a Database. For a given set of relation schemes, create tables and perform the following Simple Queries, Simple Queries with Aggregate functions. Queries with Aggregatefunctions (group by and having clause), Queries involving- Date Functions, String Functions, Math Functions Join Queries- Inner Join, Outer JoinSubqueries- With IN clause, With EXISTS clause. 	
IV	 Viewing records based on conditions. Perform the following: a. Viewing all databases, creating a Database, viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/DeletingRecords in a Table, Saving (Commit) and Undoing (rollback). Perform the following: a. Altering a Table, Dropping/Truncating/Renaming Tables, backing up / Restoring a Database. For a given set of relation schemes, create tables and perform the following Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregatefunctions (group by and having clause), Queries involving- Date Functions, String Functions, Math Functions Join Queries- Inner Join, Outer JoinSubqueries- With IN clause, With EXISTS clause. For a given set of relation tables perform the following 	
IV V	 Viewing records based on conditions. Perform the following: a. Viewing all databases, creating a Database, viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/DeletingRecords in a Table, Saving (Commit) and Undoing (rollback). Perform the following: a. Altering a Table, Dropping/Truncating/Renaming Tables, backing up / Restoring a Database. For a given set of relation schemes, create tables and perform the following Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregatefunctions (group by and having clause), Queries involving- Date Functions, String Functions, Math Functions Join Queries- Inner Join, Outer JoinSubqueries- With IN clause, With EXISTS clause. For a given set of relation tables perform the following a. Creating Views (with and without check option), Dropping views. 	
IV V	 Viewing records based on conditions. Perform the following: a. Viewing all databases, creating a Database, viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/DeletingRecords in a Table, Saving (Commit) and Undoing (rollback). Perform the following: a. Altering a Table, Dropping/Truncating/Renaming Tables, backing up / Restoring a Database. For a given set of relation schemes, create tables and perform the following Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregatefunctions (group by and having clause), Queries involving- Date Functions, String Functions, Math Functions Join Queries- Inner Join, Outer JoinSubqueries- With IN clause, With EXISTS clause. For a given set of relation tables perform the following 	



Given the table EMPLOYEE (EmpNo, Name, Salary, Designation,
DeptID) write a cursor to select the five highest paid employees from
the table.

2

Reference / Text Books:

- 1. Fundamentals of Database System by Elmasari & Navathe, 7th Edition, 2018, Pearson Education.
- 2. Database System Concepts by Silbers chatz, Korth & Sudarshan, 6th Edition, 2019, McGraw-Hill Education.

Evaluation/Assessment Methodology	
	Max. Marks:50
1) Class tasks/ Sessional Examination	25
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	
Seminar On Research Project Report	
5) ESE	25
Total	: 50
Course Learning Outcomes:	
Student will be able to:	
CO1: Design and implement a database schema for a given problem-domain	
CO2: Populate and query a database	
CO3: Create and maintain tables using PL/SQL.	



IIMTU-NEP IMPLEMENTATION Year- II / Semester- IV

Program	mme:Diplo	oma	Year: II		
Class:B.SC. (CS)			Semester: IV		
Credits		Subject: Data Mining			
Theory:	4Cr	•			
Course		Title:Data Mining			
BCS-NI	EP-404				
Course	Objective	s:			
CO1: 7	To introdu	ice students to basic a	applications, concepts, and techniques of data r	mining. To	
CO2:	develop skills for using recent data mining software to solve practical problems in a variety of				
	disciplines				
		•	repository for data analysis, frequent pattern, cla	assification	
	and predict				
		d and implement class	sical models and algorithms in data warehouses	s and data	
	mining.				
		a mining techniques in	various applications like social, scientific and env	ronmental	
	context.	DCE			
	of Paper:				
	ım Passing	g Marks/Credits:40%	Marks (ISE +ESE)		
L:4 T:0					
	Jours/Waal	(z)			
	Hours/Weel - 1 Hr. = 1				
Unit	Content			No. of	
Umu	CONCIN	3			
				Lectures	
T			- Overview Motivation Definition &	Lectures Allotted	
I	Introduc	c tion: Data Mining	g - Overview, Motivation, Definition & in Data Mining. Integration of Data Mining	Lectures	
I	Introduce Function	c tion: Data Mining alities, Major issues	in Data Mining, Integration of Data Mining	Lectures Allotted	
I	Introduce Function System v	c tion: Data Mining alities, Major issues vith Data Warehouse S	in Data Mining, Integration of Data Mining ystem.	Lectures Allotted	
I	Introduce Function System v Data Pro	ction: Data Mining alities, Major issues vith Data Warehouse Sy eprocessing: Description	in Data Mining, Integration of Data Mining ystem. ve Data Summarization, Data Cleaning-Missing	Lectures Allotted	
I	Introduce Function System v Data Pre Values, N	ction: Data Mining alities, Major issues vith Data Warehouse Sy eprocessing: Description Noisy Data, Data Integr	in Data Mining, Integration of Data Mining ystem.	Lectures Allotted	
Ι	Introduce Function System v Data Pro Values, N Cube A	ction: Data Mining alities, Major issues vith Data Warehouse Sy eprocessing: Descripti Noisy Data, Data Integr ggregation, Attribute	in Data Mining, Integration of Data Mining ystem. ve Data Summarization, Data Cleaning-Missing ration and Transformation, Data Reduction-Data	Lectures Allotted	
I	Introduce Function System v Data Prev Values, N Cube A Numeros Associat	ction: Data Mining alities, Major issues vith Data Warehouse Sy eprocessing: Description Noisy Data, Data Integring ggregation, Attribute vity Reduction, Discretion ion Rules: Introduction	in Data Mining, Integration of Data Mining ystem. we Data Summarization, Data Cleaning-Missing ration and Transformation, Data Reduction-Data Subset Selection, Dimensionality Reduction, ization and Concept Hierarchy. n, Frequent Item sets, Closed Item sets, Methods	Lectures Allotted	
	Introduce Function System v Data Prev Values, N Cube A Numeros Associat	ction: Data Mining alities, Major issues vith Data Warehouse Sy eprocessing: Description Noisy Data, Data Integring ggregation, Attribute vity Reduction, Discretion ion Rules: Introduction	in Data Mining, Integration of Data Mining ystem. ve Data Summarization, Data Cleaning-Missing ration and Transformation, Data Reduction-Data Subset Selection, Dimensionality Reduction, ization and Concept Hierarchy.	Lectures Allotted 10	
II	Introduce Function System v Data Prov Values, N Cube A Numeros Associat to Discov Mining, a	ction: Data Mining alities, Major issues vith Data Warehouse Sy eprocessing: Description Noisy Data, Data Integring ggregation, Attribute sity Reduction, Discretion ion Rules: Introduction ver Association Rules, and Rule Evaluation M	in Data Mining, Integration of Data Mining ystem. We Data Summarization, Data Cleaning-Missing ration and Transformation, Data Reduction-Data Subset Selection, Dimensionality Reduction, ization and Concept Hierarchy. n, Frequent Item sets, Closed Item sets, Methods Apriori Algorithm, Multilevel Association Rule letrics.	Lectures Allotted 10	
	Introduce Function System v Data Prov Values, N Cube A Numeros Associat to Discov Mining, a Classific	ction: Data Mining alities, Major issues with Data Warehouse Sy eprocessing: Description Noisy Data, Data Integring ggregation, Attribute sity Reduction, Discreting ion Rules: Introduction wer Association Rules, and Rule Evaluation Minimum attion and Prediction:	in Data Mining, Integration of Data Mining ystem. ve Data Summarization, Data Cleaning-Missing ration and Transformation, Data Reduction-Data Subset Selection, Dimensionality Reduction, ization and Concept Hierarchy. n, Frequent Item sets, Closed Item sets, Methods Apriori Algorithm, Multilevel Association Rule letrics. Classification Techniques-Decision Tree, Rule-	Lectures Allotted 10	
II	Introduce Function System v Data Pro Values, N Cube A Numeros Associat to Discov Mining, a Classifice Based C	ction: Data Mining alities, Major issues with Data Warehouse Sy eprocessing: Descripti Noisy Data, Data Integr ggregation, Attribute bity Reduction, Discreti ion Rules: Introduction wer Association Rules, and Rule Evaluation M sation and Prediction: lassification, Bayesian	 in Data Mining, Integration of Data Mining ystem. ve Data Summarization, Data Cleaning-Missing ration and Transformation, Data Reduction-Data Subset Selection, Dimensionality Reduction, ization and Concept Hierarchy. n, Frequent Item sets, Closed Item sets, Methods Apriori Algorithm, Multilevel Association Rule letrics. classification Techniques-Decision Tree, Rule-n Classification, k-Nearest-Neighbor Classifier, 	Lectures Allotted 10	
II	Introduce Function System v Data Prev Values, N Cube A Numeross Associat to Discov Mining, a Classifice Based C Linear R	ction: Data Mining alities, Major issues with Data Warehouse Sy eprocessing: Description Noisy Data, Data Integring ggregation, Attribute sity Reduction, Discreting ion Rules: Introduction wer Association Rules, and Rule Evaluation Ministration the transference of the system that the system of the system content of the system of the system of the system of the system of the system of the system of the system of the system of the system of the system of the system of the system of the system of the system of the system of the system of the system of the sys	 in Data Mining, Integration of Data Mining ystem. ive Data Summarization, Data Cleaning-Missing ration and Transformation, Data Reduction-Data Subset Selection, Dimensionality Reduction, Ization and Concept Hierarchy. in, Frequent Item sets, Closed Item sets, Methods Apriori Algorithm, Multilevel Association Rule letrics. c Classification Techniques-Decision Tree, Rule-In Classification, k-Nearest-Neighbor Classifier, and Error Measures, 	Lectures Allotted 10 10 10	
II	Introduce Function System v Data Prov Values, N Cube A Numeros Associat to Discov Mining, a Classifice Based C Linear R	ction: Data Mining alities, Major issues with Data Warehouse Sy eprocessing: Description Noisy Data, Data Integring ggregation, Attribute sity Reduction, Discreting ion Rules: Introduction wer Association Rules, and Rule Evaluation Ministration and Prediction: classification, Bayesiant egression, Accuracy an Analysis: Introduction	in Data Mining, Integration of Data Mining ystem. we Data Summarization, Data Cleaning-Missing ration and Transformation, Data Reduction-Data Subset Selection, Dimensionality Reduction, ization and Concept Hierarchy. n, Frequent Item sets, Closed Item sets, Methods Apriori Algorithm, Multilevel Association Rule letrics. Classification Techniques-Decision Tree, Rule- n Classification, k-Nearest-Neighbor Classifier, d Error Measures, J, Types of Data, Partitioning Methods- k-Means	Lectures Allotted 10	
II	Introduce Function System v Data Pro Values, N Cube A Numeros Associat to Discov Mining, a Classifice Based C Linear Re Cluster and k-M	ction: Data Mining alities, Major issues with Data Warehouse Sy eprocessing: Descripti Noisy Data, Data Integr ggregation, Attribute bity Reduction, Discreti ion Rules: Introduction wer Association Rules, and Rule Evaluation M sation and Prediction: classification, Bayesian egression, Accuracy an Analysis: Introduction edoids, Hierarchical C	 in Data Mining, Integration of Data Mining ystem. ve Data Summarization, Data Cleaning-Missing ration and Transformation, Data Reduction-Data Subset Selection, Dimensionality Reduction, ization and Concept Hierarchy. n, Frequent Item sets, Closed Item sets, Methods Apriori Algorithm, Multilevel Association Rule letrics. classification Techniques-Decision Tree, Rule-n Classification, k-Nearest-Neighbor Classifier, ad Error Measures, a, Types of Data, Partitioning Methods- k-Means Clustering- Chameleon, Density Based Methods- 	Lectures Allotted 10 10 10	
II	Introduce Function System v Data Prev Values, N Cube A Numeros Associat to Disco Mining, a Classifice Based C Linear Rev Cluster and k-M DBSCAN	ction: Data Mining alities, Major issues with Data Warehouse Sy eprocessing: Description Noisy Data, Data Integring ggregation, Attribute sity Reduction, Discreting ion Rules: Introduction wer Association Rules, and Rule Evaluation Ministration and Prediction: classification, Bayesian egression, Accuracy an Analysis: Introduction edoids, Hierarchical C N, OPTICS. Grid Bas	in Data Mining, Integration of Data Mining ystem. ve Data Summarization, Data Cleaning-Missing ration and Transformation, Data Reduction-Data Subset Selection, Dimensionality Reduction, ization and Concept Hierarchy. n, Frequent Item sets, Closed Item sets, Methods Apriori Algorithm, Multilevel Association Rule letrics. Classification Techniques-Decision Tree, Rule- n Classification, k-Nearest-Neighbor Classifier, d Error Measures, , Types of Data, Partitioning Methods- k-Means Clustering- Chameleon, Density Based Methods- sed Methods- STING, Model Based Methods-	Lectures Allotted 10 10 10	
II III IV	Introduce Function System v Data Prov Values, N Cube A Numeros Associat to Discov Mining, a Classifice Based C Linear R Cluster and k-M DBSCAN Neural N	ction: Data Mining alities, Major issues with Data Warehouse Sy eprocessing: Descripti Noisy Data, Data Integr ggregation, Attribute sity Reduction, Discreti ion Rules: Introduction wer Association Rules, and Rule Evaluation M eation and Prediction: Classification, Bayesian egression, Accuracy an Analysis: Introduction edoids, Hierarchical C N, OPTICS. Grid Bas fetwork Approach, Out	in Data Mining, Integration of Data Mining ystem. we Data Summarization, Data Cleaning-Missing ration and Transformation, Data Reduction-Data Subset Selection, Dimensionality Reduction, ization and Concept Hierarchy. n, Frequent Item sets, Closed Item sets, Methods Apriori Algorithm, Multilevel Association Rule letrics. classification Techniques-Decision Tree, Rule- n Classification, k-Nearest-Neighbor Classifier, d Error Measures, J, Types of Data, Partitioning Methods- k-Means Clustering- Chameleon, Density Based Methods- sed Methods- STING, Model Based Methods- lier Analysis.	Lectures Allotted 10 10 10 10	
II	Introduce Function System v Data Pro Values, N Cube A Numeross Associat to Discov Mining, a Classifice Based C Linear Re Cluster and k-M DBSCAN Neural N Recent	ction: Data Mining alities, Major issues with Data Warehouse Sy eprocessing: Descripti Noisy Data, Data Integr ggregation, Attribute bity Reduction, Discreti ion Rules: Introduction wer Association Rules, and Rule Evaluation M tation and Prediction: Classification, Bayesian egression, Accuracy an Analysis: Introduction edoids, Hierarchical C N, OPTICS. Grid Bas fetwork Approach, Out Trends and Applicat	in Data Mining, Integration of Data Mining ystem. we Data Summarization, Data Cleaning-Missing ration and Transformation, Data Reduction-Data Subset Selection, Dimensionality Reduction, ization and Concept Hierarchy. n, Frequent Item sets, Closed Item sets, Methods Apriori Algorithm, Multilevel Association Rule letrics. classification Techniques-Decision Tree, Rule- n Classification, k-Nearest-Neighbor Classifier, d Error Measures, , Types of Data, Partitioning Methods- k-Means Clustering- Chameleon, Density Based Methods- sed Methods- STING, Model Based Methods- lier Analysis.	Lectures Allotted 10 10 10	
II III IV	Introduce Function System v Data Prev Values, N Cube A Numeros Associat to Discov Mining, a Classifice Based C Linear Rev Cluster and k-M DBSCAN Neural N Recent	ction: Data Mining alities, Major issues with Data Warehouse Sy eprocessing: Descripti Noisy Data, Data Integr ggregation, Attribute bity Reduction, Discreti ion Rules: Introduction wer Association Rules, and Rule Evaluation M tation and Prediction: Classification, Bayesian egression, Accuracy an Analysis: Introduction edoids, Hierarchical C N, OPTICS. Grid Bas fetwork Approach, Out Trends and Applicat	in Data Mining, Integration of Data Mining ystem. we Data Summarization, Data Cleaning-Missing ration and Transformation, Data Reduction-Data Subset Selection, Dimensionality Reduction, ization and Concept Hierarchy. n, Frequent Item sets, Closed Item sets, Methods Apriori Algorithm, Multilevel Association Rule letrics. classification Techniques-Decision Tree, Rule- n Classification, k-Nearest-Neighbor Classifier, d Error Measures, J, Types of Data, Partitioning Methods- k-Means Clustering- Chameleon, Density Based Methods- sed Methods- STING, Model Based Methods- lier Analysis.	Lectures Allotted 10 10 10 10	



Text Books:

1. Jiawei Han, Jian Pei, MichelineKamber, "Data Mining: Concepts and Techniques", Elsevier. **Reference:**

- 1. Margaret H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education.
- Arun K. Pujari, "Data Mining Techniques", Universities Press. 2.
- 3. Pieter Adriaans&DolfZantinge, "Data Mining", Pearson Education.

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100
Prerequisites for the course: NIL	

Course Learning Outcomes:

- Understand the functionality of the various data mining and data warehousing component. CO1:
- CO2: Appreciate the strengths and limitations of various data mining and data warehousing models. Explain the analyzing techniques of various data
- Describe different methodologies used in data mining and data ware housing. CO3:
- CO4: Compare different approaches of data ware housing and data mining with various CO5: technologies.



IIMTU-NEP IMPLEMENTATION Year-II/ Semester-IV

Progra	mme:Diploma Year: II	
U	B.Sc. (CS) Semester:IV	
Credit		
Theory		
	Code: Title: Operating System	
	EP-402	
	Objectives:	
	o understand the services provided by and the design of an operating system.	
	o understand the structure and organization of the file system.	
	o understand what a process is and how processes are synchronized and scheduled.	
	o understand different approaches to memory management.	
	tudents should be able to use system calls for managing processes, memory and the f	ile system.
	of Paper: Core	
	um Passing Marks/Credits:40% Marks (ISE +ESE)	
L:4		
T:0		
P:0(In]	Hours/Week)	
Theory	-1 Hr. $= 1$ Credit	
-	al- 2 Hrs.=1Credit(4Hrs./Week=4Credits)	
Unit	Contents	No. of
		Lectures
		Allotted
Ι	INTRODUCTION: - Operating System Overview-Basic Elements, Instruction	12
	Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory	
	Access, Multiprocessor and Multicore Organization. Operating system overview,	
	objectives and functions, Evolution of Operating System, Types of Operating	
	Systems.	
II	Systems. PROCESSES: -Process States, Process Description and Process Control Block.	12
II	Systems. PROCESSES: -Process States, Process Description and Process Control Block. Processes and Threads, Types of Threads, Multicore and Multithreading,	12
	Systems. PROCESSES: -Process States, Process Description and Process Control Block. Processes and Threads, Types of Threads, Multicore and Multithreading, Scheduling Types of Scheduling, Scheduling algorithms.	
II	Systems. PROCESSES: -Process States, Process Description and Process Control Block. Processes and Threads, Types of Threads, Multicore and Multithreading, Scheduling Types of Scheduling, Scheduling algorithms. CONCURRENCY AND SCHEDULING: - Principles of Concurrency-Mutual	12
	Systems. PROCESSES: -Process States, Process Description and Process Control Block.Processes and Threads, Types of Threads, Multicore and Multithreading, Scheduling Types of Scheduling, Scheduling algorithms. CONCURRENCY AND SCHEDULING: - Principles of Concurrency-Mutual Exclusion, Semaphores, Monitors, Readers/Writers problem. Deadlocks-	
III	Systems. PROCESSES: -Process States, Process Description and Process Control Block.Processes and Threads, Types of Threads, Multicore and Multithreading, Scheduling Types of Scheduling, Scheduling algorithms. CONCURRENCY AND SCHEDULING: - Principles of Concurrency-Mutual Exclusion, Semaphores, Monitors, Readers/Writers problem. Deadlocks- prevention, avoidance, detection, Banker's Algorithm.	12
	Systems. PROCESSES: -Process States, Process Description and Process Control Block.Processes and Threads, Types of Threads, Multicore and Multithreading, Scheduling Types of Scheduling, Scheduling algorithms. CONCURRENCY AND SCHEDULING: - Principles of Concurrency-Mutual Exclusion, Semaphores, Monitors, Readers/Writers problem. Deadlocks- prevention, avoidance, detection, Banker's Algorithm. MEMORY MANAGEMENT: - Memory management requirements,	
III	Systems. PROCESSES: -Process States, Process Description and Process Control Block.Processes and Threads, Types of Threads, Multicore and Multithreading, Scheduling Types of Scheduling, Scheduling algorithms. CONCURRENCY AND SCHEDULING: - Principles of Concurrency-Mutual Exclusion, Semaphores, Monitors, Readers/Writers problem. Deadlocks- prevention, avoidance, detection, Banker's Algorithm. MEMORY MANAGEMENT: - Memory management requirements, Partitioning, Paging and Segmentation, Virtual memory - Hardware and control	12
III	Systems. PROCESSES: -Process States, Process Description and Process Control Block.Processes and Threads, Types of Threads, Multicore and Multithreading, Scheduling Types of Scheduling, Scheduling algorithms. CONCURRENCY AND SCHEDULING: - Principles of Concurrency-Mutual Exclusion, Semaphores, Monitors, Readers/Writers problem. Deadlocks- prevention, avoidance, detection, Banker's Algorithm. MEMORY MANAGEMENT: - Memory management requirements, Partitioning, Paging and Segmentation, Virtual memory - Hardware and control structures, Page fault, Page replacement algorithms, operating system software,	12
III IV	 Systems. PROCESSES: -Process States, Process Description and Process Control Block. Processes and Threads, Types of Threads, Multicore and Multithreading, Scheduling Types of Scheduling, Scheduling algorithms. CONCURRENCY AND SCHEDULING: - Principles of Concurrency-Mutual Exclusion, Semaphores, Monitors, Readers/Writers problem. Deadlocks- prevention, avoidance, detection, Banker's Algorithm. MEMORY MANAGEMENT: - Memory management requirements, Partitioning, Paging and Segmentation, Virtual memory - Hardware and control structures, Page fault, Page replacement algorithms, operating system software, Linux memory management, Windows memory management. 	12
III	 Systems. PROCESSES: -Process States, Process Description and Process Control Block. Processes and Threads, Types of Threads, Multicore and Multithreading, Scheduling Types of Scheduling, Scheduling algorithms. CONCURRENCY AND SCHEDULING: - Principles of Concurrency-Mutual Exclusion, Semaphores, Monitors, Readers/Writers problem. Deadlocks- prevention, avoidance, detection, Banker's Algorithm. MEMORY MANAGEMENT: - Memory management requirements, Partitioning, Paging and Segmentation, Virtual memory - Hardware and control structures, Page fault, Page replacement algorithms, operating system software, Linux memory management, Windows memory management. INPUT/OUTPUT AND FILE SYSTEMS: - I/O management and disk 	12
III IV	 Systems. PROCESSES: -Process States, Process Description and Process Control Block. Processes and Threads, Types of Threads, Multicore and Multithreading, Scheduling Types of Scheduling, Scheduling algorithms. CONCURRENCY AND SCHEDULING: - Principles of Concurrency-Mutual Exclusion, Semaphores, Monitors, Readers/Writers problem. Deadlocks- prevention, avoidance, detection, Banker's Algorithm. MEMORY MANAGEMENT: - Memory management requirements, Partitioning, Paging and Segmentation, Virtual memory - Hardware and control structures, Page fault, Page replacement algorithms, operating system software, Linux memory management, Windows memory management. INPUT/OUTPUT AND FILE SYSTEMS: - I/O management and disk scheduling – I/O devices, organization of I/O functions; OS design issues, I/O 	12
III IV	 Systems. PROCESSES: -Process States, Process Description and Process Control Block. Processes and Threads, Types of Threads, Multicore and Multithreading, Scheduling Types of Scheduling, Scheduling algorithms. CONCURRENCY AND SCHEDULING: - Principles of Concurrency-Mutual Exclusion, Semaphores, Monitors, Readers/Writers problem. Deadlocks- prevention, avoidance, detection, Banker's Algorithm. MEMORY MANAGEMENT: - Memory management requirements, Partitioning, Paging and Segmentation, Virtual memory - Hardware and control structures, Page fault, Page replacement algorithms, operating system software, Linux memory management, Windows memory management. INPUT/OUTPUT AND FILE SYSTEMS: - I/O management and disk 	12



Text Books:

- 1. Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley
- 2. Andrew S. Tanenbaum, "Modern Operating System", PHI Learning
- 3. Tanenbaum /Woodhaull "Operating System Design and Implementation", Pearson Publication.

Reference:

- 1. Harvey M Dietel, "An Introduction to Operating System", Pearson Education
- 2. Flynn, "Understanding Operating System", Cengage.
- 3. D M Dhamdhere, "Operating Systems: A Concept based Approach", McGraw Hill.
- 4. Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Education".

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100

Prerequisites for the course: NIL

Course Learning Outcomes:

CO1: Describe the important computer system resources and the role of operating system in their management policies and algorithms.

CO2: Understand the process management policies and scheduling of processes by CPU

CO3: Evaluate the requirement for process synchronization and coordination handled by operating system

CO4: Describe and analyze the memory management and its allocation policies.

CO5: Identify use and evaluate the storage management policies with respect to different storage management technologies.



IIMTU-NEP IMPLEMENTATION Year- II / Semester- IV

0	amme: Diploma		Year:II	
	B.Sc. (CS)		Semester:IV	
Credit		Subject: Numerica	al Analysis	
Theory				
	e Code:	Title:Numerical A	nalysis	
	VEP-404			
	e Objectives:			
CO1:		nding of numerical A	e	
CO2:			rnative methods and analyze mathematical pr	oblems to
CO 2.		suitable numerical te	-	.1
CO3:	-	-	Eigen value problem techniques for mathematica	alproblems
CO4	arising in vario		alua problems which have great significance inc	nainaarina
CO4:		-	alue problems which have great significance ine differential equations.	ngmeening
CO5:			ning language, implementation of algorithms an	decomputer
C05.		lve mathematical programme		ucomputer
Notur	e of Paper: DSE	*	Joients.	
	<u> </u>	_ arks/Credits:40% N	Iorke (ISE + ESE)	
L:4	ium rassing wia	11K5/CIEU115:40 70 IV	Taiks (ISE +ESE)	
L.4 T:0				
	Hours/Week)			
•	$\gamma - 1$ Hr. = 1 Cred	lit		
	al- 2 Hrs.=1Cred		adita)	
		111141113./ W CCN-4C1		
		m(41115.7 week - 4C1)	,	No. of
Unit		III(41113./ WCCK-4CI)	Contents	No. of Lectures
		III(41115./ WCCK-4C1)	,	
		, 	Contents	Lectures
Unit	Introduction:	Numbers represe	Contents	Lectures Allotted
Unit	Introduction: particularizatio	Numbers represe n to single precision	Contents entation on a computing machine with	Lectures Allotted
Unit	Introduction: particularizatio Intel 86 famil	Numbers represe n to single precision ly of processors. I	Contents entation on a computing machine with a, double precision, quadruple precision and the	Lectures Allotted
Unit	Introduction: particularizatio Intel 86 famil chopping error.	Numbers represe n to single precision ly of processors. I . Discussion of majo	Contents entation on a computing machine with a, double precision, quadruple precision and the Definitions of numerical rounding error and	Lectures Allotted
Unit	Introduction: particularizatio Intel 86 famil chopping error. Solution of a	Numbers represe on to single precision ly of processors. I . Discussion of majo lgebraic equations	Contents entation on a computing machine with a, double precision, quadruple precision and the Definitions of numerical rounding error and r sources of error in numerical analysis	Lectures Allotted 8
Unit	Introduction: particularizatio Intel 86 famil chopping error. Solution of al coding; Metho	Numbers represe n to single precision ly of processors. I <u>Discussion of majo</u> lgebraic equations d of False Position	Contents entation on a computing machine with a double precision, quadruple precision and the Definitions of numerical rounding error and r sources of error in numerical analysis : Description of Bijection algorithm and its	Lectures Allotted 8
Unit	Introduction: particularizatio Intel 86 famil chopping error. Solution of al coding; Metho coding; The N	Numbers represe on to single precision ly of processors. I Discussion of majo lgebraic equations d of False Position lewton-Raphson alg	Contents entation on a computing machine with a, double precision, quadruple precision and the Definitions of numerical rounding error and r sources of error in numerical analysis : Description of Bijection algorithm and its and its coding; The Secant algorithm and its	Lectures Allotted 8
Unit	Introduction: particularizatio Intel 86 famil chopping error. Solution of al coding; Metho coding; The N robustness and	Numbers represe on to single precision ly of processors. I <u>Discussion of majo</u> Igebraic equations d of False Position lewton-Raphson alg relative performance	Contents entation on a computing machine with a, double precision, quadruple precision and the Definitions of numerical rounding error and r sources of error in numerical analysis : Description of Bijection algorithm and its and its coding; The Secant algorithm and its orithm and its coding. Brief discussion of the	Lectures Allotted 8
Unit	Introduction: particularizatio Intel 86 famil chopping error. Solution of al coding; Metho coding; The N robustness and point algorithm notion of a corr	Numbers represe on to single precision by of processors. It <u>Discussion of majo</u> Igebraic equations d of False Position lewton-Raphson algorithm. relative performance n xn+1 = g(xn) given htraction algorithm.	Contents entation on a computing machine with a double precision, quadruple precision and the Definitions of numerical rounding error and <u>r sources of error in numerical analysis</u> : Description of Bijection algorithm and its and its coding; The Secant algorithm and its orithm and its coding. Brief discussion of the ce of these algorithm., Properties of the fixed- x0.Definition of the Lipshitz condition and the - Conditions for convergence of $xn+1 = g(xn)$,	Lectures Allotted 8
Unit	Introduction: particularizatio Intel 86 famil chopping error. Solution of al coding; Metho coding; The N robustness and point algorithm notion of a cor Error estimatio	Numbers represent on to single precision by of processors. It is Discussion of majo Igebraic equations d of False Position lewton-Raphson algonale relative performance n xn+1 = g(xn) given particular of the provided the second particular of the second second second second particular of the second second second second second particular of the second second second second second second particular of the second	Contents entation on a computing machine with a double precision, quadruple precision and the Definitions of numerical rounding error and r sources of error in numerical analysis : Description of Bijection algorithm and its and its coding; The Secant algorithm and its orithm and its coding. Brief discussion of the ce of these algorithm., Properties of the fixed- a x0.Definition of the Lipshitz condition and the - Conditions for convergence of $xn+1 = g(xn)$, +1 = g(xn), General notion of the order of an	Lectures Allotted 8
Unit	Introduction: particularizatio Intel 86 famil chopping error. Solution of al coding; Metho coding; The N robustness and point algorithm notion of a con Error estimatio iterative algori	Numbers represent on to single precision by of processors. It is Discussion of majo Igebraic equations d of False Position wetton-Raphson alg relative performance in $xn+1 = g(xn)$ given intraction algorithm. on for algorithm xn- thm, Aitken acceler	Contents entation on a computing machine with a double precision, quadruple precision and the Definitions of numerical rounding error and <u>r sources of error in numerical analysis</u> : Description of Bijection algorithm and its and its coding; The Secant algorithm and its orithm and its coding. Brief discussion of the ce of these algorithm., Properties of the fixed- x0.Definition of the Lipshitz condition and the - Conditions for convergence of $xn+1 = g(xn)$,	Lectures Allotted 8
Unit	Introduction: particularizatio Intel 86 famil chopping error. Solution of al coding; Metho coding; The N robustness and point algorithm notion of a con Error estimatio iterative algori systems of alge	Numbers represe on to single precision ly of processors. It . Discussion of majo Igebraic equations d of False Position lewton-Raphson alg relative performance xn+1 = g(xn) given traction algorithm. on for algorithm xn- thm, Aitken acceler ebraic equations	Contents entation on a computing machine with a double precision, quadruple precision and the Definitions of numerical rounding error and <u>r sources of error in numerical analysis</u> : Description of Bijection algorithm and its and its coding; The Secant algorithm and its orithm and its coding. Brief discussion ofthe ce of these algorithm., Properties of the fixed- x0.Definition of the Lipshitz condition and the - Conditions for convergence of $xn+1 = g(xn)$, +1 = g(xn), General notion of the order of an ration and Steffensen's algorithm, Solution of	Lectures Allotted 8
Unit	Introduction: particularizatio Intel 86 famil chopping error. Solution of al coding; Metho coding; The N robustness and point algorithm notion of a cor Error estimatio iterative algori systems of alge Numerical Int	Numbers represent on to single precision by of processors. It is Discussion of majo Igebraic equations d of False Position lewton-Raphson algon relative performance in xn+1 = $g(xn)$ given particular algorithm. For for algorithm xn- thm, Aitken accelered braic equations terpolation:Polynon	Contents entation on a computing machine with a double precision, quadruple precision and the Definitions of numerical rounding error and r sources of error in numerical analysis : Description of Bijection algorithm and its and its coding; The Secant algorithm and its orithm and its coding. Brief discussion of the ce of these algorithm., Properties of the fixed- a x0.Definition of the Lipshitz condition and the - Conditions for convergence of $xn+1 = g(xn)$, +1 = g(xn), General notion of the order of an ration and Steffensen's algorithm, Solution of nial interpolation., Definition of the Lagrange	Lectures Allotted 8
Unit	Introduction: particularizatio Intel 86 famil chopping error. Solution of al coding; Metho coding; The N robustness and point algorithm notion of a cor Error estimatio iterative algori systems of alge Numerical Int interpolating p	Numbers represent on to single precision ly of processors. It Discussion of majo Igebraic equations d of False Position lewton-Raphson alg relative performance n xn+1 = g(xn) given thraction algorithm xn - thm, Aitken accelered ebraic equations terpolation:Polynom polynomial, Interpole	Contents entation on a computing machine with a double precision, quadruple precision and the Definitions of numerical rounding error and <u>r sources of error in numerical analysis</u> : Description of Bijection algorithm and its and its coding; The Secant algorithm and its orithm and its coding. Brief discussion ofthe ce of these algorithm., Properties of the fixed- a x0.Definition of the Lipshitz condition and the - Conditions for convergence of $xn+1 = g(xn)$, +1 = g(xn), General notion of the order of an ration and Steffensen's algorithm, Solution of nial interpolation., Definition of the Lagrange lation based on the Lagrange interpolating	Lectures Allotted 8
Unit	Introduction: particularizatio Intel 86 famil chopping error. Solution of al coding; Metho coding; The N robustness and point algorithm notion of a cor Error estimatio iterative algori systems of alge Numerical Int interpolating p polynomial, N	Numbers represe n to single precision ly of processors. If Discussion of majo Igebraic equations d of False Position lewton-Raphson algonative performance n xn+1 = $g(xn)$ given n traction algorithm xn- thm, Aitken accelered braic equations terpolation:Polynomial bolynomial, Interpolation	Contents entation on a computing machine with a double precision, quadruple precision and the Definitions of numerical rounding error and <u>r sources of error in numerical analysis</u> : Description of Bijection algorithm and its and its coding; The Secant algorithm and its orithm and its coding. Brief discussion of the ce of these algorithm., Properties of the fixed- a x0.Definition of the Lipshitz condition and the - Conditions for convergence of $xn+1 = g(xn)$, +1 = g(xn), General notion of the order of an ration and Steffensen's algorithm, Solution of nial interpolation., Definition of the Lagrange lation based on the Lagrange interpolating n using divided differences, Error analysis	Lectures Allotted 8
Unit	Introduction: particularizatio Intel 86 famil chopping error. Solution of al coding; Metho coding; The N robustness and point algorithm notion of a cor Error estimatio iterative algori systems of alge Numerical Int interpolating p polynomial, N underlying poly	Numbers represe on to single precision by of processors. It <u>Discussion of majo</u> Igebraic equations d of False Position lewton-Raphson alg relative performance xn+1 = g(xn) given traction algorithm xn- thm, Aitken accelered braic equations terpolation:Polynom polynomial, Interpolation ynomial interpolation	Contents entation on a computing machine with a double precision, quadruple precision and the Definitions of numerical rounding error and r sources of error in numerical analysis : Description of Bijection algorithm and its and its coding; The Secant algorithm and its orithm and its coding. Brief discussion of the ce of these algorithm., Properties of the fixed- a x0.Definition of the Lipshitz condition and the - Conditions for convergence of $xn+1 = g(xn)$, +1 = g(xn), General notion of the order of an ration and Steffensen's algorithm, Solution of nial interpolation., Definition of the Lagrange lation based on the Lagrange interpolating n using divided differences, Error analysis on based on, Rolle's theoremThe Chebyshev	Lectures Allotted 8
Unit	Introduction: particularizatio Intel 86 famil chopping error. Solution of al coding; Metho coding; The N robustness and point algorithm notion of a cor Error estimatio iterative algori systems of alge Numerical Int interpolating p polynomial, N underlying poly	Numbers represent on to single precision ly of processors. It Discussion of majo Igebraic equations d of False Position lewton-Raphson algorithm treative performance xn+1 = g(xn) given that the accelered of the state on for algorithm xn- thm, Aitken accelered on the state explanation: Polynom polynomial, Interpolation ynomial interpolation and its optimality.	Contents entation on a computing machine with a double precision, quadruple precision and the Definitions of numerical rounding error and <u>r sources of error in numerical analysis</u> : Description of Bijection algorithm and its and its coding; The Secant algorithm and its orithm and its coding. Brief discussion ofthe ce of these algorithm., Properties of the fixed- a x0.Definition of the Lipshitz condition and the - Conditions for convergence of $xn+1 = g(xn)$, +1 = g(xn), General notion of the order of an ration and Steffensen's algorithm, Solution of nial interpolation., Definition of the Lagrange lation based on the Lagrange interpolating n using divided differences, Error analysis on based on, Rolle's theoremThe Chebyshev , Piecewise linear spline, Subpoint quadratic	Lectures Allotted 8
Unit	Introduction: particularizatio Intel 86 famil chopping error. Solution of al coding; Metho coding; The N robustness and point algorithm notion of a cor Error estimatio iterative algori systems of alge Numerical Int interpolating p polynomial, N underlying poly	Numbers represent on to single precision by of processors. If <u>Discussion of majo</u> Igebraic equations d of False Position lewton-Raphson algorithm lewton-Raphson algorithm treative performance in $xn+1 = g(xn)$ given that	Contents entation on a computing machine with a double precision, quadruple precision and the Definitions of numerical rounding error and r sources of error in numerical analysis : Description of Bijection algorithm and its and its coding; The Secant algorithm and its orithm and its coding. Brief discussion of the ce of these algorithm., Properties of the fixed- a x0.Definition of the Lipshitz condition and the - Conditions for convergence of $xn+1 = g(xn)$, +1 = g(xn), General notion of the order of an ration and Steffensen's algorithm, Solution of nial interpolation., Definition of the Lagrange lation based on the Lagrange interpolating n using divided differences, Error analysis on based on, Rolle's theoremThe Chebyshev	Lectures Allotted 8



	Transforming E	ducation System, Transforming Lives So	ction 27 & 128
IV	Solution of linear equations: Concept of Gaussian elimin	ation, the concept of	8
	pivoting and asimple illustration of why pivoting is needed	, LU factorization of	
	matrices with and without partial/full pivoting, The Cholesk		
	inversion Iterative methods, The concept of a matrix norm v		
	e.g., theFrobenius norm, The Jacobi iteration algorithm		
	algorithm, The Gauss-Seidel algorithm with over-relaxation	,	
V	Numerical calculation of matrix eigenvalues: Gershgori	n's theorem with an	8
	example - The Power algorithm, The Inverse Power al		
	transformation, The Householder transformation, Constru		
	Hessenberg matrix, The QR algorithm	erion of the opper	
Text	Books:		
	A. Patel. Numerical Analysis. Harcourt Brace, College Publisl	ners 1994	
	Cheney and D. Kincaid. Numerical Mathematics and Cor		Publishing
	mpany, 2003.	inputing. Drooks/Cole	i uonsinng
Refere			
	merical Analysis. 9 th ed. R.L. Burden and J.D. Faires: Editi	on Brooks / color 724	563 538 0
	8.2011136	011 D100KS / COIe/3.	005-556-0-
	Introduction to Numerical Analysis. EndreSüli, David F. M	oversCombridge · 052	1810264
	03.0521007941	ayerscallolluge032	-1010204 -
20	Evaluation/Assessment Methodolog	TN 7	
	Evaluation/Assessment Methodolog		Marks 100
1) Cl	ass tasks/ Sessional Examination	15	
/	esentations /Seminar	15	
/			
	signments	10	
,	search Project Report	10	
	minar On Research Project Report	76	
5) ES		75	
	Total:	100	
	uisites for the course: Problem Solving using C		
	e Learning Outcomes:		
CO1:	Discuss robustness and relative performance of different algo		
CO2:	Able to apply interpolation methods for solving the problems	numerically.	
CO3:	Able to calculate the errors and the rates of convergence.		
CO4:	Able to evaluate the relationships between different areas of	mathematics and the c	onnections

between Mathematics another disciplines. Able to develop numerical algorithms for the solution of the algebraic eigenvalueproblem.

CO5:



IIMTU-NEP IMPLEMENTATION Year- II / Semester- IV

Progra	mme:Dip	loma	Year: II	
-	BSC(CS)		Semester: IV	
Credits		Subject:Software Eng	ineering	
Theory	:4Cr		-	
Course	Code:	Title:Software Engine	eering	
BCS-N	EP-401			
Course	Objectiv	/es:		
CO 1:			software development process models.	
CO 2:			quirements specifications for different projects. De	velop some
CO 3:		vel of software architect		
CO 4:		-	mportance of Software project management concer	ots like cost
~ ~ ~		on, scheduling and revie		
CO 5:			agging techniques and analyzing their effectiveness	•
	of Paper			
	um Passi	ng Marks/Credits:40%	b Marks (ISE +ESE)	
L:4				
T:0	T (13.7	1 \		
	Hours/We			
•	-1 Hr. =		Cradita	
Unit	u- 2 пгs.=	=1Credit(4Hrs./Week=4	Contents	No. of
Umt			Contents	Lectures
				Allotted
Ι	Introdu	ction: Software- Chara	cteristics and Applications, Software Engineering,	10
			Software Process Framework, CMM, Software	_
		e e .	, Software Development Life Cycle, Software	
			Iodel, Prototyping Model, RAD Model, Spiral	
			omponent-based Development Model	
II	Softwar	e Requirements Eng	gineering and Analysis Modeling: Software	10
	Require	ments, Requirement H	Engineering Process, Elicitation Requirements,	
	Analysis	and Negotiating Rec	quirements, Requirement Specification, System	
			dation, Requirement Management, Creating a	
		1 1	fication Document, IEEE Standards for SRS,	
			Analysis Model, Data Modeling- ER Diagram,	
		_	Behavioral Modeling, Control Specification,	
		-	ctionary, Software Quality Framework, Quality	
		for Analysis Model.		10
III		e .	entation: Design Process, Principles, and Design	10
	-		cture, Refinement, Modularity, Data Structure,	
		-	al Independence, Cohesion, Coupling; Design	
			gies-Top Down and Bottom Up Design; Design	
		-	, Architectural Design, User Interface Design, oyment-Level Design, Implementation Issues and	
	-		ment, Quality Metrics for Design Model and	
	Source (• • • •	ment, Quanty metrics for Design model and	
IV			n, Validation, Testing Objectives, Unit Testing,	10
1 V	Soltwal	c resume. vermeation	n, vandation, resume objectives, onit resully,	10



Transforming Education System,	Transforming Lives Section 2f & 12B
Integration Testing, Validation Testing, System Testing, Acceptation	nce Testing,
Regression Testing, Test Characteristics, White Box Testing, Basic I	Path Testing,
Control Structure Testing, Black Box Testing, Test Plan, Test C	ase Design,
Quality Metrics for Testing.	
V Software Maintenance: Nature and Need of Maintenance,	Types of 10
Maintenance (Perceptive, Preventive, Adoptive, Corrective),	Cost of
Maintenance, Evolution of Software, Software Maintenance Proce	ss, Software
Maintenance Techniques-Reverse Engineering, Reengineering; Fact	ors affecting
Software Maintenance, Key Issues in Maintenance, Software C	onfiguration
Management, Version and Release Control, Change Control, C	onfiguration
Audit, Metrics for Maintenance.	
Text Books:	
1. Roger S. Pressman, "Software Engineering: A Practitioner's Approach", A	ddison Wesley.
2. PankajJalote, "An Integrated Approach to Software Engineering", Springe	r.
Reference:	
1. K. K. Aggarwal & Yogesh Singh "Software Engineering", New Age Interr	lational.
2. Sommerville, "Software Engineering", Pearson Education.	
3. James Peter, W. Pedrycz, "Software Engineering: An Engineering Approa	ch", John Wiley & Sons
4. Subramanian Chandramouli, SaikatDutt, ChandramouliSeetharaman, E	
Engineering", Pearson Education India	
Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO 1: Select and implement different software development process models	
CO 2: Extract and analyze software requirements specifications for differen	
CO 3: Develop some basic level of software architecture/design.	
CO 4: Define the basic concepts and importance of Software project manage	ement concepts like cost
estimation, scheduling and reviewing the progress.	1
CO 5. A sale different to the set of the size to her program development to in	

CO 5: Apply different testing and debugging techniques and analyzing their effectiveness.



IIMTU-NEP IMPLEMENTATION Year- II / Semester- IV

0	nme: Certificate	Year:II	
Class:A	ll UG Classes of II		
Credits		Subject:Human values and professional ethics	
Theory-			
	Code Theory :	Title:Human values and professional ethics	
UVE-40			
	Objectives:		
CO1:		rich cultural legacy and human values of which we are the cus	
CO2:	To focus on pro undesirable action	ofessional ethics which are broader indicators of desirable ac ons.	tions vis-à-vis
CO3:	To lay down bro	bader guidelines of values and ethics for internal and external	stakeholders.
CO4:		erational guidelines for value-based and ethical practices	in the higher
		itutions leading to implementation and monitoring.	
CO5:		outcomes of creating a value-based and ethical culture in HEIs	
CO6:		cative reinforcement programmes for nurturing human value	s and ethics in
	HEIs.		
		SE/SEC/GE/AECC-AECC	
	m Passing Marks	s/Credits:40% Marks	
L:3			
T:0	TT (TT 1)		
P: 0 (In	Hours/Week)		
	1 11 1 0 14		
•	1 Hr. = 1 Credit		
Practical		Contonto(Theory)	No.of
•		Contents(Theory)	No. of
Practical		Contents(Theory)	Lectures
Practical Unit	- NA		Lectures Allotted
Practical	- NA Course Introduct	Contents(Theory) etion - Need, Basic Guidelines, Content and Process for Value	Lectures Allotted
Practical Unit	- NA Course Introduct Education	tion - Need, Basic Guidelines, Content and Process for Value	Lectures Allotted e 6
Practical Unit I II	- NA Course Introduct Education Understanding H	tion - Need, Basic Guidelines, Content and Process for Value Harmony in the Human Being - Harmony in Myself	Lectures Allotted c 6 6
Practical Unit	- NA Course Introduct Education Understanding H Understanding H	tion - Need, Basic Guidelines, Content and Process for Value Harmony in the Human Being - Harmony in Myself Harmony in the Family and Society- Harmony in Human	Lectures Allotted c 6 6
Practical Unit I II III	- NA Course Introduct Education Understanding H Understanding H Human Relation	tion - Need, Basic Guidelines, Content and Process for Value Harmony in the Human Being - Harmony in Myself Harmony in the Family and Society- Harmony in Human Iship	Lectures Allotted 6 6 6 6 6
Practical Unit I II	- NA Course Introduct Education Understanding H Understanding H Human Relation	tion - Need, Basic Guidelines, Content and Process for Value Harmony in the Human Being - Harmony in Myself Harmony in the Family and Society- Harmony in Human	Lectures Allotted 6 6 6 6 6
Practical Unit I II III	- NA Course Introduct Education Understanding H Understanding H Human Relation	tion - Need, Basic Guidelines, Content and Process for Value Harmony in the Human Being - Harmony in Myself Harmony in the Family and Society- Harmony in Human Iship	Lectures Allotted 6 6 6 6 6
Practical Unit I II III	- NA Course Introduct Education Understanding H Understanding H Human Relation Understanding H existence	tion - Need, Basic Guidelines, Content and Process for Value Harmony in the Human Being - Harmony in Myself Harmony in the Family and Society- Harmony in Human Iship	Lectures Allotted c 6 6 6 - 6 - 6
Practical Unit I II III IV	- NA Course Introduct Education Understanding H Understanding H Human Relation Understanding H existence	tion - Need, Basic Guidelines, Content and Process for Value Harmony in the Human Being - Harmony in Myself Harmony in the Family and Society- Harmony in Human Iship Harmony in the Nature and Existence - Whole existence asCo	Lectures Allotted c 6 6 6 - 6 - 6
Practical Unit I II III IV V	- NA Course Introduct Education Understanding H Understanding H Human Relation Understanding H existence Implications of t Ethics	tion - Need, Basic Guidelines, Content and Process for Value Harmony in the Human Being - Harmony in Myself Harmony in the Family and Society- Harmony in Human hship Harmony in the Nature and Existence - Whole existence asCo the above Holistic Understanding of Harmony on Professiona	Lectures Allotted c 6 6 6 - 6 - 6
Practical Unit I II III IV V Suggesto	- NA Course Introduct Education Understanding H Understanding H Human Relation Understanding H existence Implications of t Ethics Ed Readings: For	tion - Need, Basic Guidelines, Content and Process for Value Harmony in the Human Being - Harmony in Myself Harmony in the Family and Society- Harmony in Human hiship Harmony in the Nature and Existence - Whole existence asCo the above Holistic Understanding of Harmony on Professiona r Theory	Lectures Allotted c 6 6 6 6 6 6 6 1 6 1 6
Practical Unit I II III IV V Suggeste 1. Ivar	- NA Course Introduct Education Understanding H Understanding H Human Relation Understanding H existence Implications of t Ethics ed Readings: For Illich, 1974, Ener	tion - Need, Basic Guidelines, Content and Process for Value Harmony in the Human Being - Harmony in Myself Harmony in the Family and Society- Harmony in Human hship Harmony in the Nature and Existence - Whole existence asCo the above Holistic Understanding of Harmony on Professiona r Theory rgy & Equity, The Trinity Press, Worcester, and Harper Collin	Lectures Allotted e 6 6 6 6 6 6 1 6 1 6 1 6
Practical Unit I II III IV V Suggeste 1. Ivar 2. E.F.	- NA Course Introduct Education Understanding H Understanding H Human Relation Understanding H existence Implications of t Ethics ed Readings: For Illich, 1974, Ener Schumacher, 197	tion - Need, Basic Guidelines, Content and Process for Value Harmony in the Human Being - Harmony in Myself Harmony in the Family and Society- Harmony in Human hiship Harmony in the Nature and Existence - Whole existence asCo the above Holistic Understanding of Harmony on Professiona r Theory	Lectures Allotted e 6 6 6 6 6 6 1 6 1 6 1 6
Practical Unit I II III IV V Suggest 1. Ivar 2. E.F. &Bi	- NA Course Introduct Education Understanding H Understanding H Human Relation Understanding H existence Implications of t Ethics ed Readings: For Illich, 1974, Ener Schumacher, 197 riggs, Britain.	tion - Need, Basic Guidelines, Content and Process for Value <u>Harmony in the Human Being - Harmony in Myself</u> Harmony in the Family and Society- Harmony in Human <u>hship</u> Harmony in the Nature and Existence - Whole existence asCo the above Holistic Understanding of Harmony on Professiona r Theory rgy & Equity, The Trinity Press, Worcester, and Harper Collin 73, Small is Beautiful: a study of economics as if people m	Lectures Allotted - 6 - 6 - 6 - 6 - 6 - 6 - 6 - 6
Practical Unit I II III IV V Suggeste 1. Ivar 2. E.F. &Br 3. Suss 4. Dor	- NA Course Introduct Education Understanding H Understanding H Human Relation Understanding H existence Implications of t Ethics ed Readings: For Illich, 1974, Ener Schumacher, 197 riggs, Britain. san George, 1976, eella H. Meadows	tion - Need, Basic Guidelines, Content and Process for Value Harmony in the Human Being - Harmony in Myself Harmony in the Family and Society- Harmony in Human hship Harmony in the Nature and Existence - Whole existence asCo the above Holistic Understanding of Harmony on Professiona r Theory rgy & Equity, The Trinity Press, Worcester, and Harper Collin	Lectures Allotted e 6 6 6 6 6 6 1 6 1 6 1 6 1 6 1

- 5.
- A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers. 6.



- 7. A N Tripathy, 2003, Human Values, New Age International Publishers.
- 8. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantra Shodh, Amravati.
- 9. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford UniversityPress
- 10. M Govindrajan, S Natrajan& V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
- 11. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
- 12. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted2008.
- 13. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course inHuman Values and Professional Ethics.

Evaluation/Assessment Methodology	
	Max. Marks
1) Class tasks/ Sessional Examination	10 marks
2) Presentations /Seminar	05 marks
3) Assignments	NA
4) Research Project Report	NA
Seminar On Research Project Report	35
5) ESE	
Total:	15+35
	Internal+External
Prerequisites for the course: First year must be clear for appearing in III rd /I	V th for the study of this
Audit/Qualifying course- for theory	
Second year must be clear for appearing in VI th Sem for the study of this audit	/Qualifying Course - for
theory	
Course Learning Outcomes:	
CO1: The learning process for holistic development.	
CO2: Impeccable governance.	
CO3: Effective institutional management.	
CO4: Well laid system of rewards and chastisement.	
CO5: Institutional climate where 'rights' enjoy and 'wrongs' are discourage	ed.



IIMTU-NEP IMPLEMENTATION Year- II / Semester- IV

Progra	amme: UG		Year: II	
Class:	BSC(CS)		Semester:IV	
Credit	S	Subject:Software	Engineering Lab	
Practic	cal: 2Cr	Ū		
Course	e Code:	Title:Software En	gineering Lab	
BCS-N	IEP-405P			
Course	e Objectives:			
CO1: U	Understand an	d describe basic con	ncept of UML, design, implementation of test cas	es and OOP
concep	ots using java			
CO2: I	Discuss and Ai	nalyses how to deve	elop software requirements specifications for a give	en problem.
CO3: E	Explain and bu	ild DFD models		
CO4: U	Understand and	d develop various st	tructure and behavior UML diagrams.	
	-		ct management tool Demonstrate how to manag	e file using
		management tool.		
	e of Paper: Co			
Minim	um Passing N	/Iarks/Credits:40%	% Marks	
L:0				
T:0				
P:4(In	Hours/Week)			
Theory	v - 1 Hr. = 1 Ci	redit		
Practic	al-2 Hrs.=1C	edit(4Hrs./Week=4	(Credits)	
Unit			Contents	No. of
				Lectures
I			specify the role of each of the actors. Also state	Lectures
	the precondi	tion, post condition	specify the role of each of the actors. Also state and function of each use case	Lectures Allotted 2
I	the precondi Preparation	tion, post condition of Software Re	specify the role of each of the actors. Also state	Lectures Allotted
ΙΙ	the precondi Preparation Documents	tion, post condition of Software Re and	specify the role of each of the actors. Also state and function of each use case equirement Specification Document, Design	LecturesAllotted22
	the precondiPreparationDocumentsIdentify the	tion, post condition of Software Re and classes. Classify t	specify the role of each of the actors. Also state and function of each use case	Lectures Allotted 2
II III	the precondi Preparation Documents Identify the class diagram	tion, post condition of Software Re and classes. Classify t n.	specify the role of each of the actors. Also state and function of each use case equirement Specification Document, Design them as weak and strong classes and draw the	LecturesAllotted2222
ΙΙ	the precondiPreparationDocumentsIdentify theclass diagramPreparation	tion, post condition of Software Re and classes. Classify t n. of Software Conf	specify the role of each of the actors. Also state and function of each use case equirement Specification Document, Design	LecturesAllotted22
II III	the precondi Preparation Documents Identify the class diagran Preparation related docu	tion, post condition of Software Re and classes. Classify t n. of Software Conf ments	specify the role of each of the actors. Also state and function of each use case equirement Specification Document, Design them as weak and strong classes and draw the Figuration Management and Risk Management	LecturesAllotted2222
II III	 the precondi Preparation Documents Identify the class diagram Preparation related docu Study and us 	tion, post condition of Software Re and classes. Classify t n. of Software Conf ments sage of any Design	specify the role of each of the actors. Also state and function of each use case equirement Specification Document, Design them as weak and strong classes and draw the figuration Management and Risk Management phase CASE tool	LecturesAllotted2222
II III IV	 the precondi Preparation Documents Identify the class diagram Preparation related docu Study and us 	tion, post condition of Software Re and classes. Classify t n. of Software Conf ments sage of any Design	specify the role of each of the actors. Also state and function of each use case equirement Specification Document, Design them as weak and strong classes and draw the Figuration Management and Risk Management	Lectures Allotted222222
II III IV V	the precondi Preparation Documents Identify the class diagran Preparation related docu Study and us Prepare SRS	tion, post condition of Software Re and classes. Classify t n. of Software Conf ments sage of any Design document in line v	specify the role of each of the actors. Also state and function of each use case equirement Specification Document, Design them as weak and strong classes and draw the figuration Management and Risk Management phase CASE tool	Lectures Allotted 2 2 2 2 2 2 2 2
II III IV V VI	the precondi Preparation Documents Identify the class diagran Preparation related docu Study and us Prepare SRS Develop test	tion, post condition of Software Re and classes. Classify t n. of Software Conf ments sage of any Design document in line v cases for unit testin	I specify the role of each of the actors. Also state and function of each use case equirement Specification Document, Design them as weak and strong classes and draw the Figuration Management and Risk Management phase CASE tool with the IEEE recommended standards.	Lectures Allotted 2 2 2 2 2 2 2 2 2 2
II III IV V VI VII VIII IX	 the precondi Preparation Documents Identify the class diagram Preparation related docu Study and us Prepare SRS Develop test Develop test 	tion, post condition of Software Re and classes. Classify t n. of Software Conf ments sage of any Design document in line v cases for unit testin	I specify the role of each of the actors. Also state and function of each use case equirement Specification Document, Design them as weak and strong classes and draw the figuration Management and Risk Management phase CASE tool with the IEEE recommended standards. ng and integration testing	Lectures Allotted 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
II III IV V VI VII VIII	 the precondi Preparation Documents Identify the class diagram Preparation related docu Study and us Prepare SRS Develop test Draw the ac 	tion, post condition of Software Re and classes. Classify t n. of Software Conf ments sage of any Design document in line v cases for unit testin cases for various v	I specify the role of each of the actors. Also state and function of each use case equirement Specification Document, Design them as weak and strong classes and draw the figuration Management and Risk Management phase CASE tool with the IEEE recommended standards. ng and integration testing	Lectures Allotted 2 2 2 2 2 2 2 2 2 2 2 2 2
II III IV VI VII VIII IX X	 the precondi Preparation Documents Identify the class diagram Preparation related docu Study and us Prepare SRS Develop test Draw the ac 	tion, post condition of Software Re and classes. Classify t n. of Software Conf ments sage of any Design document in line v cases for unit testin cases for various v tivity diagram te chart diagram.	I specify the role of each of the actors. Also state and function of each use case equirement Specification Document, Design them as weak and strong classes and draw the figuration Management and Risk Management phase CASE tool with the IEEE recommended standards. ng and integration testing	Lectures Allotted 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
II III IV V VI VII VIII IX X Refere	the precondi Preparation Documents Identify the class diagran Preparation related docu Study and us Prepare SRS Develop test Develop test Draw the ac Draw the sta	tion, post condition of Software Re and classes. Classify t n. of Software Conf ments sage of any Design document in line v cases for unit testin cases for various v tivity diagram te chart diagram. oks:	I specify the role of each of the actors. Also state and function of each use case equirement Specification Document, Design them as weak and strong classes and draw the figuration Management and Risk Management phase CASE tool with the IEEE recommended standards. ng and integration testing	Lectures Allotted 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
II III IV VI VII VIII IX X Refere 1. RS	the precondi Preparation Documents Identify the class diagran Preparation related docu Study and us Prepare SRS Develop test Develop test Draw the ac Draw the sta ence / Text Bo Pressman, So	tion, post condition of Software Re and classes. Classify t n. of Software Conf ments sage of any Design document in line v cases for unit testin cases for various v tivity diagram te chart diagram. oks:	specify the role of each of the actors. Also state and function of each use case equirement Specification Document, Design them as weak and strong classes and draw the figuration Management and Risk Management phase CASE tool with the IEEE recommended standards. ng and integration testing white box and black box testing techniques.	Lectures Allotted 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
II III IV VI VII VIII IX X Refere 1. RS 2. Par	the precondi Preparation Documents Identify the class diagran Preparation related docu Study and us Prepare SRS Develop test Develop test Draw the ac Draw the sta ence / Text Bo Pressman, So hkaj Jalote, So	tion, post condition of Software Re and classes. Classify t n. of Software Conf ments sage of any Design document in line v cases for unit testin cases for various v tivity diagram te chart diagram. oks: ftware Engineering ftware Engineering	specify the role of each of the actors. Also state and function of each use case equirement Specification Document, Design them as weak and strong classes and draw the figuration Management and Risk Management phase CASE tool with the IEEE recommended standards. ng and integration testing white box and black box testing techniques.	Lectures Allotted 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2

4. KK Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.



Evaluation/Assessment Methodology	
	Max. Marks:50
1) Class tasks/ Sessional Examination	25
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	
Seminar On Research Project Report	
5) ESE	25
Total:	50
Course Learning Outcomes:	
Student will be able to:	
CO1: Draw a class diagram after identifying classes and association among th	e
CO2: Graphically represent various UML diagrams, and associations among	ng them and identify the
logical sequence of activities undergoing in a system, and represent them pict	orially
CO3: Able to use modern engineering tools for specification, design, impleme	entation and testing

CO4: Develop test cases for various white box and black box testing techniques.



IIMTU-NEPIMPLEMENTATION Year-III/ Semester-V

Program	mme:De	gree	Year: III	
0	SC(CS)	0	Semester: IV	
Credits	, ,	Subject: Big Data		
Theory:				
Course		Title:Big Data		
BCS-NI		8		
Course	Objectiv	ves:		
CO1: I	Demonstr	ate knowledge of Big I	Data Analytics concepts and its applications in bus	iness.
		<i>e e</i>	onents of Map Reduce Framework and HDFS.	
		queries in NoSQL envir	-	
CO4: E	Explain p	rocess of developing M	ap Reduce based distributed processing application	ons.
CO5: E	Explain p	rocess of developing ap	oplications using HBASE, Pig etc.	
Nature	of Paper	r: DSE		
	ım Passi	ing Marks/Credits:40	% Marks (ISE+ESE)	
L:4				
T:0				
	Hours/We	·		
-	1Hr.=1C	Credit	a	
Unit			Contents	No. of
				Lectures
		(' (D ' D (Allotted
Ι		<u> </u>	Types of digital data, history of Big Data	8
			g Data platform, drivers for Big Data, Big Data	
			cs, 5 Vs of Big Data, Big Data technology rtance and applications, Big Data features –	
			and protection, Big Data privacy and ethics, Big	
			conventional systems, intelligent data analysis,	
			ses and tools, analysis vs reporting, modern data	
	analytic		ses and tools, analysis vs reporting, modelli data	
II			framework and basics, how Map Reduce	8
			ce application, unit tests with MR unit, test data	0
	· · ·	1 0 1	Map Reduce job run, failures, job scheduling,	
			ion, Map Reduce types, input formats, output	
			Real-world Map Reduce.	
III		÷	File System): Design of HDFS, HDFS concepts,	8
		· •	zes, block sizes and block abstraction in HDFS,	
		-	FS store, read, and write files, Java interfaces to	
	-		e, Hadoop file system interfaces, data flow, data	
			, Hadoop archives, Hadoop I/O: Compression,	
	-	-	ed data structures. Hadoop Environment: Setting	
			ecification, cluster setup and installation, Hadoop	
		ration, securityin Hado		
			Т /	1



	Transforming Education System	, Transforming Lives	Section 2f & 12B
IV	Hadoop Eco System and YARN: Hadoop ecosystem components	, schedulers,	8
	fairand capacity, Hadoop 2.0 New Features - Name Node high	availability,	
	HDFS federation, MRv2, YARN, Running MRv1 in YARN.	-	
	NoSQL Databases: Introduction to NoSQL MongoDB: Introd	uction, data	
	types,		
	creating, updating and deleing documents, querying, introduction	to indexing,	
	capped collections	E,	
V	Hadoop Eco System Frameworks: Applications on Big Data usi	ng Pig, Hive	8
-	and HBase.	8 8,	
	Pig: Introduction to PIG, Execution Modes of Pig, Comparison	of Pig with	
	Databases, Grunt, Pig Latin, User Defined Functions, Data	-	
	operators,	8	
	HBase– HBase concepts, clients, example, HBase RDBMS	S. advanced	
	usage, schema design, advance indexing, Zookeeper – how		
	monitoring a cluster, how to build applications with Zookeeper. If		
	strategy, introduction to Infosphere, BigInsights and Big Sheets, in	-	
	Big SQL.		
Text B			
	hael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, 1	Big Analytics	: Emerging
	iness Intelligence and Analytic Trends for Today's Businesses", Wile	•	
	-Data Black Book, DT Editorial Services, Wiley.	<i>.</i>	
	nce Book:		
	nn J. Myatt, "Making Sense of Data", John Wiley & Sons		
	e Warden, "Big Data Glossary", O'Reilly		
	Evaluation/Assessment Methodology		
	Litutation Assessment Methodology	Max	Manka 100
1) Cla	sst asks/Sessional Examination		<u>Marks 100</u> 5
,		1	3
	sentations/Seminar		
	ignments	1	0
· ·	earch Project Report	1	0
	ninar On Research Project Report	7	F
5) ESI			5
D	Total:	10	00
	isites for the course: NIL		
	e Learning Outcomes:		
CO1:	1 1		
CO1:	6 6 6		
CO3:	1 2 1		
CO4:	1 1 0 1	ations.	
CO5:	Able to understand the importance and challenges of big data.		



IIMTU-NEP IMPLEMENTATION Year-III/ Semester-V

0	nme:Degi	ree	Year: III	
Class:BS	Sc (CS)	~	Semester:V	
Credits		Subject:ERP		
Theory:4				
Course (Title:ERP		
BCS-NE				
	Objective			
R	Resource l	Planning Technology	•	-
	To focus of pproach.	on a strong emphasi	is upon practice of theory in Applications and Practi-	caloriented
		ne students to devel	lop the basic understanding of how ERP enriches th	ne business
			nultidimensional growth.	
	0	e	ninking towards business processes.	
СО5: Т	To aim at	preparing the stud	dents technological competitive and make them read	dy to self-
		ith the higher techni	e 1	-
Nature of	of Paper:	DSE		
Minimu	m Passin	g Marks/Credits:40	0% Marks (ISE +ESE)	
L:4				
T:0				
P:0(In He	ours/Waa			
1.0(mm		k)		
,	1 Hr. = 1			
Theory -		Credit		
Theory - Practical	1 Hr. = 1	Credit Credit		
Theory - Practical	1 Hr. = 1 - 2 Hrs.=	Credit Credit	Contents	No. of
Theory - Practical (4Hrs./W	1 Hr. = 1 - 2 Hrs.=	Credit Credit	Contents	No. of Lectures
Theory - Practical (4Hrs./W	1 Hr. = 1 - 2 Hrs.=	Credit Credit	Contents	
Theory - Practical (4Hrs./W	1 Hr. = 1 - 2 Hrs.= /eek=4Cr	Credit Credit edits)	Contents Evolution of ERP; what is ERP? Reasons for the	Lectures
Theory - Practical (4Hrs./W Unit	1 Hr. = 1 - 2 Hrs.= /eek=4Crd	Credit Credit edits) uction to ERP: E		Lectures Allotted
Theory - Practical (4Hrs./W Unit	1 Hr. = 1 - 2 Hrs.=: /eek=4Cr/ /eek=4Cr/ Growth	Credit Credit edits) uction to ERP: E	Evolution of ERP; what is ERP? Reasons for the nd Justification of ERP in India; Evaluation of ERP;	Lectures Allotted
Theory - Practical (4Hrs./W Unit	1 Hr. = 1 - 2 Hrs.= /eek=4Cr/ /eek=4Cr/ Growth Various	Credit Credit edits) action to ERP: E of ERP; Scenario and	Evolution of ERP; what is ERP? Reasons for the nd Justification of ERP in India; Evaluation of ERP; Advantage of ERP.	Lectures Allotted
Theory - Practical (4Hrs./W Unit	1 Hr. = 1 - 2 Hrs.= //eek=4Cro //	Credit Credit edits) action to ERP: E of ERP; Scenario an Modules of ERP; A verview of Enterp	Evolution of ERP; what is ERP? Reasons for the nd Justification of ERP in India; Evaluation of ERP; Advantage of ERP.	Lectures Allotted 8
Theory - Practical (4Hrs./W Unit	1 Hr. = 1 - 2 Hrs.=: /eek=4Cro /eek=4Cro / //////////////////////////////////	Credit Credit edits) action to ERP: E of ERP; Scenario and Modules of ERP; A verview of Enterp ement Information;	Evolution of ERP; what is ERP? Reasons for the nd Justification of ERP in India; Evaluation of ERP; Advantage of ERP. prise: An Overview of Enterprise; Integrated	Lectures Allotted 8
Theory - Practical (4Hrs./W Unit	1 Hr. = 1 - 2 Hrs.= /eek=4Crd Growth Various An Ov Manage for Mal	Credit Credit edits) (ction to ERP: E of ERP; Scenario and Modules of ERP; A verview of Enterp ement Information; I see to Order Compa	Evolution of ERP; what is ERP? Reasons for the ind Justification of ERP in India; Evaluation of ERP; Advantage of ERP. prise: An Overview of Enterprise; Integrated Business Modelling; ERP for Small Business; ERP	Lectures Allotted 8
Theory - Practical (4Hrs./W Unit	1 Hr. = 1 - 2 Hrs.= //eek=4Crd //eek=4Crd Growth Various An Ov Manage for Mai Design;	Credit Credit edits) nction to ERP: E of ERP; Scenario an Modules of ERP; A rerview of Enterp ement Information; I ce to Order Compa Hardware Environr	Evolution of ERP; what is ERP? Reasons for the nd Justification of ERP in India; Evaluation of ERP; Advantage of ERP. prise: An Overview of Enterprise; Integrated Business Modelling; ERP for Small Business; ERP anies; Business Process Mapping for ERP Module	Lectures Allotted 8
Theory - Practical (4Hrs./W Unit I	1 Hr. = 1 - 2 Hrs.= /eek=4Cro /eek=4Cro / Growth Various An Ov Manage for Mal Design; ERP at	Credit Credit edits) action to ERP: E of ERP; Scenario and Modules of ERP; A verview of Enterp ement Information; 1 ce to Order Compa Hardware Environr ad Related Techno	Evolution of ERP; what is ERP? Reasons for the and Justification of ERP in India; Evaluation of ERP; Advantage of ERP. prise: An Overview of Enterprise; Integrated Business Modelling; ERP for Small Business; ERP anies; Business Process Mapping for ERP Module ment and its Selection for ERP Implementation	Lectures Allotted 8
Theory - Practical (4Hrs./W Unit I	1 Hr. = 1 - 2 Hrs.= /eek=4Crd /eek=4Crd Growth Various An Ov Manage for Mal Design; ERP at Process	Credit Credit edits) nction to ERP: E of ERP; Scenario an Modules of ERP; A verview of Enterp ement Information; I ce to Order Compa Hardware Environr nd Related Techno Reengineering (E	Evolution of ERP; what is ERP? Reasons for the ind Justification of ERP in India; Evaluation of ERP; Advantage of ERP. prise: An Overview of Enterprise; Integrated Business Modelling; ERP for Small Business; ERP anies; Business Process Mapping for ERP Module ment and its Selection for ERP Implementation plogies: ERP and Related Technologies; Business	Lectures Allotted 8
Theory - Practical (4Hrs./W Unit I	1 Hr. = 1 - 2 Hrs.= /eek=4Cro /eek=4Cro /eek=4Cro Growth Various An Ov Manage for Mal Design; ERP at Process Executi	Credit Credit edits) nction to ERP: E of ERP; Scenario an Modules of ERP; A verview of Enterp ement Information; I ce to Order Compa Hardware Environr nd Related Techno Reengineering (E	Evolution of ERP; what is ERP? Reasons for the ind Justification of ERP in India; Evaluation of ERP; Advantage of ERP. prise: An Overview of Enterprise; Integrated Business Modelling; ERP for Small Business; ERP anies; Business Process Mapping for ERP Module ment and its Selection for ERP Implementation ologies: ERP and Related Technologies; Business BPR); Management Information System (MIS); tem (EIS); Decision support System (DSS); Supply	Lectures Allotted 8
Theory - Practical (4Hrs./W Unit I	1 Hr. = 1 - 2 Hrs.=: /eek=4Cro /eek=4Cro /eek=4Cro Growth Various An Ov Manage for Mal Design; ERP at Process Executi Chain M	Credit Credit edits) action to ERP: E of ERP; Scenario an Modules of ERP; A verview of Enterp ement Information; 1 ce to Order Compa Hardware Environr ad Related Techno Reengineering (E ve Information Syst Janagement (SCM).	Evolution of ERP; what is ERP? Reasons for the ind Justification of ERP in India; Evaluation of ERP; Advantage of ERP. prise: An Overview of Enterprise; Integrated Business Modelling; ERP for Small Business; ERP anies; Business Process Mapping for ERP Module ment and its Selection for ERP Implementation ologies: ERP and Related Technologies; Business BPR); Management Information System (MIS); tem (EIS); Decision support System (DSS); Supply	Lectures Allotted 8
Theory - Practical (4Hrs./W Unit I I II	1 Hr. = 1 - 2 Hrs.= //eek=4Cro //eek=4Cro //eek=4Cro //eek=4Cro //eek=4Cro //ek=4	Credit Credit edits) nction to ERP: E of ERP; Scenario an Modules of ERP; A verview of Enterp ement Information; 1 ce to Order Compa Hardware Environr nd Related Techno Reengineering (E ve Information Syst Management (SCM). larket: Introductio	Evolution of ERP; what is ERP? Reasons for the nd Justification of ERP in India; Evaluation of ERP; Advantage of ERP. prise: An Overview of Enterprise; Integrated Business Modelling; ERP for Small Business; ERP anies; Business Process Mapping for ERP Module ment and its Selection for ERP Implementation ologies: ERP and Related Technologies; Business BPR); Management Information System (MIS); tem (EIS); Decision support System (DSS); Supply.	Lectures Allotted 8 8 8
Theory - Practical (4Hrs./W Unit I I II	1 Hr. = 1 - 2 Hrs.= /eek=4Cro /eek=4Cro /eek=4Cro Growth Various An Ov Manage for Mal Design; ERP at Process Executi Chain M ERP M People	Credit Credit edits) nction to ERP: E of ERP; Scenario an Modules of ERP; A rerview of Enterp ement Information; I ke to Order Compa Hardware Environr nd Related Techno Reengineering (E ve Information Syst Management (SCM). Iarket: Introduction Soft, JD Edwards	Evolution of ERP; what is ERP? Reasons for the nd Justification of ERP in India; Evaluation of ERP; Advantage of ERP. prise: An Overview of Enterprise; Integrated Business Modelling; ERP for Small Business; ERP anies; Business Process Mapping for ERP Module ment and its Selection for ERP Implementation ologies: ERP and Related Technologies; Business BPR); Management Information System (MIS); tem (EIS); Decision support System (DSS); Supply	Lectures Allotted 8 8 8
Theory - Practical (4Hrs./W Unit I I II	1 Hr. = 1 - 2 Hrs.= /eek=4Cro /eek=4Cro /eek=4Cro Growth Various An Ov Manage for Mal Design; ERP at Process Executi Chain M ERP M People	Credit Credit edits) action to ERP: E of ERP; Scenario an Modules of ERP; A verview of Enterp ement Information; I ac to Order Compa Hardware Environr ad Related Techno Reengineering (E ve Information Syst Ianagement (SCM). Iarket: Introduction Soft, JD Edwards SA); QAD; A Comp	Evolution of ERP; what is ERP? Reasons for the ind Justification of ERP in India; Evaluation of ERP; Advantage of ERP. prise: An Overview of Enterprise; Integrated Business Modelling; ERP for Small Business; ERP anies; Business Process Mapping for ERP Module ment and its Selection for ERP Implementation ologies: ERP and Related Technologies; Business BPR); Management Information System (MIS); tem (EIS); Decision support System (DSS); Supply on, SAP AG, Baan Company, Oracle Corporation, World Solutions Co, System Software Associates,	Lectures Allotted 8 8 8
Theory - Practical (4Hrs./W Unit I I II	1 Hr. = 1 - 2 Hrs.= //eek=4Cro //oek=4Cro //oek=4C	Credit Credit edits) nction to ERP: E of ERP; Scenario an Modules of ERP; A rerview of Enterp ement Information; 1 ce to Order Compa Hardware Environr nd Related Technol Reengineering (E ve Information Syst Ianagement (SCM). Iarket: Introduction Soft, JD Edwards S A); QAD; A Comp dules.	Evolution of ERP; what is ERP? Reasons for the nd Justification of ERP in India; Evaluation of ERP; Advantage of ERP. prise: An Overview of Enterprise; Integrated Business Modelling; ERP for Small Business; ERP anies; Business Process Mapping for ERP Module ment and its Selection for ERP Implementation ologies: ERP and Related Technologies; Business BPR); Management Information System (MIS); tem (EIS); Decision support System (DSS); Supply on, SAP AG, Baan Company, Oracle Corporation, World Solutions Co, System Software Associates, parative Assessment and Selection of ERP Packages	Lectures Allotted 8 8 8
Theory - Practical (4Hrs./W Unit I II III	1 Hr. = 1 - 2 Hrs.= //eek=4Cro //eek=4C	Credit Credit edits) nction to ERP: E of ERP; Scenario and Modules of ERP; A rerview of Enterp ement Information; I ac to Order Compa Hardware Environr nd Related Techno Reengineering (E ve Information Syst Management (SCM). Iarket: Introduction Soft, JD Edwards S SA); QAD; A Comp dules. nplementation Life	Evolution of ERP; what is ERP? Reasons for the ind Justification of ERP in India; Evaluation of ERP; Advantage of ERP. prise: An Overview of Enterprise; Integrated Business Modelling; ERP for Small Business; ERP anies; Business Process Mapping for ERP Module ment and its Selection for ERP Implementation ologies: ERP and Related Technologies; Business BPR); Management Information System (MIS); tem (EIS); Decision support System (DSS); Supply on, SAP AG, Baan Company, Oracle Corporation, World Solutions Co, System Software Associates, parative Assessment and Selection of ERP Packages; Pre-	Lectures Allotted 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8
Theory - Practical (4Hrs./W Unit I II III	1 Hr. = 1 - 2 Hrs.=: /eek=4Cro /eek=4Cro /eek=4Cro Growth Various An Ov Manage for Mal Design; ERP at Process Executi Chain M People Inc. (SS and Mo ERP In evaluati	Credit Credit edits) action to ERP: E of ERP; Scenario and Modules of ERP; A verview of Enterp ement Information; I ac to Order Compa Hardware Environr ad Related Techno Reengineering (E ve Information Syst Anagement (SCM). Iarket: Introduction Soft, JD Edwards SA); QAD; A Comp dules. aplementation Life on Screening; Pac	Evolution of ERP; what is ERP? Reasons for the nd Justification of ERP in India; Evaluation of ERP; Advantage of ERP. prise: An Overview of Enterprise; Integrated Business Modelling; ERP for Small Business; ERP anies; Business Process Mapping for ERP Module ment and its Selection for ERP Implementation ologies: ERP and Related Technologies; Business BPR); Management Information System (MIS); tem (EIS); Decision support System (DSS); Supply on, SAP AG, Baan Company, Oracle Corporation, World Solutions Co, System Software Associates, parative Assessment and Selection of ERP Packages	Lectures Allotted 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8



Mode).

Text Books:

- 1. Daniel E. O'Leary, Enterprise Resource Planning Systems, Cambridge University Press, 2002.
- 2. Ellen Monk, Bret Wagner, Concepts in Enterprise resource planning, Cengage learning, Third edition, 2009.

Reference

- 1. Enterprise Resource Planning Alexis Leon Second Edition TMH
- 2. Manufacturing Resource Planning (MRP II) with Introduction to ERP; SCM; an CRM by Khalid Sheikh, Publisher: Mc. Graw-Hill

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100
Prerequisites for the course: Problem Solving using C	
Course Learning Outcomes:	
CO1: Make basic use of Enterprise software, and its role in integrating b	usiness functions.

- CO2: Analyze the strategic options for ERP identification and adoption.
- CO3: Design the ERP implementation strategies.
- CO4: Analyse the strategic options for ERP identification and adoption.
- CO5: Create reengineered business processes for successful ERP implementation.



IIMTU-NEPIMPLEMENTATION Year-III/ Semester-V

Progra	mme: Certificate Y	ear:III	
Class:E		emester:V	
Credits	Subject: Data communio	cation network	
Theory:	4Cr		
Course	Code: Title:Data communication	on network	
BCS-N	EP-503		
Course	Objectives:		
CO1: T	o introduce the various types of con	mputer networks.	
CO2: 7	o explore the various layers of OS	I Model.	
CO3: 7	To introduce UDP and TCP Models		
CO4: 7	To identify various application layer	r protocols.	
CO5: 7	To demonstrate the TCP/IP and OS	I models	
Nature	of Paper: DSE		
Minim	um Passing Marks/Credits:40%	Marks (ISE+ESE)	
L:4			
T:0			
P:0(In H	Hours/Week)		
Theory	-1Hr.=1Credit		
Practica	ll-2Hrs.=1Credit		
(4Hrs./V	Week=4Credits)		
Unit		Contents	No. of
			Lectures
			Allotted
Ι	Data Communications: Compone	ents – Direction of Data flow – Networks –	10
	Components and Categories - T	ypes of Connections – Topologies –Protocols	
	and Standards ISO / OSI mod	1 Empression In Mathematica and A TM Empression	
	and Standards – 150 / OST mod	el, Example Networks such as ATM, Frame	
	Relay, Transmission modes, Mu	altiplexing, Transmission Media, Switching,	
		· · · · · · · · · · · · · · · · · · ·	
II	Relay, Transmission modes, Mu Circuit Switched Networks	· · · · · · · · · · · · · · · · · · ·	10
II	Relay, Transmission modes, Mu Circuit Switched Networks Data link layer: Introduction, Fra	ultiplexing, Transmission Media, Switching,	10
II	Relay, Transmission modes, Mu Circuit Switched Networks Data link layer: Introduction, Fra Parity – LRC – CRC Hamming c Point Protocols. ALOHA, CSM	ultiplexing, Transmission Media, Switching, ming, and Error – Detection and Correction – ode, Flow and Error Control, HDLC, Point to A/CD, LAN – Ethernet IEEE 802.3, IEEE	10
II	Relay, Transmission modes, Mu Circuit Switched Networks Data link layer: Introduction, Fra Parity – LRC – CRC Hamming c Point Protocols. ALOHA, CSM	ultiplexing, Transmission Media, Switching, ming, and Error – Detection and Correction – ode, Flow and Error Control, HDLC, Point to	10
II	Relay, Transmission modes, Mu Circuit Switched Networks Data link layer: Introduction, Fra Parity – LRC – CRC Hamming c Point Protocols. ALOHA, CSM 802.5 – IEEE 802.11, Random ac	ultiplexing, Transmission Media, Switching, ming, and Error – Detection and Correction – ode, Flow and Error Control, HDLC, Point to A/CD, LAN – Ethernet IEEE 802.3, IEEE	10
	Relay, Transmission modes, Mu Circuit Switched Networks Data link layer: Introduction, Fra Parity – LRC – CRC Hamming c Point Protocols. ALOHA, CSM 802.5 – IEEE 802.11, Random ac	ultiplexing, Transmission Media, Switching, ming, and Error – Detection and Correction – ode, Flow and Error Control, HDLC, Point to A/CD, LAN – Ethernet IEEE 802.3, IEEE cess, Controlled access, Channelization. cess Delivery, UDP and TCP protocols, Data	
	Relay, Transmission modes, Mu Circuit Switched Networks Data link layer: Introduction, Fra Parity – LRC – CRC Hamming c Point Protocols. ALOHA, CSM 802.5 – IEEE 802.11, Random ac Transport Layer: Process to Proc Traffic, Congestion, Congestion C	ultiplexing, Transmission Media, Switching, ming, and Error – Detection and Correction – ode, Flow and Error Control, HDLC, Point to A/CD, LAN – Ethernet IEEE 802.3, IEEE cess, Controlled access, Channelization. cess Delivery, UDP and TCP protocols, Data	
III	Relay, Transmission modes, Mu Circuit Switched Networks Data link layer: Introduction, Fra Parity – LRC – CRC Hamming c Point Protocols. ALOHA, CSM 802.5 – IEEE 802.11, Random ac Transport Layer: Process to Proc Traffic, Congestion, Congestion C Network layer: Logical Addressin	ultiplexing, Transmission Media, Switching, ming, and Error – Detection and Correction – ode, Flow and Error Control, HDLC, Point to A/CD, LAN – Ethernet IEEE 802.3, IEEE cess, Controlled access, Channelization. cess Delivery, UDP and TCP protocols, Data Control, QoS, Integrated Services,	10
III	Relay, Transmission modes, Mu Circuit Switched Networks Data link layer: Introduction, Fra Parity – LRC – CRC Hamming c Point Protocols. ALOHA, CSM 802.5 – IEEE 802.11, Random ac Transport Layer: Process to Proc Traffic, Congestion, Congestion C Network layer: Logical Addressin IGMP, Forwarding, Uni-Cast Rou	ultiplexing, Transmission Media, Switching, ming, and Error – Detection and Correction – ode, Flow and Error Control, HDLC, Point to A/CD, LAN – Ethernet IEEE 802.3, IEEE cess, Controlled access, Channelization. cess Delivery, UDP and TCP protocols, Data Control, QoS, Integrated Services, ng, Internetworking, Address mapping, ICMP,	10
III IV	Relay, Transmission modes, Mu Circuit Switched Networks Data link layer: Introduction, Fra Parity – LRC – CRC Hamming c Point Protocols. ALOHA, CSM 802.5 – IEEE 802.11, Random ac Transport Layer: Process to Proc Traffic, Congestion, Congestion C Network layer: Logical Addressin IGMP, Forwarding, Uni-Cast Rou	altiplexing, Transmission Media, Switching, ming, and Error – Detection and Correction – ode, Flow and Error Control, HDLC, Point to A/CD, LAN – Ethernet IEEE 802.3, IEEE cess, Controlled access, Channelization. cess Delivery, UDP and TCP protocols, Data Control, QoS, Integrated Services, ng, Internetworking, Address mapping, ICMP, tting Protocols, Multicast Routing Protocols. ne space, DNS in internet, electronic mail,	10 10
III IV	Relay, Transmission modes, Mu Circuit Switched Networks Data link layer: Introduction, Fra Parity – LRC – CRC Hamming c Point Protocols. ALOHA, CSM 802.5 – IEEE 802.11, Random ac Transport Layer: Process to Proc Traffic, Congestion, Congestion C Network layer: Logical Addressir IGMP, Forwarding, Uni-Cast Rou Application Layer: Domain nan SMTP, FTP, WWW, HTTP, SNM	altiplexing, Transmission Media, Switching, ming, and Error – Detection and Correction – ode, Flow and Error Control, HDLC, Point to A/CD, LAN – Ethernet IEEE 802.3, IEEE cess, Controlled access, Channelization. cess Delivery, UDP and TCP protocols, Data Control, QoS, Integrated Services, ng, Internetworking, Address mapping, ICMP, tting Protocols, Multicast Routing Protocols. ne space, DNS in internet, electronic mail,	10 10
III IV V Text Boo	Relay, Transmission modes, Mu Circuit Switched Networks Data link layer: Introduction, Fra Parity – LRC – CRC Hamming c Point Protocols. ALOHA, CSM 802.5 – IEEE 802.11, Random ac Transport Layer: Process to Proc Traffic, Congestion, Congestion C Network layer: Logical Addressin IGMP, Forwarding, Uni-Cast Rou Application Layer: Domain nan SMTP, FTP, WWW, HTTP, SNM	altiplexing, Transmission Media, Switching, ming, and Error – Detection and Correction – ode, Flow and Error Control, HDLC, Point to A/CD, LAN – Ethernet IEEE 802.3, IEEE cess, Controlled access, Channelization. cess Delivery, UDP and TCP protocols, Data Control, QoS, Integrated Services, ng, Internetworking, Address mapping, ICMP, tting Protocols, Multicast Routing Protocols. ne space, DNS in internet, electronic mail,	10 10 10
III IV V Text Boo 1. Data	Relay, Transmission modes, Mu Circuit Switched Networks Data link layer: Introduction, Fra Parity – LRC – CRC Hamming c Point Protocols. ALOHA, CSM 802.5 – IEEE 802.11, Random ac Transport Layer: Process to Proc Traffic, Congestion, Congestion C Network layer: Logical Addressir IGMP, Forwarding, Uni-Cast Rou Application Layer: Domain nan SMTP, FTP, WWW, HTTP, SNM Dks: Communications and Networking,	altiplexing, Transmission Media, Switching, ming, and Error – Detection and Correction – ode, Flow and Error Control, HDLC, Point to A/CD, LAN – Ethernet IEEE 802.3, IEEE cess, Controlled access, Channelization. eess Delivery, UDP and TCP protocols, Data Control, QoS, Integrated Services, ng, Internetworking, Address mapping, ICMP, ting Protocols, Multicast Routing Protocols. ne space, DNS in internet, electronic mail, IP.	10 10 10
III IV V Text Bo 1. Data	Relay, Transmission modes, Mu Circuit Switched Networks Data link layer: Introduction, Fra Parity – LRC – CRC Hamming c Point Protocols. ALOHA, CSM 802.5 – IEEE 802.11, Random ac Transport Layer: Process to Proc Traffic, Congestion, Congestion C Network layer: Logical Addressir IGMP, Forwarding, Uni-Cast Rou Application Layer: Domain nan SMTP, FTP, WWW, HTTP, SNM oks: Communications and Networking, puter Networks, Andrew S Tanenb	 altiplexing, Transmission Media, Switching, ming, and Error – Detection and Correction – ode, Flow and Error Control, HDLC, Point to A/CD, LAN – Ethernet IEEE 802.3, IEEE cess, Controlled access, Channelization. cess Delivery, UDP and TCP protocols, Data Control, QoS, Integrated Services, ng, Internetworking, Address mapping, ICMP, nting Protocols, Multicast Routing Protocols. ne space, DNS in internet, electronic mail, 4P. 	10 10 10
III IV V Text Boo 1. Data 2. Com Reference	Relay, Transmission modes, Mu Circuit Switched Networks Data link layer: Introduction, Fra Parity – LRC – CRC Hamming c Point Protocols. ALOHA, CSM 802.5 – IEEE 802.11, Random ac Transport Layer: Process to Proc Traffic, Congestion, Congestion C Network layer: Logical Addressir IGMP, Forwarding, Uni-Cast Rou Application Layer: Domain nan SMTP, FTP, WWW, HTTP, SNM oks: Communications and Networking, puter Networks, Andrew S Tanenb	 altiplexing, Transmission Media, Switching, ming, and Error – Detection and Correction – ode, Flow and Error Control, HDLC, Point to A/CD, LAN – Ethernet IEEE 802.3, IEEE cess, Controlled access, Channelization. cess Delivery, UDP and TCP protocols, Data Control, QoS, Integrated Services, ng, Internetworking, Address mapping, ICMP, nting Protocols, Multicast Routing Protocols. ne space, DNS in internet, electronic mail, 4P. Behrouz A. Farozan, Fourth Edition TMH, 200 aum, 4th Edition. Pearson Education, PHI. 	10 10 10

2. An Engineering Approach to Computer Networks, S. Keshav, 2nd Edition, Pearson Education.

3. Computer Networking: A Top-Down Approach Featuring the Internet. James Kurose& Keith W.



Evaluation/Assessmen	nt Methodology	
		Max. Marks 100
1) Class tasks/ Sessional Examination		15
2) Presentations /Seminar		
3) Assignments		
4) Research Project Report		10
Seminar On Research Project Report		
5) ESE		75
	Total:	100
Prerequisites for the course: NIL		
Course Learning Outcomes:		

CO1. Students should understand and explore the basics of Computer Networks and Various Protocols.

CO2. Students will be in a position to administrate a network and flow of information.

CO3. Able to understand the World Wide Web Concepts.

CO4. Able to understand the concepts of network security

CO5. Able to secure device from network issues.



IIMTU-NEP IMPLEMENTATION Year-III/ Semester-V

Progra	mme:Degree Year: III				
0	B.SC(CS) Semester: V				
Credits					
	eory:4Cr				
Course					
BCS-N					
Course	Objectives:				
CO 1: 5	Solve different types of display techniques.				
CO 2: A	Apply Point, Line, Circle, Ellipse, Polygon algorithm.				
CO 3: 5	Solve 2DTransformations and Composition of 3-D Transformation.				
CO 4: A	Apply Point, Text, Line, Polygon Clipping and Cohen-Sutherland Clipping Algorith	m			
	Solve Pipeline and Different Types of Projections techniques.				
	of Paper: Core				
	um Passing Marks/Credits:40% Marks (Internal +ESE)				
L:4					
T:0					
	Hours/Week)				
-	- 1 Hr. = 1 Credit				
Unit	al-2 Hrs.=1Credit(4Hrs./Week=4Credits)	No. of			
Umt	Contents	Lectures			
		Allotted			
Ι	Introduction: Basic of Computer Graphics, Uses of Computer Graphics,	8			
-	Shadow mask techniques, CRT working, Visual Display Devices-Refresh CRT,				
	Raster-Scan Displays, Random-Scan Displays, Color-CRT Monitors, DVST,				
	Flat Panel Displays, 3-D Viewing Devices, Stereoscopic and Virtual-Reality				
	Systems; Raster-Scan System, Random Scan System, Input/Output Devices,				
	Hard-Copy Devices, Color Models: RGB, CMY, HSV, HLS Color Models.				
II	Output Primitives Algorithms: Scan Conversion: Point, Line, Circle, Ellipse,	8			
	Polygon; Filled area Algorithms: Scan-line Polygon Fill Algorithm, Boundary-				
	Fill Algorithm, Flood-Fill Algorithm, Aliasing, and Introduction to Anti-				
	Aliasing.				
III	Geometric Transformations: 2-Dimensional Transformations (Translation,	8			
	Rotation, Scaling, Reflection, Shear, Inverse Transformation, Composite				
	Transformation, Homogeneous Coordinates and Matrix Representation, Matrix Representation of 3-D Transformations, Composition of 3-D Transformation.				
IV	Two-Dimensional Viewing and Clipping: Viewing Pipeline, The Window-to-	8			
1 V	Viewport Transformations, Convex and Concave Clipping, Point Clipping, Line	0			
	Clipping-Cohen-Sutherl and Polygon Clipping, Ling-Bar sky Line Clipping,				
	Cyrus-Beck Algorithm, Midpoint Subdivision Algorithm; Sutherland-Hodgeman				
	$-\nabla y_1 u_0 = D \nabla \nabla \nabla A_1 g \nabla H u_1 u_1 u_1 u_1 u_1 u_1 u_1 u_1 u_1 u_1$				
V	Polygon clipping.	8			
V	Polygon clipping. Three-Dimensional Viewing and Clipping: Viewing Pipeline, Projections,	8			
V	Polygon clipping.	8			



Reference:

- 1. SteveMarschner, Peter Shirley, "Fundamentals of Computer Graphics", CRC Press.
- 2. John Vince, "Mathematic sfor Computer Graphics", Springer.

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO 1: Learned and solved different types of display techniques	
CO 2: WAP for Point, Line, Circle, Ellipse, Polygon algorithm.	

CO 3: Learned and Solved 2D Transformations and Composition of 3-D Transformation.

CO 4: Applied Point, Text, Line, Polygon Clipping and Cohen-Sutherl and Clipping Algorithm

CO 5: Learned and Solved Pipeline and Different Types of Projections techniques.



IIMTU-NEPIMPLEMENTATION Year-III/ Semester-V

Program	me:Degree	Year:III			
Class:B.SC.(CS)		Semester: V			
Credits	redits Subject: Python Programming				
Theory:4					
Course C					
BCS-NEI		-			
Course C	bjectives:				
CO1: Un	derstand and use variables.				
CO2: Wo	ork with common Python data	a types, like integers, floats, strings as well as I	pandas Data		
	nes.				
	e basic flow control including f	for loops and conditionals.			
	ad data from text files.				
	tain basic summary statistics fr	rom data files.			
-	f Paper: Core course				
	n Passing Marks/Credits:409	% Marks (ISE+ESE)			
L:4					
T:0					
	urs/Week)				
	Hr.=1Credit	~			
	2Hrs.=1Credit(4Hrs./Week=40		NT		
Unit		Contents	No.		
			ofLectures Allotted		
	Introduction: Installing Pyt	hon in Windows/Linux/Mac OS, Using Python	10		
	interpreter, Execute a Script, S	Structuring with Indentation, Editors.			
Ι	Data types and Variables	: Variables, Variables v/s identifiers, Naming			
	convention of variables, Keyw	vords.			
	Data Structure: List, Tuples,	Sets, Dictionaries			
	Input And Output: Input fu	nction, Input with raw input (), Output with old	10		
II	string format, Python format f				
11		ments, For/while Statements, Range () function,			
	Break and continue statements	s, Else clauses on Loops.			
	e	ion, Default Argument, Keyword Argument,	10		
	Arbitrary Arguments List.				
III	File Handling: Reading from the file, Writing to the file, Methods of file				
	objects.				
	Error And Expectation: Syntax Errors, Exceptions, Handling Exceptions (try,				
	except).				
	0	import a module, Import the names, Executing	10		
IV	modules as scripts.				
_ . ,		ntax, Class Objects, Instance Objects, Method			
	Objects, Class and Instance V				
	e	ar Expressions, date time - date and time	10		
V	libraries, Dealing with Excel				
	Advanced Modules: Regular	Expressions ϖ date time - date and time libraries.			



Dealing with Excelm GU	Πω Web Scrappingw	
Text Books:		
1. Python Cook book Author: By I	David Beazley and Brian K. Jones	
2. The Python Book: The Ultimate	e Guide to Coding with Python by Aaron Asad	i (ed.)
3. Functional Programming in Pyth	non Author: David Mertz	
Reference:		
1. Python-(Mark Lutz)		
2. Python Training guide (BPB Pu	blications)	
Eva	luation/Assessment Methodology	
		Max. Marks 100
1) Class tasks/SessionalExamination	on	15
2) Presentations/Seminar		
3) Assignments		
4) Research Project Report	10	
Seminar On Research Project R	eport	75
5) ESE		75
	Total:	100
Prerequisites for the course: Data M	lining	
Course Learning Outcomes:		
CO1: The course is designed	to provide Basic knowledge of Python.	
CO2: Interpret the fundament	al Python syntax and semantics and be fluent	in the use of Python
control flow statements.		-
CO3: Express proficiency in t	he handling of strings and functions.	
CO4: Identify the commonly	used operations involving file systems and reg	ular expressions.
CO5: Articulate the Object-O and polymorphism as us	riented Programming concepts such as encapsed in Python.	sulation, inheritance



IIMTU-NEP IMPLEMENTATION Year-III/ Semester-V

Prog	ramme:UG	Year:III	
0	s:B.SC. (CS)	Semester:V	
Cred		Subject: Python Programming Lab	
Pract	ical: 2Cr		
Cour	se Code:	Title:Python Programming Lab	
BCS-	NEP-505P		
Cour	se Objectives	:	
CO1:	To be able to	introduce core programming basics and various Operators of Python	programming
Lang	-		
		te about Python data structures like Lists, Tuples, Sets and dictionarie	
		d about Functions, Modules and Regular Expressions in Python ^π Pro	gramming.
-	re of Paper: (
	mum Passing	Marks/Credits:40% Marks	
L:0			
T:0		N .	
	n Hours/Week ry - 1 Hr. = 1 (
		Credit(4Hrs./Week=4Credits)	
Sr.	Contents	credit(41115.7 week=4Credits)	No. of
51.	Contents		
1			Lectures
			Lectures Allotted
I	Write a pyth	on script to check whether a given number is even or odd.	Allotted
I II		on script to check whether a given number is even or odd. on script to add two integers' values taken from user.	Allotted
	Write a Pyth	on script to add two integers' values taken from user.	Allotted
II	Write a Pyth Write a pyth	· · ·	Allotted 1 1
II III	Write a Pyth Write a pyth Write a prog	on script to add two integers' values taken from user. on script to calculate area of circle where radius is taken from user.	Allotted 1 1 1
II III IV	Write a Pyth Write a pyth Write a prog Write a Pyth	on script to add two integers' values taken from user. on script to calculate area of circle where radius is taken from user. ram to copy the content of one file to another file.	Allotted 1 1 1 1 1 1
II III IV V	Write a Pyth Write a pyth Write a prog Write a Pyth Write a prog Write a prog	on script to add two integers' values taken from user. on script to calculate area of circle where radius is taken from user. ram to copy the content of one file to another file. on Program to find the sum of series: $1 + 1/2 + 1/3$. ram to find the sum of n natural numbers. ram to find factorial of a given number.	Allotted 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
II III IV V VI VII VIII	Write a Pyth Write a pyth Write a prog Write a Pyth Write a prog Write a prog	on script to add two integers' values taken from user. on script to calculate area of circle where radius is taken from user. ram to copy the content of one file to another file. on Program to find the sum of series: $1 + 1/2 + 1/3$. ram to find the sum of n natural numbers.	Allotted 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
II III IV V VI VII	Write a Pyth Write a pyth Write a prog Write a Pyth Write a prog Write a prog Write a prog	on script to add two integers' values taken from user. on script to calculate area of circle where radius is taken from user. ram to copy the content of one file to another file. on Program to find the sum of series: $1 + 1/2 + 1/3$. ram to find the sum of n natural numbers. ram to find factorial of a given number.	Allotted 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
II IV V VI VII VIII IX X	Write a Pyth Write a pyth Write a prog Write a Pyth Write a prog Write a prog Write a prog Write a prog Program to c	on script to add two integers' values taken from user. on script to calculate area of circle where radius is taken from user. ram to copy the content of one file to another file. on Program to find the sum of series: $1 + 1/2 + 1/3$. ram to find the sum of n natural numbers. ram to find factorial of a given number. ram to find whether a given number is Armstrong number or not.	Allotted 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
II IV V VI VII VIII IX X Text	Write a Pyth Write a pyth Write a prog Write a prog Write a prog Write a prog Write a prog Write a prog Program to c Books:	on script to add two integers' values taken from user. on script to calculate area of circle where radius is taken from user. ram to copy the content of one file to another file. on Program to find the sum of series: $1 + 1/2 + 1/3$. ram to find the sum of n natural numbers. ram to find factorial of a given number. ram to find whether a given number is Armstrong number or not. ram takes a number and computes the prime factors of the integer. whech whether a given number is a palindrome.	Allotted 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
II IV V VI VII VIII IX X Text 1. Po	Write a Pyth Write a pyth Write a prog Write a Pyth Write a prog Write a prog Write a prog Write a prog Program to c Books: oja Sharma, "	on script to add two integers' values taken from user. on script to calculate area of circle where radius is taken from user. ram to copy the content of one file to another file. on Program to find the sum of series: 1 + 1/2 + 1/3. ram to find the sum of n natural numbers. ram to find factorial of a given number. ram to find whether a given number is Armstrong number or not. ram takes a number and computes the prime factors of the integer. wheck whether a given number is a palindrome.	Allotted 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
II IV V VI VII VII IX X Text 1. Po 2. M	Write a Pyth Write a pyth Write a prog Write a prog Write a prog Write a prog Write a prog Write a prog Program to c Books: ooja Sharma, " ark Summer f	on script to add two integers' values taken from user. on script to calculate area of circle where radius is taken from user. ram to copy the content of one file to another file. on Program to find the sum of series: 1 + 1/2 + 1/3. ram to find the sum of n natural numbers. ram to find factorial of a given number. ram to find whether a given number is Armstrong number or not. ram takes a number and computes the prime factors of the integer. check whether a given number is a palindrome.	Allotted 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
II III IV V VI VII VIII IX X Text 1. Po 2. M Pea	Write a Pyth Write a pyth Write a prog Write a prog Write a prog Write a prog Write a prog Write a prog Program to c Books: ooja Sharma, " ark Summer f	on script to add two integers' values taken from user. on script to calculate area of circle where radius is taken from user. ram to copy the content of one file to another file. on Program to find the sum of series: 1 + 1/2 + 1/3. ram to find the sum of n natural numbers. ram to find factorial of a given number. ram to find whether a given number is Armstrong number or not. ram takes a number and computes the prime factors of the integer. check whether a given number is a palindrome.	Allotted 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
II III IV V VI VII VIII IX X Text 1. Po 2. Ma Pea Refe	Write a Pyth Write a pyth Write a prog Write a Pyth Write a prog Write a prog Write a prog Write a prog Write a prog Program to c Books: ooja Sharma, " ark Summer f arson Educatio rence:	on script to add two integers' values taken from user. on script to calculate area of circle where radius is taken from user. ram to copy the content of one file to another file. on Program to find the sum of series: 1 + 1/2 + 1/3. ram to find the sum of n natural numbers. ram to find factorial of a given number. ram to find whether a given number is Armstrong number or not. ram takes a number and computes the prime factors of the integer. check whether a given number is a palindrome. Programmingin Python", BPB Publications. field, "Programming in Pythona Complete Introduction to the Python".	Allotted 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
II III IV V VI VII VIII IX X Text 1. Po 2. Mi Pea Refer 1. M	Write a Pyth Write a pyth Write a prog Write a prog Write a prog Write a prog Write a prog Write a prog Program to c Books: ooja Sharma, " ark Summer f arson Education rence: fark Lutz, "Prog	on script to add two integers' values taken from user. on script to calculate area of circle where radius is taken from user. ram to copy the content of one file to another file. on Program to find the sum of series: 1 + 1/2 + 1/3. ram to find the sum of n natural numbers. ram to find factorial of a given number. ram to find whether a given number is Armstrong number or not. ram takes a number and computes the prime factors of the integer. eheck whether a given number is a palindrome.	Allotted 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
II III IV V VI VII VIII IX X Text 1. Po 2. Mi Pea Refer 1. M 2. W	Write a Pyth Write a pyth Write a prog Write a prog Write a prog Write a prog Write a prog Write a prog Program to c Books: ooja Sharma, " ark Summer fi arson Education rence: Mark Lutz, "Provesley Chun, "	on script to add two integers' values taken from user. on script to calculate area of circle where radius is taken from user. ram to copy the content of one file to another file. on Program to find the sum of series: 1 + 1/2 + 1/3. ram to find the sum of n natural numbers. ram to find factorial of a given number. ram to find whether a given number is Armstrong number or not. ram takes a number and computes the prime factors of the integer. check whether a given number is a palindrome. Programmingin Python", BPB Publications. field, "Programming in Pythona Complete Introduction to the Python".	Allotted 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1



IIMTU-NEP IMPLEMENTATION Year-III/ Semester-V

DrogrommerUC		Year: III			
Programme:UG Class: BSC(CS)		Semester: V			
Practical :2 Cr	Subject:Comp	uter Graphics Lab			
	Course Code: Title:Computer Graphics Lab				
BCS-NEP-504P					
Course Objectives:		-h			
CO 1: Solve different typ		-			
CO 2: Apply Point, Line					
		mposition of 3-D Transformation.			
		Clipping and Cohen-Sutherland Clippi	ng Algoriti	nm	
	a Different Type	es ofProjections techniques.			
Nature of Paper: Core					
0	ks/Credits:40%	b Marks (Internal +ESE)			
L:0					
T:0 D:4(Le House(Weals)					
P:4(In Hours/Week)					
Practical- 2 Hrs.=1Credit	t(4Hrs./Week=2)	Credits)			
Unit Contents				No. of	
				Lectures	
	. 1 1 .	1'' 1'1 1' 1TT .		Allotted	
		graphics construction like line and Hut		2	
		graphics construction like circle and tr		2	
	m to draw basic	graphics construction like arc and mov	ing	2	
images.			11.00		
e	m to draw basic	c graphics construction like ellipse and	different	2	
shapes.					
C C	im to draw basic	c graphics construction like rectangle	and smile	2	
face					
Text Books:	<i>"C</i>				
		Graphics", Pearson Education.		• • • • • •	
•	iner, Hughes,"C	Computer Graphics: Principle & Prac	ctice", Add	ison Wesley	
Professional.					
Reference:	(חמש		
	•	ndamentals of Computer Graphics", C	KC Press.		
2. John Vince, " <i>Mathen</i>		uter Graphics", Springer.			
	Evaluati	ion/Assessment Methodology	M	M. 1. 70	
	1.5			x. Marks 50	
1) Class tasks/ Sessiona			25		
2) Presentations /Semin	ar				
3) Assignments					
	portSeminar on I	Research Project Report	25		
5) ESE					
		Total:	50		



Prerequisites for the course: NIL

Course Learning Outcomes:

CO 1: Learned and solved different types of display techniques.

CO 2: WAP for Point, Line, Circle, Ellipse, Polygon algorithm.

CO 3: Learned and Solved 2DTransformations and Composition of 3-D Transformation.

CO 4: Applied Point, Text, Line, Polygon Clipping and Cohen-SutherlandClipping Algorithm

CO 5: Learned and Solved Pipeline and Different Types of Projections techniques.



IIMTU-NEPIMPLEMENTATION Year-III/ Semester-VI

Progra	mme:Deg	gree	Year: III	
-	Class:BSC(CS)		Semester: VI	
Credits	. ,	Subject: Cyber Secur	rity	
Theory:				
	Course Code: Title:Cyber Security			
BCS-N		j		
	Objectiv	es:		
CO1:			nd methods used in cybercrime.	
CO2:	Identify	risk management proc	cesses, risk treatment methods, organization of info	ormation
	security			
CO3:	Classify	cyber security solutio	ns and information assurance.	
CO4:	Examin	e software vulnerabilit	ies and security solutions to reduce the risk of expl	loitation.
CO5:	Analyze	the cyber security nee	eds of an organization.	
Nature	o fPaper	: Core Course		
Minim	um Passii	ng Marks/Credits:40	% Marks (ISE+ESE)	
L:4		-		
T:0				
P:0(In H	Hours/We	ek)		
Theory-	-1Hr.=1Ci	redit		
Practica	al-2Hrs.=1	Credit(4Hrs./Week=4	Credits)	
Unit			Contents	No. of
				Lectures
				Allotted
Ι	Introd	uction to Ethical H	Iacking: Key issues plaguing the information	10
	security	y world, incident mana	gement process, and penetration testing,	
	Footpr	inting and Reconnai	issance: Various types of footprints, footprints	
	tools, a	nd countermeasures.		
II	Scanni	ng Network: Net	work scanning techniques and scanning	10
	counter	measure.		
III			bility Analysis: Enumeration techniques and	10
			Vulnerability Analysis using different tools.	10
IV	•	6	are Threats: System Hacking Methodology,	10
			attacks and covering tracks. Different types of	
	•	•	d Trojan countermeasures, working of viruses,	
		analysis, computer	worms, malware analysis procedure and	
		inication.		
V			ng: Packet sniffing techniques, identify theft, and	10
		engineering counterme	asure	
Text Bo		~	• • • • • • • • • • • • • • • • • • •	
		-	al property & E Commerce, Security", 1 st Edition	n, Dominant
	lisher,201		Laws" Second Edition Wedhwe and Company	Now Dolk:
	•	yuer, Guidelo Cyber	Laws", Second Edition, Wadhwa and Company,	new Deini,
200′		1' 1' 0' 1	ementation Issues, NIIT, PHI.	
3. Info				



Reference

- Vakul Sharma, "Handbook of Cyber Laws" Macmillan India Ltd, 2nd Edition, PHI,2003.
 Justice Yatindra Singh, "Cyber Laws", Universal Law Publishing, 1st Edition, New Delhi, 2003.

	, , ,		
Evaluation/Assessment Methodology			
	Max. Marks 100		
1) Class tasks/Sessional Examination	15		
2) Presentations /Seminar			
3) Assignments			
4) Research Project Report	10		
5) Seminar On Research Project Report			
6) ESE	75		
Total:	100		
Prerequisites for the course: Data Mining			
Course Learning Outcomes:			
CO1: Able to analyze and evaluate the cyber security needs of an organization	n.		
CO2: Able to determine and analyze software vulnerabilities and security s risk of exploitation.			

CO3: Able to measure the performance and troubleshoot cyber security systems.

CO4: Implement cyber security solutions and use of cyber security, information assurance, and cyber/computer forensics software/tools.

CO5: Comprehend and execute risk management processes, risk treatment methods, and key risk and performance indicators



IIMTU-NEP IMPLEMENTATION Year-III/ Semester-VI

Progra	mme:Deg	ree	Year: III	
Class:E	B.SC. CS		Semester:VI	
Credits	5	Subject:E-Commerce		
Theory	:4Cr	, , , , , , , , , , , , , , , , , , ,		
Course		Title:E-Commerce		
BCS-N	EP-603			
Course	Objective	es:		
CO1:	Impart th	he students with kno	wledge and understanding of contemporary tra	ends in e-
CO2:	commerc	ce.		
CO3:	Explain e	electronic system and Ir	nternet.	
CO4:	Describe	the use of e-commerce	security.	
CO5:	To provid	de adequate knowledge	and understanding about E-Com practices to the st	udents.
	Understa	nd the usage of plannin	g and marketing for e-commerce.	
Nature	of Paper:	DSE		
Minim	um Passin	ng Marks/Credits:40%	Marks (ISE +ESE)	
L:4				
T:0				
P:0(In H	Hours/Wee	ek)		
Theory	- 1 Hr. = 1	l Credit		
Unit			Contents	No. of
				Lectures
				Allotted
Ι	An intro	oduction to electronic	commerce: What is E-Commerce (Introduction	8
	and Defin	nition), Main activities	E-Commerce. Goals of E-Commerce, Technical	
	Compone	ents of E-Commerce,	Functions of E-Commerce, Advantages and	
	disadvant	tages of E-Commerce,	, Scope of E-Commerce, Electronic Commerce	
	Applicati	ions, Electronic Comm	erce and Electronic Business(C2C) (C2G; G2G,	
	B2G, B2	P, B2A, P2P, B2A, C2A	A, B2B, B2C)	
II			olution of Internet, Domain Names and Internet	8
			, .gov, .net etc.), Types of Networks, Internet	
	Service P	Provider, World Wide V	Web, Internet & Extranet, Role of Internet in B2B	
		U U	osite, Cost, Time, Reach, Registering a Domain	
			email, Barter, Exchange, Shopping Bots	
III		-	ransaction, Computer Monitoring, Privacy on	8
		1 1	acy, Computer Crime(Laws, Types of Crimes),	
		1	ystem, Software Packages for privacy, Hacking,	
	-	·	, Virus problem, virus protection, Encryption and	
		• • • •	ography, DES, Public Key Encryption, RSA,	
			n, Firewall, Digital Signature.	
IV	Electronic Data Exchange: Introduction, Concepts of EDI and Limitation,		8	
			ntages of EDI, EDI model, Electronic Payment	
	System: Introduction, Types of Electronic Payment System, Payment Types,			
	-	• -		
	Value E	• -	edit Card System, Electronic Fund Transfer,	



	Transforming Education 1		action 27 & 12B	
V	Planning for Electronic Commerce: Planning Electronic Commerce initiates, 8			
	linking objectives to business strategies, measuring cost objectives, comparing			
benefits to Costs, Strategies for developing electronic commerce web sites.				
	Internet Marketing; The PROS and CONS of online shopping	ng, The cons of		
	online shopping. Justify an Internet business, Internet marketing	techniques, The		
	E-cycle of Internet marketing, Personalization e-commerce.			
Text B	ooks:			
1. G.S	.V. Murthy, E-Commerce Concepts, Models, Strategies -: - Himala	ya Publishing Ho	use, 2011.	
2. Kan	nlesh K Bajaj and Debjani Nag, E- Commerce, 2005.			
Referen	ice			
1. Gra	y P. Schneider, Electronic commerce, International Student Edition	n, 2011.		
2. E-C	ommerce, Fundamentals and Applications, Wiley Student Edition,			
	Evaluation/Assessment Methodology			
		Max.	Marks 100	
1) Clas	ss tasks/ Sessional Examination	15		
2) Pres	sentations /Seminar			
3) Ass	ignments			
4) Research Project Report 10				
Seminar On Research Project Report				
5) ESE	5) ESE 75			
	Total:	100		
Prerequ	isites for the course: Problem Solving using C			
Course	Learning Outcomes:			
CO1:	Identify and explain fundamental web site tools including desig	gn tools, program	ming tools,	
	and data processing tools.			
CO2:	i e			
CO3:	CO3: Acquire the knowledge of security issues and explain procedures used to protect against			
	security threats.			
	CO4: Communicate effectively in ways appropriate to the discipline, audience and purpose.			
CO5:	CO5: Implement the corrective measures to management issues underlying e-Commerce issues			
	including organizational structure, strategic planning, goal setting	.		



IIMTU-NEP IMPLEMENTATION Year-III/ Semester-VI

Programm	e: Degree	Year: III	
Class:B.SC	C. CS	Semester: VI	
Credits	Credits Subject: Mobile Computing		
Theory:4Ci			
Course Co	de: Title: Mobile Compu	iting	
BCS-NEP-	603		
Course Ob	0		
	iderstand the basic concepts		
	arn the basics of mobile data		
		yer protocols and Ad-Hoc networks.	
		and application layer protocols.	
CO5: To ga	in knowledge about differen	t mobile platforms and application development.	
	Paper: DSE		
	Passing Marks/Credits:40%	% Marks (ISE +ESE)	
L:4			
T:0			
P:0(In Hou	· · · · · · · · · · · · · · · · · · ·		
	Hr. = 1 Credit		
Unit		Contents	No. of
			Lectures
			Allotted
Ι	Mobile Computing: Issue	es in Mobile Computing, Wireless Telephony,	8
		Bluetooth Technology, Wireless Multiple Access	
Protocols, Channel Allocation in Cellular Systems. Wireless Application			
	Protocol, WRITE A PRO	GRAM technology, Mobile Information device,	
	Mobile Computing Applicat		
II	-	es: Mobility, Wireless Communication and	8
	Portability, Data Replication	on and Replication Schemes, Basic Concept of	
	Multihopping, Adaptive	Clustering for Mobile Network, Multi-cluster	
	Architecture.		
III		ocation Based Services, Automatically Locating	8
		Organizing Services, Issues and Future Directions,	
	Mobile IP, Comparison of T	CP and Wireless.	
IV	Transaction Management	: Data Dissemination, Cache Consistency, Mobile	8
	-	bile Database Research Directions, Security Fault	
	Tolerance for Mobile N/W.		
V	What is Ad-hoc Network?	Problems with Message Routing in Wireless Ad-	8
	hoc Mobile Networks, Rou	tting scheme based on signal strength, Link state	
	and Distance Vector routing	protocols, Ad-hoc on Demand Distance Vector .	
Text Book	.s:		
1. Shambl	nu Upadhyaya, Abhijeet	Chaudhary, Kevin Kwiat, Mark Weiss,	"Mobile
Compu	ting", Kluwer Academic Pub	lishers.	
2. UWE	Hansmann, Lothar Merk,	Martin-S-Nickie's, Thomas Stone, "Principles	of Mobile
Compu	ting", Springer International	Edition.	
0 117 1	and Mabila Naturalia Ara	hitectures, by Yi-Bing Lin & Imrich Champak, Joh	n Wiley &
3. Wireles	s and mobile networks Arc	intectures, by 11-bing Lin & initian Champak, join	



Reference

- 1. Mobile and Personal Communication systems and services, by Raj Pandya, Prentice Hall of India, 2001.
- 2. Wireless Web Development, Ray Richter, Springer Publishing, 2000.

Evaluation/Assessment Methodology			
	Max. Marks 100		
1) Class tasks/ Sessional Examination	15		
2) Presentations /Seminar			
3) Assignments			
4) Research Project Report	10		
Seminar On Research Project Report			
5) ESE	75		
Total:	100		
Prerequisites for the course: Problem Solving using C			
Course Learning Outcomes:			
CO1: Understand about mobile communication with their different routin	ng algorithms.		
CO2: Apply different data backup schemes used in mobile network to store the data.			
CO3: Able to explain about location management that is much important for mobile network.			
CO4: Build the knowledge of how transactions are done through mobile, different security issues			
while mobile transaction.			
CO5: Appraise different routing protocols used for routing the path like	ADDV, DSR, FSR etc.		



IIMTU-NEP IMPLEMENTATION Year-III/ Semester-VI

0	mme:Degre	ee	Year:III	
	B.Sc. (CS)		Semester: VI	
Credits		Subject:Real Time S	ystem	
Theory				
		Title:Real Time Syst	em	
	EP-603			
	Objectives			
CO1:	•	he basic of tasks and	6	
CO2:			nguages and databases.	
CO3:	•	e real time communic		
CO4:			es and reliability models for Hardware Redundancy.	
CO5:	To underst	tand clock synchroniz	zation.	
Nature	of Paper: l	DSE		
			6 Marks (ISE +ESE)	
L:4		,		
T:0				
	Hours/Week	()		
· ·	- 1 Hr. = 1	2 · · · · · · · · · · · · · · · · · · ·		
Unit			Contents	No. of
Umt			Contents	Lecture
Ι				Allotted
I		UCTION TO TASK		8
			me Computing, Structure of a Real Time System,	
			asures for Real time Systems, Task Assignment	
			iprocessor scheduling algorithms, RM algorithm	
	with differ			
II			OR SCHEDULING:	8
			S tasks, Task assignment, Utilization balancing –	
			off-line - Focused addressing and bidding- Buddy	
			llingAperiodic scheduling - Spring algorithm.	
III		ME COMMUNICA		8
	Introductio	on – VTCSMA –	PB CSMA- Deterministic collision resolution	
	-	-	acket messages- dynamic planning based-	
	Communio	cation with periodic a	nd aperiodic messages.	
IV	REAL TI	ME DATABASES:		8
	Basic Def	finition, Real time	Vs General purpose databases, Main Memory	
	Databases,	, Transaction priori	ties, Transaction Aborts, Concurrency control	
	issues, Di	isk Scheduling Algo	orithms, Maintaining Serialization Consistency,	
		for Hard Real Time S		
V			ND CASE STUDIES:	8
			eal-time modelling, Air traffic controller system –	-
		d airdefense system.	<i>a</i> , <i>b</i> , <i>a</i> , <i>a</i> , <i>b</i>	
Text B				
LUAL D				
Ian	-W S Lin	"Real-fime systems"	, 1st Edition, Prentice Hall, 2000.	

2. Philips A. LaPlante, "Real-Time System Design and Analysis", 3rdEdition, John Wiley & Sons,



2004.

3. C. Siva Ram Murthy, G. Manimaran, "Resource management in real-time systems and networks", PHI, 2009.

Reference

- 1. C.M. Krishna, Kang G. Shin, "Real Time Systems", Tata Mc. Graw Hill, 2010.
- 2. Giorgio C. Bottazzi, "Hard real-time computing systems: predictable scheduling algorithms and applications", Springer, 2008.

Evaluation/Assessment Methodology		
	Max. Marks 100	
1) Class tasks/ Sessional Examination	15	
2) Presentations /Seminar		
3) Assignments		
4) Research Project Report	10	
Seminar On Research Project Report		
5) ESE	75	
Total:	100	
Prerequisites for the course: Problem Solving using C		
Course Learning Outcomes:		
CO1: Understand the features and structures of practical Operating Sys	tem implementations.	
CO2: Acquire practical knowledge Real Time Operating Systems used in embedded system.		
CO3: Understand the use of multitasking techniques in Real Time Systems.		
CO4: Compare different scheduling algorithms and the schedule ability criteria.		

CO5: Analyze real time systems with regard to keeping time and resource restrictions.



IIMTU-NEP IMPLEMENTATION Year-III/ Semester-VI

Programm	ne: UG		Year:III		
Class: BSC	C(CS)		Semester:VI		
Credits		Subject:Artificial in	ntelligence lab(SPT-IV)		
Practical: 2	2Cr	-	-		
Course Co	ode:	Title: Artificial intel	lligence lab		
BCS-NEP-	-412P				
Course Ob	0				
	• •	ply standard practic	es and methodologies in software of	developmer	nt and project
manageme					
	•	U	f artificial intelligence.		
		e concept of Artificia	al intelligence.		
Nature of	_				
	Passing 1	Marks/Credits:40%	Marks		
L:0					
T:0					
P:4(In Hou					
Theory - 1			Creadita)		
		bredit(4Hrs./Week=4	Credits)		N f
Unit	Contents				No. of
					Lectures Allotted
Ι	Write a ni	rogram in prolog to i	mplement simple facts and Queries		2
			mplement simple arithmetic		2
		0 1 0	olve Monkey banana problem		2
			olve Tower of Hanoi		2
			olve 8 Puzzle problems		2
	-	<u> </u>	olve 4-Queens problem		2
	1	<u> </u>	olve Traveling salesman problem.		2
	_	rogram in prolog for	<u> </u>		2
Reference	_				
1. Elaine l	Rich& Ke	evin Knight, "Artifica	ial Intelligence", Tata McGraw Hill.		
2. Dan W.	. Patterson	n, "Introduction to A	rtificial Intelligence & Expert Systems	5 ", PHI.	
		Evaluati	on/Assessment Methodology		
				Μ	ax. Marks:50
		ional Examination		25	
/	tations /Se	eminar			
3) Assignment					
	ch Project	-			
	ar On Rese	earch Project Report			
5) ESE				25	
			Total:	50	



Course Learning Outcomes:

Student will be able to:

- CO1: To understand the concept of Artificial intelligence.
- CO2: To understand the design principles of pattern recognition with estimation and apply classification technique.
- CO3: To apply knowledge representation and reasoning techniques.



IIMTU-NEP IMPLEMENTATION Year-III/ Semester-VI

Program	nme:UG Year: III	
0	SC.(CS) Semester: VI	
Credits	Subject:Cyber Security Lab	
Practical	* • •	
Course	Code: Title:Cyber Security Lab	
BCS-NE	•	
Course	Objectives:	
CO1: Pro	ovide practical application of cyber security concepts learne	d in theory.
	miliarize students with a wide range of security tools and te	
	nphasize ethical and legal considerations in the field of cybe	•
	ay updated with the latest trends, threats, and advancements	in cyber security.
	of Paper: Core	
	m Passing Marks/Credits:40% Marks	
L:0		
T:0		
· · · · · · · · · · · · · · · · · · ·	ours/Week)	
•	1 Hr. = 1 Credit	
	- 2 Hrs.=1Credit(4Hrs./Week=2Credits)	
Unit	Contonto	
	Contents	No. of
	Contents	Lectures
T		Lectures Allotted
I	Checklist for reporting cybercrime at Cybercrime Police	Lectures AllottedStation.
II	Checklist for reporting cybercrime at Cybercrime Police Checklist for reporting cybercrime online.	Lectures AllottedStation.22
	Checklist for reporting cybercrime at Cybercrime Police	Lectures AllottedStation.22
II	Checklist for reporting cybercrime at Cybercrime Police Checklist for reporting cybercrime online. Basic checklist, privacy and security settings for po	Lectures AllottedStation.22
II III	Checklist for reporting cybercrime at Cybercrime Police Checklist for reporting cybercrime online. Basic checklist, privacy and security settings for populatforms.	Lectures AllottedStation.2opular social media22222
II III IV	Checklist for reporting cybercrime at Cybercrime Police of Checklist for reporting cybercrime online. Basic checklist, privacy and security settings for populatforms. Checklist for secure net banking.	Lectures AllottedStation.2Opular social media2Opular social media2
II III IV V	Checklist for reporting cybercrime at Cybercrime Police of Checklist for reporting cybercrime online. Basic checklist, privacy and security settings for po- platforms. Checklist for secure net banking. Setting and configuring two factor authentication in the M Installation and configuration of computer Anti-virus. Wi-Fi security management in computer and mobile.	Lectures AllottedStation.2opular social media22210bile phone.2222222
II III IV V VI VII VIII	 Checklist for reporting cybercrime at Cybercrime Police & Checklist for reporting cybercrime online. Basic checklist, privacy and security settings for peplatforms. Checklist for secure net banking. Setting and configuring two factor authentication in the M Installation and configuration of computer Anti-virus. Wi-Fi security management in computer and mobile. Setting and configuring two factor authentications in the Installation security management in computer and mobile. 	Lectures AllottedStation.2opular social media22210bile phone.2222222
II III IV V VI VII VIII Reference	Checklist for reporting cybercrime at Cybercrime Police 3 Checklist for reporting cybercrime online. Basic checklist, privacy and security settings for poplatforms. Checklist for secure net banking. Setting and configuring two factor authentication in the M Installation and configuration of computer Anti-virus. Wi-Fi security management in computer and mobile. Setting and configuring two factor authentications in the 1 ce / Text Books:	Lectures AllottedStation.222opular social media222Mobile phone.222Mobile phone.2
II III IV V VI VII VIII Reference 1. Cybe	Checklist for reporting cybercrime at Cybercrime Police & Checklist for reporting cybercrime online. Basic checklist, privacy and security settings for po- platforms. Checklist for secure net banking. Setting and configuring two factor authentication in the M Installation and configuration of computer Anti-virus. Wi-Fi security management in computer and mobile. Setting and configuring two factor authentications in the T ce / Text Books: er Crime Impact in the New Millennium, by R. C Mishra, A	Lectures AllottedStation.2Opular social media2Opular social media210bile phone.222Mobile phone.222Mobile phone.222Mobile phone.222Mobile phone.222Mobile phone.2
II III IV V VI VII VIII Reference 1. Cybe 2. Elect	Checklist for reporting cybercrime at Cybercrime Police & Checklist for reporting cybercrime online. Basic checklist, privacy and security settings for poplatforms. Checklist for secure net banking. Setting and configuring two factor authentication in the M Installation and configuration of computer Anti-virus. Wi-Fi security management in computer and mobile. Setting and configuring two factor authentications in the T ce / Text Books: er Crime Impact in the New Millennium, by R. C Mishra, A tronic Commerce by Elias M. Awed, Prentice Hall of India	Lectures AllottedStation.222opular social media222Mobile phone.222Mobile phone.222Wobile phone.222Wobile phone.222Vultor Press. Edition 2010.Pvt. Ltd.
II III IV V VI VII Reference 1. Cybe 2. Elect 3. Cybe	Checklist for reporting cybercrime at Cybercrime Police 3 Checklist for reporting cybercrime online. Basic checklist, privacy and security settings for poplatforms. Checklist for secure net banking. Setting and configuring two factor authentication in the M Installation and configuration of computer Anti-virus. Wi-Fi security management in computer and mobile. Setting and configuring two factor authentications in the Setting and configuring two factor authentications in the Cre / Text Books: Er Crime Impact in the New Millennium, by R. C Mishra, A tronic Commerce by Elias M. Awed, Prentice Hall of India er Laws: Intellectual Property & E-Commerce Security by K	Lectures AllottedStation.2Station.2opular social media2opular social media2Image: State of the second
II III IV V VI VII VIII Reference 1. Cybe 2. Elect 3. Cybe 4. Netw	Checklist for reporting cybercrime at Cybercrime Police & Checklist for reporting cybercrime online. Basic checklist, privacy and security settings for poplatforms. Checklist for secure net banking. Setting and configuring two factor authentication in the M Installation and configuration of computer Anti-virus. Wi-Fi security management in computer and mobile. Setting and configuring two factor authentications in the T ce / Text Books: er Crime Impact in the New Millennium, by R. C Mishra, A tronic Commerce by Elias M. Awed, Prentice Hall of India	Lectures AllottedStation.2Station.2opular social media2opular social media2Image: State of the second
II III IV V VI VII Reference 1. Cybe 2. Elect 3. Cybe 4. Netw Ltd.	Checklist for reporting cybercrime at Cybercrime Police 3 Checklist for reporting cybercrime online. Basic checklist, privacy and security settings for poplatforms. Checklist for secure net banking. Setting and configuring two factor authentication in the M Installation and configuration of computer Anti-virus. Wi-Fi security management in computer and mobile. Setting and configuring two factor authentications in the Setting and configuring two factor authentications in the Cre / Text Books: Er Crime Impact in the New Millennium, by R. C Mishra, A tronic Commerce by Elias M. Awed, Prentice Hall of India er Laws: Intellectual Property & E-Commerce Security by K	Lectures AllottedStation.2Station.2opular social media2opular social media2Image: Social media2

Fundamentals of Network Security by E. Maiwald, McGraw Hill.
 If the course is available as Generic Elective, then the students of following departments may opt it.



Evaluation/Assessment Methodology			
	Max. Marks:50		
1) Class tasks/ Sessional Examination	25		
2) Presentations /Seminar			
3) Assignments			
4) Research Project Report			
Seminar On Research Project Report			
5) ESE	25		
Total:	50		

Course Learning Outcomes:

Student will be able to:

- CO1: After completion of this module, students would be able to understand the concept of Cyber security and issues and challenges associated with it.
- CO2: Students, at the end of this module, should be able to understand the cybercrimes, their nature, legal remedies and as to how report the crimes through available platforms and procedures.
- CO3: On completion of this module, students should be able to appreciate various privacy and security concerns on online social media and understand the reporting procedure of inappropriate content, underlying legal aspects and best practices for the use of social media platforms.
- CO4: After the completion of this module, students would be able to understand the basic concepts related to E-Commerce and digital payments. They will become familiar with various digital payment modes and related cyber security aspects, RBI guidelines and preventive measures against digital payment frauds.
- CO5: Students, after completion of this module will be able to understand the basic security aspects related to Computer and Mobiles. They will be able to use basic tools and technologies to protect their devices.



School of Computer Science & Applications ACADEMIC HANDBOOK



Ordinance & Academic Regulations B.Sc. -CS (Data Science)



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- 6. Program Specific outcome
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- 8. Eligibility in all year as NEP (entry & exit) as per NEHQF and NSQF (if applicable)
- 9. Curriculum
- 10. Medium of Instruction
- 11. Choice base Credit system (CBCS)/LOCF/OBE
- 12. Registration for course in a semester
- 13. Attendance
 - 13.1 Condonation of medical cases
 - 13.2 Additional Condonation
- 14. Assessment procedure
 - 14.1 Internal Assessment (IA) (External Assessment (EA)
 - 14.2 Practical Assessment
 - Internal Assessment (IA) (External Assessment (EA)
- 15. Research Project/Semester Project Assessment Criteria
- 16. Internship Research / Industrial Internship
- 17. For non credit courses / audit courses
- 18. Credit weightage
- 19. Maximum duration of programme/promotion policy
- 20. Maximum gaps between semester/year
- 21. Credit system & grading CGPA/SGPA
- 22. Class / division
- 23. Transfer of credit /Academic Credit Bank
- 24. Change of discipline
- 25. Use of technological intervention
- 26. Student Discipline
- 27. Student Welfare
- 28. Ragging
- 29. Power of modify
- 30. Exit point
- 31. NC/Credit Course



1. **PREAMBLE**

As the technological enhancement and availability of technology to every person of world a huge demand of computer skilled professional is ample. In this world of opportunities, impact of higher education is so inevitable for getting desired guidance to secure, right kind of employment. It is compulsory to pursue higher related education in the best institutes. In this direction major reforms are to opt Learning Outcomes-based Curriculum Framework (LOCF), specially, in the undergraduate education (UG) program, that ensure student centric, interactive and outcome-oriented goals, objectives and skill enhancement to acquire. LOCF along with National Education Policy (NEP) in this regard ensure uniform education fabric of standard and content delivery education all over the nation. This syllabus development is a step to ensure development of the undergraduates for both, academia and employability. Latest technical trends, industry standards, market needs, and interests of students, future expectations the need has been taken into consideration while developing the syllabus.

The LOCFinculcation is to build up a comprehensive course structure with detailed syllabus. This is an effort to develop a student centric framework where they are expected to have a concrete understanding of fundamentals of computer science along with the latest trends and techniques like Artificial Intelligence, Internet of Things (IoT), Machine Learning (ML) with advanced skill sets that include Mobile Application environment, Object Oriented Programming (OOPs) among many courses. Each course aims to present learning targets and objectives, and thus provide learning and teaching strategies, assessment and resources. The students shall be equipped with the latest trends in computer science, after completion of the programme.

With this an education temple of nation should ensure an environment, which should be bias free, irrespective of cast, religion, races, sex difference and easily available to youths of the nation. The human value, ethics and environmental teaching is also introduced with this.

2. DEFINITIONSANDNOMENCLATURE

In these Regulations, context otherwise requires:

- 1. "Programme" means Degree Programme like Bachelor of Computer Science (B.Sc.-CS). Hence further B.Sc.-CS and B.Sc.-CS (Data Science) will call B.Sc.-CS in this document.
- 2. "GPA" means Grade Point Average.
- 3. "Course" means a theory or practical subjects that are normally studied in a semester.
- 4. "VC, Vice-Chancellor of IIMT-University" means the Head of the University.
- 5. "Registrar" is the Head of all Academic and General Administration of the University.
- 6. "Dean" means the authority of the school who is responsible for all academic activities of various programmes and implementation of relevant rules of these Regulations pertaining to the AcademicProgrammes.
- 7. "COE, Controller of Examinations" means the authority of the University who is responsible for all activities related to the University Examinations, publication of results, award of gradesheets and degrees.
- 8. "Dean Student Welfare" is responsible for all student related activities including student discipline, extra and co–curricular activities, attendance and meetings with class represent actives, Student Council, and parent–teacher meeting.
- 9. "HoD" means the Head of the Department concerned.
- 10. "University" means IIMT-University, Meerut.
- 11. "TCH" means Total Contact Hours–refers to the teaching–learning periods.
- 12. "DEC" means Department Exam Committee.



- 13. "BoS"meansBoardofStudies.
- 14. "ACM" means Academic Council Meeting the highest authoritative body for approval for allAcademicPolicies.
- 15. "Class Coordinator" is a faculty of the class who takes care of the attendance, academic performance, and the general conduct of the students of that class.
- 16. "IA" is Internal Assessment which is assessed for every student for every course during these mester.
- 17. "ESE" is End Semester Examination conducted by the University at the End of the Semester for all the courses of that semester.
- 18. "UGC" means University Grants Commission.
- 19. "MHRD" means Ministry of Human Resource Development, Govt. of India.
- 20. "AICTE" means All India Council of Technical Education.
- 21. "HEI" means Higher EducationInstitutions.
- 22. "PRN" means Permanent Registration Number.
- 23. "CGPA" means Cumulative GPA.
- 24. "SGPA" means Semester GPA.
- 25. "NC" means Non-Credit.

3. VISION AND MISSION OF THE SCHOOL VISION

To achieve heights in computer education domain by creating appropriate environment for students, faculties and staff with availability of latest technological infrastructure.

MISSION

- 1. To dissipate appropriate all types of practical and theoretical computer science knowledge to our young students.
- 2. Inculcate professional efficiency in the students for brighter career opportunity as per industry latest requirement.
- 3. To provide learning environment for students with our reputed academics partner in the field of computer science.
- 4. To prepare our student as an IT professional with full of ethics and human values.

4. **PROGRAM EDUCATIONAL OBJECTIVES (PEO)**

- **PEO1:** The graduates are designed to produce skill graduates who will be competent professionals in academics, industry and organizations of government and private sector.
- **PEO2** The pass out graduates will be able to handle the fast-changing world requirements and will become effective professionals.
- **PEO3:** The successful Graduates will be a good team leader and will be able to lead the team to find optimal solutions and achieve expertise in their field or become entrepreneurs and play the leading roles in all types of organizations.

5. **PROGRAM OUTCOMES (PO'S)**

- **PO1**: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **PO2:** Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.



- **PO3:** Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **PO4:** Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **PO5:** Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools prediction and modeling to complex engineering activities with an understanding of the limitations.
- **PO6:** The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- **PO7:** Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and the need for sustainable development.
- **PO8:** Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **PO9:** Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **PO10:** Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and receive clear instructions.
- **PO11:** Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in team, to manage projects and in multidisciplinary environments.
- **PO12:** Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

6. **PROGRAM SPECIFIC OUTCOMES (PSO'S)**

- **PSO1:** To equip the graduates with practical knowledge and give hands on experience to them.
- **PSO2:** To expose the students to the basic concepts of integration, differentiation, vector calculus, probability & statistics, and discrete mathematics.
- **PSO3:** To equip graduates with the study of design, development and analysis of software.
- **PSO4:** To aware graduates about the benefits of data storage and create awareness of new trends in database management system.

7. ADMISSION

Hence further B.Sc.-CS and B.Sc.-CS (Data Science) will be called B.Sc.-CS in this document. The admission policy and procedure shall be decided from time to time by the University based on the guidelines issued by the UGC/ Ministry of Education, Government of India. Seats are also made available for Non-Resident Indians and foreign nationals, who satisfy the admission eligibility norms of the University as per the UGC Norms.



8. ELIGIBILITYIN ALL YEARS AS PER NEP (ENTRY)

- **8.1** Candidate should have passed "10+2" exam (recognized board) in any stream with at least 40% in aggregate.
- 8.2 Admission will be based on academic record.
- **8.3** The Academic Council shall have power to amend or repeal the eligibility criteria laid down at clause 8.1& 8.2, if required.

9. CURRICULUM

The curriculum for Bachelor of Computer Science Programme is designed to have minimum and maximum credits as per the scheme of 120-160 credits that are distributed across six semesters of study for the award of degree.

10. MEDIUM OF INSTRUCTION

The medium of instruction is ENGLISH for all courses, examinations, seminar presentations and project reports.

11. CHOICE BASED CREDIT SYSTEM (CBCS)/ LOCF/ OBE

- **11.1** The three-year curriculum has been divided into six semesters. Semester Ist to VIth shall include lectures, tutorials, practical, seminars and project work as defined in the scheme of instruction and examination issued by the University from time to time.
- **11.2** The curriculum will be also including such other curricular, co-curricular and extra- curricular activities as may be prescribed by the University from time to time. Credit System BCA programme will have a curriculum in which every course will be assigned certain credits reflecting its weight and contact periods per week, as given below:

1 Lecture period (L) per week	= 1 Credit
1 Tutorial period (T) per week	= 1 Credit
1 Practical period (P) per week	= 0.5 Credit
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In addition to theory and laboratory courses there may be other courses such as seminar, project etc., which will be assigned credits as per their contribution in the programme without regard to contact periods.

11.3 Minimum Credit Requirements

The minimum credit required for award of a B.Sc.-CS degree is 120. This is normally divided into theory courses, tutorials, laboratory courses, seminars and projects in duration of six semesters. The credits are distributed semester wise as shown in the structure and syllabus manual of the programme. Courses generally progress in sequences, building competencies and their positioning indicates certain academicmaturity on the part of the learners. Learners are expected to follow the semester wise schedule of courses given in the syllabus manual of the programme.

11.4 Course Categories

Under CBCS, the degree programme will consist of the following categories of courses as per following table:



S. No.	Category	
1.	Core Course (Theory)-CC	
2.	Core Course (Practical)-CC(P)	
3.	Discipline Specific Elective (Theory)- DSE	As per Format 1 & 2
4.	Generic Elective (Theory)-GE	
5.	Ability Enhancement Compulsory Courses-AECC	of CBCS
6.	Skill Enhancement Courses-SEC	
7.	Research Project (RP)	

11.5 Curriculum Structure

The curriculum for B.Sc.-CS will contain a listing of all courses, with each course having a course category, course number, course title, number of contact periods per week, number of credits assigned, and the marks assigned to various components of evaluation.'

11.6 Approval of the Curriculum

The curriculum for B.Sc.-CSprogramme will be prepared by the Department concerned and will be approved by the Board of Studies of the Department. The Academic Council for final approval and then the Curriculum will be implemented. Same procedure shall be used for any modification in the Curriculum.

12. REGISTRATION FOR A COURSE IN A SEMESTER

A student will be eligible for registration of courses only if he/she satisfies the regulation (progression), and has cleared all dues to the University, Hostel and Library up to the end of the previous semester if student is not debarred from enrolment on disciplinary grounds.

The university follows a flexible Choice Based Credit System and slot-based table. Accordingly, the students shall be given the option for selecting their courses, credits, teachers, slots and create their timetable. The student is given the option of selecting the number of credits to undergo in a semester, subject to the curriculum requirements.

Except for the first-year courses, registration for a semester will be done during a specified week before the start of the semester as per the academic calendar.

Late registration /enrolment will be permitted by the Dean of the School for genuine cases, on recommendation by the Head of the respective department, with a late fee as decided from time to time.

The student shall make the choice of course in consultation with the Class Coordinator and as stipulated from time to time.

Students shall have to pay additional fee as prescribed, for registering in certain elective courses under Generic Electives courses offered by certain specific departments and for higher level Foreign Languages, as decided from time to time.

13. ATTENDANCE

The faculty handling a course must finalize the attendance, three calendar days before the last instructional day of the course and submit to the HoD through the class teacher.

13.1 Condonation of Medical Cases

a. A student with less than 75% attendance (Total Contact Hours -"TCH") in any course, will not



be permitted to appear for the end-semester examination in that course, irrespective of the reason for the shortfall of the attendance. The student is however permitted to avail Academic Leave up to 10% for attending academic related activities like, Industrial Visits, Seminars, Conferences, Competitions etc., with the prior approval of the HoD. After the event, the student should submit the relevant documents for proof to the HoD for approval of the Academic Leave.

- b. The remaining 25% allowance in attendance is given to account for activities under NCC / NSS / Cultural / Sports/ Minor Medical exigencies etc.
- c. Students under "CO (Carry Over)" category in any course shall attend, the immediately following Summer / Winter course. The detailed schedule of the Summer / Winter courses offered in every semester will be announced during the end of that semester. The students who have obtained "CO (Carry Over)" has to select their appropriate slots and courses, optimally to attend the courses.

13.2 Additional Condonation

Additional Condonation may be considered in rare and genuine cases which includes, approved leave for attending select NCC / Sports Camps, cases requiring prolonged medical treatment and critical illness involving hospitalization. For such select NCC / Sports Camps prior permission for leave shall be obtained by the respective Dean / Director of sports from the designated authority, before deputing the students.

For medical cases, submission of complete medical history and records with prior information from the parent / guardian to Dean (Students Welfare) DSW is mandatory. The assessment of such cases will be done by the attendance sub – committee on the merit of the case and put-up recommendations to the Vice – Chancellor. Such condonation is permitted only twice for a student in the entire duration of the programme.

The Vice-Chancellor, based on the recommendation of the attendance sub-committee may then give condonation of attendance, only if the Vice-Chancellor deems it fit and deserving. But in any case, the condonation cannot exceed 10%.

14. ASSESSMENT PROCEDURE

- 14.1 Internal Assessment (IA) 25 Marks & External Assessment (EA) 75 Marks
- 14.2 Practical Assessment (as per format 1 and 2)

15. RESEARCH PROJECT/SEMESTER PROJECT – ASSESSMENT CRITERIA

The general guidelines for assessment of Project are given in Table 15.1

S. No.	Review / Examination scheme	Broad Guidelines	Weightage
1	First Review	Concept	10%
2	Second Review	Design	10%
3	Third Review	Experiment/Analysis	20%
4	Final Review/ESM	Project report and Viva – Voce, Results and Conclusion	60%

Table 15.1: Assessment pattern for Research Project / Semester Project



16. INTERNSHIP – RESEARCH/INDUSTRIAL INTERNSHIP

A student has to compulsorily attend summer internship at the end of 4th semester for a minimum period of 30 days. In lieu of Summer-Winter internship, the student is permitted to register for undertaking project work under a faculty of the University and carry out the project for minimum period of 30 days. In both the cases, the internship report in the prescribed format duly certified by the faculty in-charge shall be submitted to the HoD. The evaluation will be done through presentation and viva. The course will have a weight age as defined in the respective curriculum.

For the final year project and viva-voce end semester examination, the student shall submit a project report in the prescribed format issued by the University. The reviews will be conducted by a committee constituted by the HoD. The end semester assessment will be based on the project report and a viva on the project conducted by a committee constituted by controller of examination. This may include an external expert.

17. FOR NON – CGPA COURSES/AUDIT COURSES

The Assessment will be done based on the respective assessment as per rubrics issued by the HoD.

A student securing less than the minimum specified internal assessment marks in any course will not be permitted to appear for the end-semester examination in that course and will be graded under "CO (Carry Over)" category for that course. This will be denoted in the grade sheet as "CO (Carry Over)", till the course is successfully completed in the subsequent semester(s).

18. CREDIT WEIGHTAGE

Credits are the weightage, assigned to the courses based on the following general pattern:One Hour1 creditsTwo Hour Practical0.5 credits

19. MAXIMUM DURATION OF THE PROGRAMME /PROMOTION POLICY

A student may complete the programme at a slower pace than the regular pace, but in any case, in not more than **N+2 years**.

A student completing the degree programmes in the extended period will not be eligible for university ranking.

20. MAXIMUM GAPS BETWEEN SEMESTER/YEAR

A student may be permitted by the Vice-Chancellor to withdraw from the entire programme for a maximum of two semesters for reasons of ill health, start – up venture or other valid reasons as recommended by a committee consisting of Head of Department, Dean of School and Dean (Student Welfare).

21. CREDIT SYSTEM & GRADING CGPA/SGPA

Introduction

IIMT University implemented the UGC guidelines to implement of the choice-based credit system with a view to offer student's choice of courses within a programme with a flexibility to complete the programme by earning credits at a pace decided by the students themselves. The system allowed students to choose inter-disciplinary, intra-disciplinary courses according to their learning needs, interest and aptitude. It was considered as a cafeteria approach and was expected to provide mobility to students.



21.1 Credit System

As per the current credit system practiced in institutions needs comprehensive reforms as they offer very little flexibility, choice and are less learner centric. Degrees offered today are more self-contained focusing on a specialization area and depend a lot on knowledge available with the faculty from the department only. Though the most requisite credit system does exist, wherein students are given a wide choice and flexibility, these exist as small islands in the vast ocean of thousands of educational institutes in India. In such institutions, the curriculum is frequently designed which is learner centric and offering a wide specialization area for students to pick and choose courses from.

The institutions shall make attempts wherein the design of the credit system and the teaching and evaluation modes shall be the responsibility of individual course teachers. The students should have the freedom to opt for courses from other specializations and not just from their core specialization. For this there has to be stronger collaborations between departments of the University and outside.

21.2 Grading system

Most institutions follow the absolute grading system which is a simple procedure wherein the marks obtained by students correspond to a specific grade and grade point. It reflects the individual performance in a particular subject without any reference to the group/class. The absolute grading system has limitations and may be susceptible to some inconsistencies.

The relative grading system on the other hand provides relative performance of a student to a group/class wherein the student is ranked in a group/class on basis of relative level of achievement. In this system decisions are made in advance by the faculty members as to what proportion of students would be awarded a particular grade on the basis of their relative performance and which is done by assigning grades on basis of a normal curve. This facilitates comparative performance and eliminates negative effect of pass or fail.

Relative grading system may be used if the number of students registered for the course is at least 30. For a class of smaller size, an absolute grading scheme may be used. The statistical method may be used with adjustments to calculate the mean (M), median (Md) and standard deviation (SD) of the total marks (TM) obtained by the students registered for the course. If the mean and median coincide, the mean may be used for further computations, otherwise the median may be used. If suppose the mean is used, then the letter grades may be awarded based on the ranges specified in table below:

A grading system as shown in given table-

Letter Grade	Range	
A+	TM>M+1.75SD	
A $M+1.25 \text{ SD} \leq TM \leq M+1.75 \text{SD}$		
B+	$M+0.75 SD \leq TM \leq M+1.25SD$	
В	$M+0.25 \text{ SD} \le TM \le M+0.75 \text{ SD}$	
C+	$M-0.25 \text{ SD} \le TM \le M-0.25 \text{ SD}$	
С	$M-0.75 \text{ SD} \le TM \le M-0.25 \text{ SD}$	
D+	$M-1.25 \text{ SD} \le TM \le M-0.75 \text{ SD}$	
D	$M-1.75 \text{ SD} \le TM \le M-1.25 \text{ SD}$	
E+	$M-2.0 \text{ SD} \le TM \le M-1.75 \text{ SD}$	

 Table 21.2: Grading system



E	$M-2.25 \text{ SD} \le TM \le M-2.0 \text{ SD}$
F	M-2.25 SD > TM
	Carry Over (Summer / Winter) due to Attendance deficiency (between
CO	40% and 75%)and/or
	I. Lack of minimum IA marks as specified in clause 10.0 Table 3.
RA	Repeat the course due to (i) Lack of minimum attendance (below
KA	40%) in regular course.
	DETAINED "RC" or "RA" or both in all registered theory courses of
	a semester. The student is detained and has to repeat the entire
	semester. Clause 12.3

Letter grades may be improved based on the following scheme: Use the table above to determine grade boundaries. Look for natural gaps in the neighborhood of grade boundaries. Choose the largest gap in the neighborhood and make this as the grade boundary.

An 'E', 'E+' and 'F' grade may not be a purely relative grade. These may be assigned on the following basis:

- A minimum, say 30/100, may be set as pass marks for the course. A failure grade may then be awarded only if the Total Marks for the course are less than 30. Otherwise, the students may be awarded the Just Pass Grade D.
- A failure grade may be awarded to students whose marks are below the prescribed minimum even if the table above leads to a pass grade.

Similarly, a lower limit may be set for the A grade also, for instance greater than or equal to 86. Students not achieving the prescribed minimum may be awarded a lower letter grade even if the table above indicates otherwise. A pass grade may be made mandatory for both internal as well as external examinations in the case of a separate internal and external assessment,

- a. Internal and External marks may be summed up with appropriate weightage to compute a total out of 100 marks. The letter grade may be assigned on this computed total.
- b. Internal and external marks may be graded separately and then the assigned grade points may be used, with appropriate weightage, to compute a final grade point and letter grade.

Grading in the case of Re-evaluations, Retests and Remedial Examinations may be based on the following guidelines:

- a. The ranges of marks once computed for awarding letter grades the first time, called the First Distribution (FD), will not be modified.
- b. If a re-evaluation leads to a change in marks, then FD will be used to award an appropriate letter grade.
- c. A retest may be permitted, if
 - i. A student gets a letter grade of E+ or E. In this case, irrespective of the marks obtained, at most D grade may be awarded.
 - ii. A student is unable to complete course requirements because of certified illness or tragedy. In this case FD will be used to award an appropriate letter grade.

The use of relative grading system may be recommended in autonomous institutions, institutes of national importance and institutions with high ranking. The results of the relative grading system may be shared by such institutions later with other interested institutions to implement the same.

21.3 GPA and CGPA

GPA is the ratio of the sum of the product of the number of credits Ci of course "i "and the grade points Pi earned for that course taken over all courses "i" registered and successfully completed by the student to the sum of Ci for all "i". That is,



$$GPA = \frac{\sum_{i} C_{i} P_{i}}{\sum_{i} C_{i}}$$

CGPA will be calculated in a similar manner, in any semester, considering all the courses enrolled from the first semester onwards.

- **21.2** The Grade card will not include the computation of GPA and CGPA for courses with letter grade CO, RC and U until those grades are converted to the regular grades.
- **21.3** A course successfully completed cannot be repeated.

Grade Sheet

Letter grade

Based on the performance, each student is awarded a final letter grade at the end of the semester in each course. The letter grades and corresponding grade points are given in Table 8. A student is considered to have completed a course successfully and earned credits if he/she

secures a letter grade other than F, CO, RA in that course.

After results are declared, grade sheet will be issued to each student which will contain the following details:

- a. program and discipline for which the student has enrolled.
- b. Semester of registration.
- c. The course code, name of the course, category of course and the credits for each course registered in that semester
- d. The letter grade obtained in each course
- e. Semester Grade Point Average (GPA)
- f. The total number of credits earned by the student up to the end of that semester in each of the course categories.
- g. The Cumulative Grade Point Average (CGPA) of all the courses taken from the first semester.
- h. Credits earned under Non CGPA courses.

22. CLAS/DIVISION

22.1 Classification is based on CGPA and is as follows:

$CGPA \ge 8.0$: First Class with distinction
$6.5 \le CGPA < 8.0$: First Class
$5.0 \le CGPA \le 6.5$: Second Class

- 22.2 (i) Further, the award of 'First class with distinction' is subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses in his/her first appearance with effect from II semester, within the minimum duration of the programme.
 - (ii) The award of 'First Class' is further subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses within 3 years for Bachelor of Computer Application.
 - (iii) The period of authorized break of the programme (vide clause 11.0) will not be counted for the purpose of the above classification.



23. TRANSFER OF CREDITS/ACADEMIC CREDIT BANK

- **23.1** "Credit-transfer" means the mechanism by which the eligible HEIs registered with ABC are able to receive or provide prescribed 'credits' to individual registered ABC account in adherence to the UGC credit norms for the 'course/s' registered by the desirous students in any eligible higher education institution within India.
- **23.2.** Within the broad framework of these regulations, the Academic Council, based on the recommendation of the Credit Transfer Committee so constituted may permit students to transfer part of the credit earned in other approved Universities of repute & status in the India or abroad.
- **23.3** The Academic Council may also approve admission of students who have completed a portion of course work in another approved Institute of repute under Multiple entry &Exit system, based on the recommendation of the credit transfer committee on a case-to-case basis.
- **23.4** Students who have completed coursework, at least first year, at some university other than the university to which transfer is to be sought, may request for transfer of admission to this university. A student may be granted admission only through an admission process that will follow the same policy as for fresh admissions. However, a uniform credit system must be followed by all universities to effect transfer of credits.

23.5 Credit Transfer request can be submitted only after the student has been admitted in the concerned program and the following conditions are met: University Grants Commission initiated the concept of National Academic Credit Bank (NAC-Bank) which will be a digital / virtual / online entity to be established and managed by UGC. The main objective of the NAC-Bank would be to facilitate student mobility across the education system wherein the credits can be accumulated and be used at alter point of time for the requirements of partial fulfillment of a degree program.

- i. The course work has been completed at a UGC approved and accredited University through fulltime formal learning mode.
- ii. The university accreditation grade/ ranking is not lower than that of the university to which the transfer is sought.
- iii. The courses prescribe to the common minimum syllabus under UGC CBCS system.
- iv. The letter grade obtained in the courses is "B" or better.
- v. The number of credits to be transferred does not exceed the prescribed limit.
- vi. The program in question must have a similar credit system, in particular, modular or semester and the same numeric and letter grading system along with common meaning of the term "credit" in numerical terms.

The aspect of shelf life of courses needs to be considered while accepting credits as obsolescence of knowledge of certain field in terms of its current relevance needs to be investigated. The time elapsed between successful completion of certain courses of the program and the admission to which program transfer is sought needs to be considered. The maximum number of credit points that may be considered under a credit transfer needs to be specified. Contextual variables such as teaching-learning approach adopted, learning facilities offered, use of evaluation modes may also be considered while preparing the credit transfer policy.



Moderation

Moderation of assessment is an organized procedure which ensures use of valid assessment material and consistent application of criteria, to provide fair academic judgment and reliable outcome in the form of marks or grades. It assures appropriate designing and implementation of assessment activities along with generation of valid and reliable results.

Integration of moderation process with assessment system is imperative for the development of academic quality in higher educational institutions as:

- It addresses any difference in individual judgments of different evaluators.
- It ensures that all achievements in the form of marks and grades across courses reflect achievement of same level of standard.
- It is also carried out to develop a common understanding of the standards and criteria and to recognize performance which demonstrates that standard or fulfilsthose criteria.

Moderation may be conducted in case there are large number of fail grades or high grades, or when large numbers of students who have received the same grade or clustering of students on letter grades, or when there are discrepancies between grades allocated to individual students in different courses, or to find out the difficulty level of the question paper or whether the assessments modes used cover the entire syllabus or not.

Applicability - Moderation will be made applicable to both external and internal modes of assessment. All programs and courses will indicate, as part of their statements on assessment, arrangements for the moderation of assessed work. This can be done through formulation of a moderation policy and implemented across all programs and courses of instruction and delivery. The time frame for the moderation will be linked with the time frame for assessment. In the event moderation is triggered, an evaluation will begin with a discussion on the

following (though not exhaustive) lines:

- a. What are the rubrics used for each of the different types of assessment in the course? Is a standardized/ prescribed rubric used or has the instructor developed his/ her own rubric. If the instructor is using a personally framed rubric, or if there is no identified rubric, then how does the assessment map to learning outcomes?
- b. The difficulty level of the questions included in the assessments, i.e., is the difficulty level on the extremes, very easy or very hard.
- c. The manner of awarding marks, i.e., has the correction been at the extremes, liberal or tough.

Each department will establish a committee and designate roles and responsibilities at different levels for smooth working of the moderation process. In order to maintain neutrality, it will be ensured that moderator should not be the assessor. Staff members will be trained professionally in assessment techniques and moderation procedures. All assessment material produced by learner including examination sheets, assignments, project reports, research reports etc. will be examined.

Institutions will be encouraged to make the moderation process online. In this system, assessment plans, moderation plans, assessment tools, samples of which may be submitted online. Moderation reports will be generated online so that progress can be tracked and submitted to the CoE after the approval of Dean and HoD. The moderation will not be restricted to just assessment but also include moderation of content and assessment design.

24. CHANGE OF DISCIPLINE

"Academic Flexibility" is the provision for innovative and interchangeable curricular structures to enable creative combinations of Courses/Programmes in Disciplines of study leading to Degree/Diploma/PG Diploma/Certificate of Study offering multiple entry and multiple exit facilities in tune with National Education Policy-2020, while removing the rigid curricular



boundaries and creating new possibilities of life-long learning.

25. USE OF TECHNOLOGICAL INTERVENTIONS

With the proliferation of different types of access devices, especially mobile access devices, technology has the potential to augment traditional classroom practices and revolutionize learning and evaluation methods. Technology, in fact can be an important driver to enable lifelong learning. Learning and engagement of students is facilitated by use of technology through several modes such as synchronous learning, semi-synchronous learning, blended learning, collaborative learning, flipped classroom etc. MOOC's, especially provided through SWAYAM, are a window of opportunity for lifelong learning and are offered through technology-based platforms. Learning management systems (LMS) may be used by institutions to integrate the entire teaching, learning and evaluation process. The Learning Management System may be used by institutions to deliver academic content in blended form and to assess learning through thesis, assignments etc. Open-source learning management systems such as *Moodle, Edmodo* may be used for posting content in the form of videos, audios, e-learning modules, live class sessions etc. Use of plagiarism detection software will be highly recommended to check originality of the content.

In the conduct of examinations, universities face tremendous challenges such as need for trained manpower, distribution of question paper without delays and errors, delays in evaluation of answer scripts, lack of infrastructure to conduct examinations at a large scale, non-availability of faculty members for assessment, security issues faced during paper setting and paper distribution, tampering of certificates and answer scripts etc.

For a typical examination department of an institution will be an autonomous body right from registration of student to convocation through an integrated system. In fact, steps must be taken to implement a complete examination management system that considers the complete life cycle of examination process. The use of technology will reduce dependency on human intervention and be error free. The following functions will be automated:

- i. Registration of students and generating unique PRN,
- ii. Filling up of examination form,
- iii. Generation of seat numbers and admit cards/hall tickets,
- iv Preparation of list of paper setter,
- v. Use of question bank system to draw question sets, question paper generation,
- vi. Online distribution of question papers on the day of examination with system of encryption,
- vii. Barcode system for answer books (this will eliminate issues related to errors, avoid malpractices etc.),
- viii. Digitization of answer scripts and onscreen evaluation of answer sheets,
- ix. Tracking of student's performance,
- x. Marks submission through online software,
- xi. Viewing of result through online system,
- xii. Online verification and revaluation system,
- xiii. Digitization of certificates and marksheets (to avoid tampering and easy retrieval),
- xiv. Certificate authentication system,
- xv. Submission of various other applications through online system.

The above will lead to conduct of functions of the examination system in an efficient and transparent manner and timely availability of information to students.



26. STUDENT DISCIPLINE

Every student is required to observe utmost discipline and decorum both inside and outside thecampus and not to indulge in any activity which may affect adversely the prestige reputation of theUniversity and School.

27. STUDENT WELFARE

Any act of indiscipline of a student reported to the Dean (Students Welfare) and Head of theDepartment will be referred to a Discipline Committee constituted for the purpose. The Committeewill enquire into the charges and decide on a suitable punishment if the charges are substantiated. The committee will also authorize the Dean (Students Welfare) to recommend to the Vice-Chancellorfor the implementation of the decision. The student concerned may appeal to the Vice-Chancellor, whose decision will be the final.

28. RAGGING

Ragging in any form is a criminal and non-bailable offence in our country. The current State andCentrallegislationsprovidestringentpunishmentsincludingimprisonment.Oncetheinvolvemen tofastudent(s) is established in ragging, offending fellow students/staff, harassment of any nature to thefellow students/staff etc. the student(s) will be liable to be dismissed from the University, as per thelaid down procedures of the UGC / Govt. /Institute. Every senior student at the University, along withtheir parent, shall give an undertaking every year in this regard and the same should be submitted at the timeofRegistration.

29. POWER TO MODIFY

Not with standing all that has been stated above, the Academic Council is vested with powers to modify any or all the above regulations from time to time, if required, subject to the approval by the Board of Studies and final approval by Vice-Chancellor.

30. EXIT POINT

Exit point will be governed as per format 1 and format 2.

31. NC/CREDIT COURSE

For non-credit courses 'Satisfactory' or 'Unsatisfactory' shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.



Evaluation Scheme



		B.Sc. COM	PUTER SCIENCE (D SEMESTER-I	ATA SC	IENCE)					
S							on Scheme	ie		
S. No.	Subject Code	Subject Name	Course Type		Periods		Internal External		Total	Creadita
110.				L	Т	Р	Marks	Marks	Marks	Credits
1	BCS-NEP-101	Problem Solving using C	C1	4	0	0	25	75	100	4
2	BCS-NEP-111	SPT-I (Probability & Statistics)	C2	4	0	0	25	75	100	4
3	BCS-NEP-104	 Mathematics-I Discrete Mathematics 	DSE	4	0	0	25	75	100	4
4	NHU-111	English Communication	AECC	3	0	0	15	35	50	3
5	BCS-NEP-105P	Problem Solving using C Lab	CORE LAB 1	0	0	4	25	25	50	2
6	BCS-NEP-112P	SPT-I (Probability & Statics Lab)	CORE LAB 2	0	0	4	25	25	50	2
		Grand Total		15	0	8	140	310	450	19
	1 - Core Course 1, C2 - C Course, RP – Research P	Core Course 2, DSE – Discipline Specific Electi roject	ive, AECC – Ability En	hancemer	nt Comp	ulsory C	ourse, GE – Ger	eric Elective, S	EC- Skill Enh	ancement
L-I	Lecture, T- tutorials, P- I	Practical (Labs), NC- Non-Credit Course								
N	OTE: STUDENT CAN	TAKE NCC (GENCC-101) AS A GENERAL E	ELECTIVE/OPTIONAL	COURS	E AND	CERTIF	ICATE WILL B	E PROVIDED	AFTER COM	PLETION
	OF NCC COURS	E.								



C				Evaluation Scheme							
S. No.	Subject Code	Subject Name	Course Type		Periods		Internal	External	Total	Credits	
110.				L	Т	Р	Marks	Marks	Marks	Creans	
1	BCS-NEP-201	Data Structure and Algorithms using C	C1	4	0	0	25	75	100	4	
2	BCS-NEP-211	SPT-II (Linux& Administration)	C2	4	0	0	25	75	100	4	
3	BCS-NEP-204	 Mathematics-II Optimization Techniques 	DSE	4	0	0	25	75	100	4	
4	*Code will be decided by parent department	GE-I (To be opted by the students as per the given electives in the list attached)	GE (Mandatory)	4	0	0	25	75	100	4	
5	NHU-112	Environmental & Ecology	AECC	3	0	0	15	35	50	3	
6	BCS-NEP-205P	Data Structure and Algorithms using C Lab	CORE LAB 1	0	0	4	25	25	50	2	
7	BCS-NEP-212P	SPT-II (Linux& Administration Lab)	CORE LAB 2	0	0	4	25	25	50	2	
8	BCS-NEP-207P	MOOCS/NPTEL	SEC	4	0	0	50	0	50	4	
		Grand Total		23	0	8	215	385	600	27	



G				III Evaluation Scheme							
S. No.	Subject Code	Subject Name	Course Type		Periods		Internal	External	Total	Credits	
110.				L	Т	Р	Marks	Marks	Marks	Creuits	
1	BCS-NEP-301	OOPS using JAVA	C1	4	0	0	25	75	100	4	
2	BCS-NEP-311	SPT-III (Machine Learning)	C2	4	0	0	25	75	100	4	
3	BCS-NEP-302	 Computer System Architecture Data Analytics 	DSE	4	0	0	25	75	100	4	
4	BCS-NEP-303	Communication Skill & Personality Development	AECC	3	0	0	15	35	50	3	
5	BCS-NEP-305P	OOPS using JAVA Lab	CORE LAB 1	0	0	4	25	25	50	2	
6	BCS-NEP-312P	SPT-III (Machine Learning Lab)	CORE LAB 2	0	0	4	25	25	50	2	
		Grand Total		15	0	8	140	310	450	19	
Cours	e, RP – Research Projec	Core Course 2, DSE – Discipline Specific Elect et Practical (Labs), NC- Non-Credit Course	ive, AECC – Ability En	hancemen	t Compu	lsory Co	ourse, GE – Gene	eric Elective, SI	EC- Skill Enha	ncement	



C							Evaluatio	on Scheme		
S. No.	Subject Code	Subject Name	Course Type]	Periods		Internal	External	Total	Credits
110.				L	Т	Р	Marks	Marks	Marks	Creatis
1	BCS-NEP-401	Software Engineering	C1	4	0	0	25	75	100	4
2	BCS-NEP-411	SPT-IV (Artificial Intelligence)	C2	4	0	0	25	75	100	4
3	BCS-NEP-404	 Data Mining Numerical Analysis 	DSE	4	0	0	25	75	100	4
4	*Code will be decided by parent department	GE-2(To be opted by the students as per the given electives in the list attached)	GE-2 (Mandatory)	4	0	0	25	75	100	4
5	UVE-401	Human Values and Professional Ethics	AECC	3	0	0	15	35	50	3
6	BCS-NEP-405P	Software Engineering Lab	CORE LAB 1	0	0	4	25	25	50	2
7	BCS-NEP-412P	SPT-IV (Artificial Intelligence Lab)	CORE LAB 2	0	0	4	25	0	50	2
8	BCS-NEP-407P	MOOCS/NPTEL	SEC	4	0	0	50	0	50	4
		Grand Total		23	0	8	215	360	600	25



			B.Sc. COMPUTER SCIE SEMES	,	FA SCIEN	CE)						
G				Evaluation Scheme								
S. No.	Subject Code	Subject Name	Course Type		Periods		Internal	External Marks	Total	Credits		
110.				L	Т	Р	Marks	External Marks	Marks	Creatis		
1	BCS-NEP-511	SPT-V	C1	4	0	0	25	75	100	4		
2	BCS-NEP-513	SPT-VI	C2	4	0	0	25	75	100	4		
3	BCS-NEP-503	 Data Communication Network ERP Big Data 	DSE	4	0	0	25	75	100	4		
4	RP-I AUDIT	Research Project-I [@]	AUDIT	2	0	0	50	0	50	NC		
5	BCA-NEP-IP-I	Internship	Industrial Internship (Mandatory)	0	0	10	50	0	50	5		
6	BCS-NEP-512P	SPT-V Lab	CORE LAB 1	0	0	4	25	25	50	2		
7	BCS-NEP-514P	SPT-VI Lab	CORE LAB 2	0	0	4	25	25	50	2		
		Grand Total		14	0	18	275	175	500	21		
Course L- L	e, RP – Research Project ecture, T- tutorials, P- P	re Course 2, DSE – Discipline S ractical (Labs), NC- Non-Credit OJECT – II is a Noncredit course	Course				·		- Skill Enhan	cement		



G				Evaluation Scheme						
S. No.	Subject Code	Subject Name	Course Type		Periods	1	Internal	External	Total	Credits
110.				L	Т	Р	Marks	Marks	Marks	Creuits
1	BCS-NEP-611	SPT-VII	C1	4	0	0	25	75	100	4
2	BCS-NEP-613	SPT-VIII	C2	4	0	0	25	75	100	4
3	BCS-NEP-603	 Mobile Computing E-Commerce Real Time System 	DSE	4	0	0	25	75	100	4
4	BCS-NEP-IP-II	Industrial Project	Minor Industrial Project	0	0	10	100	0	100	5
5	BCS-NEP-612P	SPT-VII Lab	CORE LAB 1	0	0	4	25	25	50	2
6	BCS-NEP-614P	SPT-VIII Lab	CORE LAB 2	0	0	4	25	25	50	2
7	*Code will be decided by parent department	GE-3(To be opted by the students as per the given electives in the list attached)	GE3(Mandatory)	4	0	0	25	75	100	4
8	BCS-NEP-607P	MOOC	SEC	2	0	0	50	0	50	2
9	RP-II AUDIT	Research Project-II [@]	AUDIT	4	0	0	50	0	50	4
		Grand Total		22	0	18	350	350	700	29
Course L- L	e, RP – Research Project Lecture, T- tutorials, P- Pra	Course 2, DSE – Discipline Specific E ctical (Labs), NC- Non-Credit Course CT – II is a Noncredit course (Audit Co					·	· · · · · · · · · · · · · · · · · · ·	C- Skill Enh	ancement





<u>IIMTU-NEP IMPLEMENTATION</u> <u>CBCS: Statement of Credit distribution</u>

College/School: SCHOOL OF COMPUTER SCIENCE AND APPLICATIONS	Credit Range: 120 - 160
Programme: B.Sc CS [DATA SCIENCE]	(Suggested by CBCS Committee)
Duration: 3 YEARS	
Annual/Semester: SEMESTER	

Minimum Credit Score Required for Certificate (40)	First Year	Semeste r	Core Course/ Foundation Course		Skill Enhancement Course (SEC)	Discipline Specific Elective (DSE)	Generic Elective (GE) (From other Faculty)	Research Project (RP)	Prerequisite
CERTIFICATE	First Year Credit (46)	I	Problem Solving Using C (Th. 4 Cr.+ P 2Cr.) Probability Statistics (Th. 4 Cr.+ P 2Cr.) SPT- I	English Communication (Th. 3 Cr.)		 Mathematics I Discrete Mathematics (Th. 4 Cr.) 			
		II	Data Structure Algorithms using C (Th. 4 Cr. + P 2Cr.) Linux&Administration (Th. 4 Cr. + P 2Cr.) SPT-II	Environment &Ecology (Th. 3 Cr.)	MOOC/NPTEL 4 Cr.	 Mathematics II Optimization Techniques (Th. 4 Cr.) 	GE-I (Mandatory)(Th. 4 Cr.)		Problem Solving using C Mathematics I

Note: - Students can take NCC (GENCC-101) as a General Elective/Optional course and certificate will be provided after competition of NCC Course.

Format-1



College/School: SCHOOL OF COMPUTER SCIENCE AND APPLICATIONS	Credit Range: 120 - 160
Programme: B.Sc CS [DATA SCIENCE]	(Suggested by CBCS Committee)
Duration: 3 YEARS	Provision to change the stream onwards
Annual/Semester: SEMESTER	

Minimum Credit			Core Course/	Ability Enhancement	Skill Enhancement	Discipline Specific	Generic Elective (GE)	Research	Prerequisite
Score Required for Diploma (80)	Second Year	Semester	Foundation Course	Compulsory Course (AECC)	Course (SEC)	Elective (DSE)	(From other Faculty)	Project (RP)	
DIPLOMA	Second Year Credit (46)	111	OOPS using JAVA (Th. 4 Cr.+ P 2Cr.) Machine Learning (Th. 4 Cr.+ P 2Cr.) SPT-III	Communication Skill & Personality Development (Th. 3 Cr.)		 Computer System Architecture Data Analytics (Th. 4 Cr) 			
		IV	Software Engineering (Th. 4 Cr. + P2Cr.) Artificial Intelligence (Th. 4 Cr.+ P 2Cr.) SPT-IV	Human Values and Professional Ethics (Th. 3 Cr.)	MOOC/NPTEL 4 Cr.	 Data Mining Numerical Analysis (Th. 4 Cr.) 	GE-II (Mandatory) 4 Cr.		

Note: - Students can take NCC (GENCC-101) as a General Elective/Optional course and certificate will be provided after competition of NCC Course.



College/School: SCHOOL OF COMPUTER SCIENCE AND APPLICATIONS Programme: B.Sc. - CS [DATA SCIENCE] Duration: 3 YEARS Annual/Semester: SEMESTER

Credit Range: 120 - 160 (Suggested by CBCS Committee) Provision to change the Core Papers (Main Subject)

Minimum Credit Score Required for Diploma (120)	Third Year	Semester		Ability Enhancement Compulsory Course (AECC)	Skill Enhancement Course (SEC)	Discipline Specific Elective (DSE)	Generic Elective (GE) (From other Faculty)	Research Project (RP)	Prerequisite
DEGREE	Third Year Credit (50)	v	SPT-V (Th. 4 Cr. + P 2Cr.) SPT-VI (Th. 4 Cr. + P 2Cr.)			 Data Communication Network ERP BIG Data (Th. 4 Cr.) 		RP-1 (AUDIT) (Non-Credit) Research Project- I Internship (5 Cr.)	
		VI	SPT-VII (Th. 4 Cr. + P 2Cr.) SPT-VIII (Th. 4 Cr. + P 2Cr.)		MOOC/NPTEL 4 Cr.	 Mobile Computing E-Commerce Real Time System (Th. 4 Cr.) 	GE - III (Mandatory) 4 Cr.	RP-2 (AUDIT) (Non-Credit) Research Project-II Industrial Project (5 Cr.)	

Note: - Students can take NCC (GENCC-101) as a General Elective/Optional course and certificate will be provided after competition of NCC Course



Academic Hand Book (School of Computer Sciences & Application)



IIMTU-NEP Implementation: B.Sc (Computer Science-Data Science) Program Year Semester Paper Periods Periods Paper Title Unit Prerequisite Elective Credit (15 (Periods (Hours) per (For other per weeks) Week Semester faculty) per semester i) C1 (Th. 4 Cr. + Problem Solving using C 4 45 5 4 SEMESTER -I (19 P 2 Cr.) 2 4 10 Problem Solving using C lab 5 **English Communication** ii) AECC-I 3 40 3 5 1. Mathematics-I iii) DSE-I 4 4 45 Cr.) 2. Discrete Mathematics CERTIFICATE COURSE FIRST YEAR(46 Cr.) ii) C2(Th.4 Cr.+P 45 [®]SPT – I [®]SPT 5 4 4 2Cr2 4 10 - I Lab Note: - Students can take NCC (GENCC-101) as a General Elective/Optional course and certificate will be provided after competition of NCC Course. i) C3 (Th. 4 Cr. + 45 Data Structure Algorithms using C Data 5 4 4 – II(27 Structure Algorithms using C P 2 Cr.) 2 10 4 ii) AECC-II 40 LabEnvironment & Ecology 3 3 5 40 MOOCS (NPTEL) iii) SEC-I & II 5 SEMESTER -Cr.) 4 4 iv) DSE-II 4 45 1. Mathematics-II 5 4 2. Optimization Techniques #To be selected from another School v)GE-I 4 4 45 5 ii) C4 (Th.4Cr.+P 4 45 [®]SPT – II 5 4 [@]SPT - II Lab 2 Cr.) 2 4 10

Format-2



Programme Outcome:

- PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools prediction and modeling to complex engineering activities with an understanding of the limitations.

Programme Specific Outcome:

- PSO1: To equip the graduates with practical knowledge and give hands on experience to them.
- PSO2: To expose the students to the basic concepts of integration, differentiation, vector calculus, probability & statistics, and discrete mathematics.
- PSO3: To equip graduates with the study of design, development and analysis of software.
- PSO4: To aware graduates about the benefits of data storage and create awareness of new trends in database management system.



Programme	Year	Semester (15 weeks)	Paper	Credit	Periods per Week	Periods (Hours) per Semester	Paper Title	Unit (Periods per semester)	Prerequisite	Elective (For other faculty)
			i) C5 (Th. 4 Cr. +	4	4	45	OOPS using Java	5		
		61	P 2 Cr.)	2	4	10	OOPS using Java Lab			
		III(19	ii) AECC-III	3	3	40	Communication Skill & Personality	5		
		T T					Development			
		TER Cr.)	iii) DSE-III	4	4	45	1. Computer System Architecture	5		
	$\overline{\cdot}$	C II					2. Data Analytics			
SE	Cr.)	SEMESTER Cr.)	i) C6 (Th. 4 Cr. +	4	4	45	[@] SPT – III	5		
R		M	P 2 Cr.)	2	4	10	[@] SPT - III Lab			
COURSE	YEAR(46	SI	Note: - Students can ta	ke NCC ((GENCC-	101) as a G	eneral Elective/Optional course and cer	tificate will be	provided after	
C	EA		competition of NCC C	ourse.					-	
DIPLOMA	· .		i) C7 (Th. 4 Cr. +	4	4	45	Software Engineering	5		
Ō	P P	12	P 2 Cr.)	2	4	10	Software Engineering Lab			
h	SECOND	-IV(27	ii) AECC-IV	3	3	40	Human values and Professional	5		
DI	E	T T	iii) SEC-III& IV	4	4	40	Ethics	5		
	$\mathbf{\tilde{s}}$	TER Cr.)	iv) DSE-IV	4	4	45	MOOCS (NPTEL)	5		
		C II					1. Data Mining			
		E	v) GE-II	4	4	45	2. Numerical Analysis	5		
		SEMESTER Cr.)					#To be opted from anotherSchool			
		SI	ii) C8 (Th. 4 Cr. +	4	4	45	[@] SPT – IV	5		
			P 2 Cr.)	2	4	10	[@] SPT - IV Lab			



Programme	Year	Semester (15 weeks)	Paper	Credit	Periods per Week	Periods (Hours) per Semester	Paper Title	Unit (Periods per semester)	Prerequisite	Elective (For other faculty)
		$\hat{\cdot}$	i) C9 (Th. 4 Cr. +	4	4	45	[@] SPT – V	5		
		Cr.)	P 2 Cr.)	2	4	10	[@] SPT - V Lab			
		(21	ii) DSE-V	4	4	45	1. Data Communication	5		
		> -					Network2. ERP3. BIG Data			
		ER	ii) C10 (Th. 4 Cr. +P 2	4	4	45	[@] SPT – VI [@] SPT - VI Lab	5		
		SEMESTER	Cr.)	2	4	10				
	$\widehat{\cdot}$	JE	iii) Research Project	NC						
LSH SH	C	E	iv) Internship	5	5	10	Internship			
DEGREE COURSE	THIRD YEAR (50 Cr.)	S	(Mandatory)				<u>A</u>			
0	R		i) C11 (Th. 4 Cr. +	4	4	45	[@] SPT – VII	5		
E	EA		P 2 Cr.)	2	4	10	[@] SPT - VII Lab			
RE	λ	(29 Cr.)	ii) SEC-V & VI	4	4	40	MOOCS (NPTEL)	5		
[5]	RL	63	iii) DSE-VI	4	4	45	1.Mobile Computing	-		
DE	H	10					2. E-Commerce	5		
	H	IV-		4	4	15	3. Real Time System	~		
			iv) GE-III	4	4	45	#To be opted from another School	5		
		E	ii) C12 (Th. 4 Cr. +	4	4	45	[@] SPT – VIII [®] SPT - VIII Lab	5		
		SEMESTER	P 2Cr.)	2	4	10				
		SEI	iii) Research Project	NC						
			iv) Industrial Project (Mandatory)	5	5	10	Industrial Project			

Annexure -2

List of SPT Subjects -

1. Probability Statistics

3. Machine Learning

Linux and Administration
 Artificial Intelligence



Academic Hand Book (School of Computer Sciences & Application)



IIMTU-NEPIMPLEMENTATION Year-I/Semester-I

Progra	mme:Certificate	Year: I	
0	BSC CS(DS)	Semester:I	
Credit			
Theory	•		
	e Code: Title:Probability &	Statistics (SPT-I)	
	EP-111		
Course	e Objectives:		
CO1:	Understand the concepts of c	urve and central tendency.	
	Understand the basic concept		
CO3:	Formulate theorems about the	e concept of probability.	
	Solve the problem on mean a		
CO5:	To classify the data based on	different parameters.	
Nature	e of Paper: Core Course		
	um Passing Marks/Credits:	40% Marks (ISE+ESE)	
L:4			
T:0			
	Hours/Week)		
	r-1Hr.=1Credit		
	al-2Hrs.=1Credit		
-	Week=4Credits)		
Unit		Contents	No.
			ofLectures
т			Allotted
Ι		efining Objective of study, Population(universe),	10
		method of sampling, Tools of collecting data-	
		conversation, emails, SMS, online surveys, d on various parameters Age, income, gender,	
		Data-Forming the tables for further Analysis.	
		es of Normal Curve, Average and their needs-	
	•	dian, Mode, why always AM is used as Average	
		ges-Quartiles, Deciles, Percentiles.	
II		of Normal tendency of Data: ->Skewness	10
	—	Moments and Moment Generating Functions,	
	•	an or Arbitrary Origin, defining SKEWNESSas	
		Data-Karl. Pearson's coefficient of Skewness,	
		kewness, Skewness by methods of Moments,	
	-	-	
	Defining KURTOSISas Ve	Thear distortion of Data-raykuttle, wesokuttle,	
	-	tanding the Normal Curve through Skewness&	
	-		
III	Leptokurtic curves, Unders Kurtosis. Theory of Probability-1:-	tanding the Normal Curve through Skewness& Basics of Probability-Simple events, Sure events,	10
III	Leptokurtic curves, Unders Kurtosis. Theory of Probability-1:-	tanding the Normal Curve through Skewness&	10
III	Leptokurtic curves, Unders Kurtosis. Theory of Probability-1:- I impossible events, Compo Events, Understanding the S	tanding the Normal Curve through Skewness& Basics of Probability-Simple events, Sure events, und Events, equally likely events, Exhaustive Sample Space, empirical definition of probability,	10
III	Leptokurtic curves, Unders Kurtosis. Theory of Probability-1:- impossible events, Compo Events, Understanding the S Defining the logical conne	tanding the Normal Curve through Skewness& Basics of Probability-Simple events, Sure events, und Events, equally likely events, Exhaustive	10



Mutually Exclusive events.		
IV Discrete Theoretical Distributions: -Binomial Theoretical Distr	ibutions	10
and its Parameters, Poissson Theoretical Distributions and its Para	ameters,	
Applications of theoretical distribution to create expected frequencies		
Continuous Theoretical Distributions: -Defining Normal (or G		
Distribution-Understanding its characteristics mean & variance, I	Defining	
The standard normal Distribution-Understanding Area under Norma	Curve,	
Understanding the Normalization of Data.		
V Introduction of Linear Algebra(in Brief): -Vectors & Scalars- P	roducts,	10
cosine law, Orthogonal vectors, linear combination, linear independent	ence of	
vectors, Matrices- addition, Product, transpose, determinant, Identify	matrix,	
Invertible matrix, Inverse, rank of Matrix, Trace, Spur, Popular T	ypes of	
Matrices-Symmetric, Diagonal, Orthogonal, Orthonormal, Eigen va	alues &	
Eigen Vectors.		
Introduction of Topology (In Brief): - Introduction of Metric	spaces	
(Metric distances)- Various types of Metrics.		
Text Book:		
1. "Fifty Challenging Problems in Probability with Solutions": By Frederick		
2. "An Introduction to Probability Theory and Its Applications": By William	Feller.	
Reference Book:		
1. "Probability Statistics and Queueing Theory" by P Kandasamy		
Evaluation/Assessment Methodology		
	Max.	Marks 100
1) Classtasks/Sessional Examination		15
2) Presentations /Seminar		
3) Assignments		10
4) Research Project Report		
5) Semina rOn Research Project Report		
6) ESE		75
Total:		100
Prerequisites for the course: NIL		
Course Learning Outcomes:		
CO1: Able to understand the discrete and continuous distributions.		
CO2: Able to understand the basic rules and theorems in probability.		
CO3: Able to solve the problems on mean and variance.		
CO4: Able to understand the key concepts of probability.		
CO5: Able to define various types of metrics.		



IIMTU NEP-IMPLIMENTATION Year- I /Semester- I

Program	nme:Certificate		Year: I	
	SC CS(DS)		Semester: I	
Credits		Subject: Disc	crete Mathematics	
Theory:4				
Course		Title:Discrete	e Mathematics	
BCS-NE	EP-104			
Course	Objectives:			
CO1:			f Algebraic Structures like Groups, Rin	gs and Fields.
CO2:			and recursive functions.	
CO3:			ics to solve basic problems in discrete math	
CO4:		-	tation to define and formally reason abou	t basic discrete
	structures such as S			
CO5:			sing logical connectives and quantifiers to	
		Ŭ	ruth tables and propositional and predicate	logic.
Nature of	f Paper: Discipline S	Specific Electiv	ve	
Minimun	nPassingMarks/Cre	dits:40% Mai	rks (ISE+ESE)	
L:4				
T:0				
P:0(In H	ours/Week)			
Theory-	1Hr.=1Credit			
Practical	-2Hrs.=1Credit(4Hrs	./Week=4Cred	lits)	
Unit		(Contents	No.
				ofLectures
				Allotted
Ι	•		of sets and Cardinals, Venn diagrams	8
			dered pairs and Set Identities.	
		• • •	of functions, Operations on functions,	
	Recursively defined			
		· 1	ns on relations, Composite relations, relations, Partial order relation.	
II	-		ttices: Introduction, Partial ordered sets,	8
	/	5	sets, Hasse diagram, Introduction on	-
			Bounded, Complemented, Modular and	
	Complete lattice.			
	-	Introduction, A	xioms and Theorems of Boolean algebra,	
	-		of Boolean functions, Karnaugh maps,	
	Logic gates.	-		
III	Predicate Logic:	Theory of Pre	dicates, First order predicate, Predicate	8
	formulas, Quantifier	rs, Inference th	eory of predicate logic.	
	Propositional: Pro	opositions, Ti	ruth tables, Tautology, Contradiction,	
	-	-	f Inference and Natural Detection.	
IV			on to algebraic Structures and properties.	8
			ni group, Monoid, Group, Abelian group	
	• • •		oup, Cyclic group, Cosets, Permutation	
	<u> </u>			



groups, Homomorphism and Isomorphism of groups.	
Rings and Fields: Definition and elementary prop Fields.	erties of Rings and
	hamatical Industian 0
V Natural Numbers: Introduction, Piano's axioms, Mat	
Strong Induction and Induction with Nonzero Base case	
Recurrence Relation & Generating functions:	
properties of Generating Functions. Simple Recur	
constant coefficients and Linear recurrence relation	m without constant
coefficients. Methods of solving recurrences.	and Digconhola
Combinatorics: Introduction, Counting technique	es and Pigeonhole
principle, Polya's Counting theorem.	
	" Macrow Hill 2006
1. Kenneth H.Rosen, "Discrete Mathematics and Its Applications"	
2. B. Kolman, R.C Bus by and S.C Ross, "Discrete Mathematics Reference Book:	Structures, Prentice Hall,2004.
	Idison Wesley 2004
1. R.P Girimaldi, "Discrete and Combinatorial Mathematics", Ac	•
2. Y.N. Singh, "Discrete Mathematical Structures", Wiley-India, Evaluation/Assessment Methode	
	Max. Marks 100
	WIAX. WIATKS 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
3) Assignments4) Research Project Report	10
	10
4) Research Project Report	10 75
 4) Research Project Report Seminar On Research Project Report 	
 Research Project Report Seminar On Research Project Report ESE 	75
 4) Research Project Report Seminar On Research Project Report 5) ESE Total:	75
 4) Research Project Report Seminar On Research Project Report 5) ESE Total: Prerequisites for the course: Nil 	75
 4) Research Project Report Seminar On Research Project Report 5) ESE Total: Prerequisites for the course: Nil Course Learning Outcomes:	75 100
 4) Research Project Report Seminar On Research Project Report 5) ESE Total: Prerequisites for the course: Nil Course Learning Outcomes: CO1: Able to identify the properties of functions and relations. 	75 100 ions.
 4) Research Project Report Seminar On Research Project Report 5) ESE Total: Prerequisites for the course: Nil Course Learning Outcomes: CO1: Able to identify the properties of functions and relations. CO1: Able to understand the concepts of sets and perform operate	75 100 ions. ibles.



IIMTU-NEP IMPLEMENTATION Year-I/Semester-I

0	ne: Certificate	Year:I	
Class:BS0		Semester: I	
Credits	Subject:Mathe	matics-I	
Theory:40			
Course C		tics-I	
BCS-NEP			
Course O	0		
	-	verse of a matrix and solve system of linear equations.	
	-	of Various Types of Functions, Continuity over an Inter-	erval, to find
		rem and type of Discontinuities.	
		ves, Chain Rule, Derivatives of Composite Functions,	Logarithmic
	Differentiation, Successiv		
		s like Rolle's Theorem, Mean Value Theorem, Leibni	itz Theorem,
	artial Differentiation, Eu		
		al as Limit of Sum, Riemann Sum, Fundamental	Theorem of
	*	rals, Methods of Integration Substitution.	
	Paper: DSE		
	Passing Marks/Credit	ts:40% Marks (Internal +ESE)	
L:4			
T:0	ATT 1 \		
P:0(In Ho	<i>,</i>		
	Hr. = 1 Credit		
	2 Hrs.=1Credit(4Hrs./W		
Unit		Contents	No. of
			Lectures
Ι	Dotorminants: Dofinit	tion Minors Cofactors Properties of Determinants	Allotted 8
1		tion, Minors, Cofactors, Properties of Determinants, Types of Matrices, Addition, Subtraction, Scalar	0
		ultiplication of Matrices, Adjoint, Inverse, Cramer's	
		Eigen Vectors of a Matrix, Cayley-Hamilton Theorem	
	(without proof)	Eigen vectors of a watrix, Cayley-Hammon Theorem	
II		Limit at a Point, Properties of Limit, Computation of	8
11	-	pes of Functions, Continuity at a Point, Continuity	0
		mediate Value Theorem, Type of Discontinuities.	
		inculate value Theorem, Type of Discontinuities.	
III	Differentiation · Deriv	vative, Derivatives of Sum, Differences, Product &	8
		e, Derivatives of Composite Functions, Logarithmic	0
	Differentiation, Succes		
IV	,	rentiation: Rolle's Theorem, Mean Value Theorem,	8
1 1	• •	ns (Maclaurin's& Taylor's), Indeterminate Forms, L'	0
		axima & Minima, Leibnitz Theorem, Partial	
	Differentiation, Euler's		
V		as Limit of Sum, Riemann Sum, Fundamental	8
•		us, Indefinite Integrals, Methods of Integration	0
	Theorem of Calcult	is, moething integrals, wethous of integration	



	Substitution, By Parts, Partial Fractions, Integration of Alge	braic and
	Transcendental Functions, Definite Integral, Simple Problems	
	Integral.	
Te	xt Books:	·
1. I	Babu Ram, "Engineering Mathematics", Pearson Education	
2. I	I.K. Dass, "Advanced Engineering Mathematics", S. Chand & Company.	
Re	ference	
1. I	Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons	5.
2. I	B. S. Grewal, "Elementary Engineering Mathematics", Khanna Publishers	
	Evaluation/Assessment Methodology	
		Max. Marks 100
1)	Class tasks/ Sessional Examination	15
2)	Presentations /Seminar	
3)	Assignments	
4)	Research Project Report	10
	Seminar On Research Project Report	
5)	ESE	75
	Total:	100
Pre	requisites for the course:NIL	
Co	urse Learning Outcomes:	
CO	1: Compute the rank and inverse of a matrix and solve system of linear e	equations.
CO	2: Computation of Limits of Various Types of Functions, Continuity	over an Interval, to find
	Intermediate Value Theorem and type of Discontinuities.	
CO	3: Understand the Derivatives, Chain Rule, Derivatives of Composite	Functions, Logarithmic
	Differentiation and Successive Differentiation.	
CO	4: Use of different theorems like Rolle's Theorem, Mean Value Theo	orem, Leibnitz Theorem,
	Partial Differentiation, Euler's Theorem.	
CO	5: Understanding of Integral as Limit of Sum, Riemann Sum, Fu	indamental Theorem of
	Calculus, Indefinite Integrals, Methods of Integration Substitution.	



IIMTU-NEPIMPLEMENTATION Year-I/Semester-I

Class: B Credits Theory:	SC CS(DS) Semester: I	
Theory	Subject: English communication	
Course	e	
NHU-1		
Course	Objectives:	
CO1:	It aims to improve English communication skills i.e., Listening, speaking, reading,	, & writing.
CO2:	To develop potential skills to deal confidently in English with diverse situat	tions in the
	external world.	
	To work in a collaborative manner & communicate effectively in English.	
	To get exposure to various activities related to English Communication which will	ll enable the
	learners to take initiative, solve problems, and demonstrate a positive work ethics.	
Nature	of Paper: AECC	
Minim	um Passing Marks/Credits:40% Marks	
L: 3		
T: 0		
P: 0 (In	Hours/Week)	
	1 Hr. = 1 Credit	
Unit	Contents	No. of
		Lectures Allotted
Ι	English Communication skills: listening skills, speaking skills, reading skills,	8
	writing skills. Starting and sustaining a conversation.	
	6 6	
	Process of Communication, Essential of effective Communication, Barriers to	
	Communication, Role of Communication.	
II	Communication, Role of Communication.Public Speech, Delivering skills, Group discussion, Communication in	8
II	Communication, Role of Communication.Public Speech, Delivering skills, Group discussion, Communication in seminars, Conferences and Committees Parts of Speech- Noun, Pronoun,	8
п	Communication, Role of Communication.Public Speech, Delivering skills, Group discussion, Communication in seminars, Conferences and Committees Parts of Speech- Noun, Pronoun, Adjective, Verb, Adverb, Conjunction, Preposition, Interjection, Articles,	8
	Communication, Role of Communication.Public Speech, Delivering skills, Group discussion, Communication in seminars, Conferences and Committees Parts of Speech- Noun, Pronoun, Adjective, Verb, Adverb, Conjunction, Preposition, Interjection, Articles, Common errors in English	-
II	Communication, Role of Communication.Public Speech, Delivering skills, Group discussion, Communication in seminars, Conferences and Committees Parts of Speech- Noun, Pronoun, Adjective, Verb, Adverb, Conjunction, Preposition, Interjection, Articles, Common errors in EnglishPresentation: Features, Styles, Use of visual aids, Creating a Dynamic	8
	Communication, Role of Communication.Public Speech, Delivering skills, Group discussion, Communication in seminars, Conferences and Committees Parts of Speech- Noun, Pronoun, Adjective, Verb, Adverb, Conjunction, Preposition, Interjection, Articles, Common errors in EnglishPresentation: Features, Styles, Use of visual aids, Creating a Dynamic Presentation, Presentation and interaction, Telephonic conversation & Basic	-
	Communication, Role of Communication.Public Speech, Delivering skills, Group discussion, Communication in seminars, Conferences and Committees Parts of Speech- Noun, Pronoun, Adjective, Verb, Adverb, Conjunction, Preposition, Interjection, Articles, Common errors in EnglishPresentation: Features, Styles, Use of visual aids, Creating a Dynamic Presentation, Presentation and interaction, Telephonic conversation & Basic Etiquette.	-
	Communication, Role of Communication.Public Speech, Delivering skills, Group discussion, Communication in seminars, Conferences and Committees Parts of Speech- Noun, Pronoun, Adjective, Verb, Adverb, Conjunction, Preposition, Interjection, Articles, Common errors in EnglishPresentation: Features, Styles, Use of visual aids, Creating a Dynamic Presentation, Presentation and interaction, Telephonic conversation & Basic Etiquette. Non-Verbal Communication: Meaning, Types and Importance. Listening:	-
III	Communication, Role of Communication.Public Speech, Delivering skills, Group discussion, Communication in seminars, Conferences and Committees Parts of Speech- Noun, Pronoun, Adjective, Verb, Adverb, Conjunction, Preposition, Interjection, Articles, Common errors in EnglishPresentation: Features, Styles, Use of visual aids, Creating a Dynamic Presentation, Presentation and interaction, Telephonic conversation & Basic Etiquette. Non-Verbal Communication: Meaning, Types and Importance. Listening: Difference between Listening and Hearing	8
	Communication, Role of Communication.Public Speech, Delivering skills, Group discussion, Communication in seminars, Conferences and Committees Parts of Speech- Noun, Pronoun, Adjective, Verb, Adverb, Conjunction, Preposition, Interjection, Articles, Common errors in EnglishPresentation: Features, Styles, Use of visual aids, Creating a Dynamic Presentation, Presentation and interaction, Telephonic conversation & Basic Etiquette. Non-Verbal Communication: Meaning, Types and Importance. Listening:	-
III	 Communication, Role of Communication. Public Speech, Delivering skills, Group discussion, Communication in seminars, Conferences and Committees Parts of Speech- Noun, Pronoun, Adjective, Verb, Adverb, Conjunction, Preposition, Interjection, Articles, Common errors in English Presentation: Features, Styles, Use of visual aids, Creating a Dynamic Presentation, Presentation and interaction, Telephonic conversation & Basic Etiquette. Non-Verbal Communication: Meaning, Types and Importance. Listening: Difference between Listening and Hearing Word Skills-Synonyms, Antonyms, Words often Confused, Idioms, Phrases, 	8
III IV	Communication, Role of Communication.Public Speech, Delivering skills, Group discussion, Communication in seminars, Conferences and Committees Parts of Speech- Noun, Pronoun, Adjective, Verb, Adverb, Conjunction, Preposition, Interjection, Articles, Common errors in EnglishPresentation: Features, Styles, Use of visual aids, Creating a Dynamic 	8
	writing skills. Starting and sustaining a conversation.	



Text Books:	
 English Grammar and Composition by Wren & Martin 	
 Effective Communication and Soft Skills by Nitin Bhatnagar 	
 The ACE of Soft Skills: Attitude, Communication and Etiquette for Su 	ccess by Gonalaswamy
Ramesh and Mahadevan Ramesh.	ccess by Obparaswaniy
Reference	
English Grammar in Use by Raymond Murphy	
English Grammar Composition and Usage by J.C. Nesfield	
Evaluation/Assessment Methodology	
	Max. Marks 50
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar/Attendance	
3) Assignments/TA	
4) Research Project Report	Nil
Seminar On Research Project Report	
5) ESE	35
Total:	50
Prerequisites for the course: NIL	
Course Learning Outcome:	
CO1: To get knowledge about communication skills.	
CO2: To understand about use of grammar.	
CO3: To understand about presentation.	
CO4: To get information about how to face interview and public.	
CO5: To get knowledge about telephonic conversation & etiquette.	



IIMTU-NEP IMPLEMENTATION Year-I/ Semester-I

Progra	mme: Certific	ate	Year: I	
Class: 1	BSC CS(DS)		Semester: I	
Credits		Subject: Problem Solving	using C	
Theory:	4Cr			
Course	Code:	Title: Problem Solving usi	ing C	
BCS-N	EP-101			
Course	Objectives:			
CO1:	Students wil	l be able to learn the basics	of programming language and Fundament	tal concepts of
	C Language.			
CO2:			rstand Concepts of basic programming wi	th Conditional
~ ~ ~		Control statements.		
CO3:		l be familiar with concept c	of Arrays, Pointers, Functions, categories of	of function and
G A	recursion.			
CO4:		II be able to develop Prog	gram with Structure; learn Union and Co	omplete String
005	Operations.			
<u>CO5:</u>			ing programs to perform read write operation	ions.
	of Paper: Co			
	um Passing N	larks/Credits: 40% Marks	s (ISE +ESE)	
L:4				
T:0	Hours (Weals)			
T:0 P: 0 (In	Hours/Week)			
T:0 P: 0 (In Theory	-1 Hr. $= 1$ Cr	edit)	
T:0 P: 0 (In Theory Practica	-1 Hr. $= 1$ Cr	edit redit (4Hrs./Week=4Credits	,	No. of
T:0 P: 0 (In Theory	-1 Hr. $= 1$ Cr	edit redit (4Hrs./Week=4Credits) ntents	No. of
T:0 P: 0 (In Theory Practica	-1 Hr. $= 1$ Cr	edit redit (4Hrs./Week=4Credits	,	Lectures
T:0 P: 0 (In Theory <u>Practica</u> Unit	- 1 Hr. = 1 Cr ll- 2 Hrs.=1 Cr	edit redit (4Hrs./Week=4Credits Cor	itents	Lectures Allotted
T:0 P: 0 (In Theory Practica	- 1 Hr. = 1 Cr l- 2 Hrs.=1 Cr Introductio	edit redit (4Hrs./Week=4Credits Con on to 'C' Language: Histo	ry, C Character Set, Tokens, Keywords,	Lectures
T:0 P: 0 (In Theory <u>Practica</u> Unit	- 1 Hr. = 1 Cr ll- 2 Hrs.=1 Cr Introduction Constants,	edit redit (4Hrs./Week=4Credits Con on to 'C' Language: Histo Identifiers, Variables, Data	ry, C Character Set, Tokens, Keywords, a Types, Comments, Structures of 'C'	Lectures Allotted
T:0 P: 0 (In Theory <u>Practica</u> Unit	- 1 Hr. = 1 Cr d- 2 Hrs.=1 Cr Introduction Constants, Program, In	edit redit (4Hrs./Week=4Credits Con on to 'C' Language: Histo Identifiers, Variables, Data ntroduction to Pre-processo	ry, C Character Set, Tokens, Keywords, a Types, Comments, Structures of 'C' r Directives: #include, #define, printf(),	Lectures Allotted
T:0 P: 0 (In Theory <u>Practica</u> Unit	- 1 Hr. = 1 Cru ll- 2 Hrs.=1 Cr Introduction Constants, Program, In scanf(), D	edit redit (4Hrs./Week=4Credits Con on to 'C' Language: Histo Identifiers, Variables, Data ntroduction to Pre-processo Declaration, Assignment,	ry, C Character Set, Tokens, Keywords, a Types, Comments, Structures of 'C'	Lectures Allotted
T:0 P: 0 (In Theory <u>Practica</u> Unit I	- 1 Hr. = 1 Cr l- 2 Hrs.=1 Cr Introduction Constants, Program, Ir scanf(), D Arithmetic	edit redit (4Hrs./Week=4Credits Con on to 'C' Language: Histo Identifiers, Variables, Data ntroduction to Pre-processo peclaration, Assignment, Expressions.	ry, C Character Set, Tokens, Keywords, a Types, Comments, Structures of 'C' r Directives: #include, #define, printf(), Operators, Expressions, Statements,	Lectures Allotted
T:0 P: 0 (In Theory <u>Practica</u> Unit	- 1 Hr. = 1 Cr d- 2 Hrs.=1 Cr Introduction Constants, Program, In scanf(), D Arithmetic Branching	edit redit (4Hrs./Week=4Credits Con on to 'C' Language: Histo Identifiers, Variables, Data ntroduction to Pre-processo Declaration, Assignment, Expressions. and Looping: Two Way	ry, C Character Set, Tokens, Keywords, a Types, Comments, Structures of 'C' r Directives: #include, #define, printf(),	Lectures Allotted 10
T:0 P: 0 (In Theory <u>Practica</u> Unit I	 1 Hr. = 1 Crulled 2 Hrs.=1 Crulled 2 Constants, Program, Irr scanf(), D Arithmetic 2 Branching cascaded if 	edit redit (4Hrs./Week=4Credits Con on to 'C' Language: Histo Identifiers, Variables, Data ntroduction to Pre-processo peclaration, Assignment, Expressions. and Looping: Two Way -else), Switch Statement, T	ry, C Character Set, Tokens, Keywords, a Types, Comments, Structures of 'C' r Directives: #include, #define, printf(), Operators, Expressions, Statements, y Selection (if, if-else, Nested if-else,	Lectures Allotted 10
T:0 P: 0 (In Theory <u>Practica</u> Unit I	- 1 Hr. = 1 Cr I- 2 Hrs.=1 Cr Introduction Constants, Program, Int scanf(), D Arithmetic Branching cascaded iff (for, while,	edit redit (4Hrs./Week=4Credits Cor on to 'C' Language: Histo Identifiers, Variables, Data ntroduction to Pre-processo Declaration, Assignment, Expressions. and Looping: Two Way -else), Switch Statement, T do-while) in C, break and c	ry, C Character Set, Tokens, Keywords, a Types, Comments, Structures of 'C' r Directives: #include, #define, printf(), Operators, Expressions, Statements, y Selection (if, if-else, Nested if-else, ernary Operator, goto Statement, Loops	Lectures Allotted 10
T:0 P: 0 (In Theory Practica Unit I	 1 Hr. = 1 Cr 2 Hrs.=1 Cr Introductic Constants, Program, Ir scanf(), D Arithmetic Branching cascaded iff (for, while, Arrays: Ty 	edit redit (4Hrs./Week=4Credits Con Con Ton to 'C' Language: Histo Identifiers, Variables, Data ntroduction to Pre-processo Declaration, Assignment, Expressions. and Looping: Two Way -else), Switch Statement, T do-while) in C, break and c /pes of Arrays, Array Dec	ry, C Character Set, Tokens, Keywords, a Types, Comments, Structures of 'C' r Directives: #include, #define, printf(), Operators, Expressions, Statements, y Selection (if, if-else, Nested if-else, ernary Operator, goto Statement, Loops ontinue Statements, Nested Loops.	Lectures Allotted 10
T:0 P: 0 (In Theory Practica Unit I	 1 Hr. = 1 Crullet Introduction Constants, Program, Ir scanf(), D Arithmetic Branching cascaded iff (for, while, Arrays: Ty Data from A 	edit redit (4Hrs./Week=4Credits Con Con Ton to 'C' Language: Histo Identifiers, Variables, Data ntroduction to Pre-processo Declaration, Assignment, Expressions. and Looping: Two Way -else), Switch Statement, T do-while) in C, break and c /pes of Arrays, Array Dec	ry, C Character Set, Tokens, Keywords, a Types, Comments, Structures of 'C' r Directives: #include, #define, printf(), Operators, Expressions, Statements, y Selection (if, if-else, Nested if-else, ernary Operator, goto Statement, Loops ontinue Statements, Nested Loops. laration, Array Initialization, Accessing unctions, Multi-Dimensional Arrays.	Lectures Allotted 10
T:0 P: 0 (In Theory Practica Unit I	 1 Hr. = 1 Creater of the second sec	edit redit (4Hrs./Week=4Credits Con on to 'C' Language: Histo Identifiers, Variables, Data ntroduction to Pre-processo beclaration, Assignment, Expressions. and Looping: Two Way -else), Switch Statement, T do-while) in C, break and c /pes of Arrays, Array Dec Array, Using Arrays with Fu	ry, C Character Set, Tokens, Keywords, a Types, Comments, Structures of 'C' r Directives: #include, #define, printf(), Operators, Expressions, Statements, y Selection (if, if-else, Nested if-else, ernary Operator, goto Statement, Loops ontinue Statements, Nested Loops. laration, Array Initialization, Accessing inctions, Multi-Dimensional Arrays. , Array of Pointers.	Lectures Allotted 10
T:0 P: 0 (In Theory Practica Unit I	 1 Hr. = 1 Crailer 1 Hr. = 1 Crailer 2 Hrs.=1 Crailer Introduction Constants, Program, Irascanf(), D Arithmetical Branching cascaded iffer (for, while, Arrays: Ty Data from A Pointers: B Storage Classical 	edit redit (4Hrs./Week=4Credits Con Con Con Con Con Con Con Con	ry, C Character Set, Tokens, Keywords, a Types, Comments, Structures of 'C' r Directives: #include, #define, printf(), Operators, Expressions, Statements, y Selection (if, if-else, Nested if-else, ernary Operator, goto Statement, Loops ontinue Statements, Nested Loops. laration, Array Initialization, Accessing inctions, Multi-Dimensional Arrays. , Array of Pointers.	Lectures Allotted 10
T:0 P: 0 (In Theory Practica Unit I	 1 Hr. = 1 Cr. 1 Hr. = 1 Cr. 1 2 Hrs.=1 Cr. Introduction Constants, Program, Ir scanf(), D Arithmetic T Branching cascaded if (for, while, Arrays: Ty Data from A Pointers: B Storage Cla Functions: Function, content 	edit redit (4Hrs./Week=4Credits Con on to 'C' Language: Histo Identifiers, Variables, Data ntroduction to Pre-processo eclaration, Assignment, Expressions. and Looping: Two Way -else), Switch Statement, T do-while) in C, break and c /pes of Arrays, Array Dec Array, Using Arrays with Fu asics, Pointer and Function asses: Automatic, External, Advantages of Functior	ry, C Character Set, Tokens, Keywords, a Types, Comments, Structures of 'C' r Directives: #include, #define, printf(), Operators, Expressions, Statements, y Selection (if, if-else, Nested if-else, ernary Operator, goto Statement, Loops ontinue Statements, Nested Loops. laration, Array Initialization, Accessing unctions, Multi-Dimensional Arrays. , Array of Pointers. Static & Register. ns, declaring a Function, defining a ent Passing – Call by Value, Call by	Lectures Allotted 10



IV S	String: Declaring, Initializing, String Manipulation Functions, String	Input and 8
O	Output Functions, String Pointer, Array of Strings, Passing String to I	Function.
S	Structure and Union: Basic of Structures, Structures and Functions	s, Array of
S	Structures, Pointer to Structure, Union.	
V F	File Handling: Introduction, File Types- Text, Binary, The Fil	e Pointer, 8
O	Dpening a File, Closing a File, Reading and Writing a File, File	Handling
F	Functions: fgetc(), fputc(), fputs(), fgets(), fprintf(), fscanf(), fwrite	(), fread(),
fs	seek(), ftell(), feof(), etc.	
Text Books	s:	
1. E. Balag	guruswamy, "Programming in ANSI C", Tata McGraw-Hill Education	on.
2. Yashwa	antKanetkar, "Let us C", BPB Publications	
Reference		
1. V Rajar	raman, "Computer Basics and C Programming", PHI Learning	
2. Ashok I	N. Kamthane, "Programming in C", Pearson Education.	
	Evaluation/Assessment Methodology	
		Max. Marks 100
1) Class ta	asks/ Sessional Examination	15
2) Presenta	ations /Seminar	
3) Assignr	ments	
4) Researc	ch Project Report	10
5) Seminar	r On Research Project Report	
6) ESE		75
	Total:	100
Prerequisite	es for the course: NIL	
Learning (Outcomes:	
CO1: Stu	idents will be able to develop programs based on fundamental concep	ots of programming in C.
Stu	idents will be able to solve problems based on Conditional and Iteration	ive Control Statements.
CO2: Stu	idents will be able to learn Complete Programming Concepts of	Arrays, Pointers and get
fam	niliar with modular programming Concepts of C using Functions.	
CO3: Stu	idents will be able to learn conceptual programming with S	String, Structure and its
diff	ferentiation with Union.	
CO4: Stu	idents will be able to perform File handling programs with read and w	write concepts.



IIMTU-NEP IMPLEMENTATION Year-I / Semester-I

heory: 0 Tratcical:4Cr Course Code: Title: Problem Solving using C Lab CS-NEP-105P Course Objectives: Yoo 1: Students will be able to learn the basics of programming language and Fundamental concepts of C Language. Yoo 2: Students will be able to learn and understand Concepts of basic programming with Conditional and Iterative Control statements. Yoo 3: Students will be familiar with the concept of Arrays, Pointers, Functions, categories of function, and recursion. Yoo 4: Students will be able to develop a Program with Structure; learn Union and Complete String Operations. Yoo 5: Students will be familiar with File handling programs to perform read-write operations. Yoo 4: Students Will be familiar with File handling programs to perform read-write operations. Yoo 5: Students Will be familiar with File handling programs to perform read-write operations. Yoo 5: Students Will be familiar with File handling programs to perform read-write operations. Yoo 4: Infimum Passing Marks/Credits:40% Marks Yoo 7: Yei(In Hours/Week) 'heory - 1 Hr. = 1 Credit Contents No. of Lectures Allotted I Write a program to find the largest and smallest among three entered on umbers and also display "hello world" in C. O2 III Write a program t		UG Year:I	
Theory: 0 Tratical:4Cr Course Code: Title: Problem Solving using C Lab CS-NEP-105P Students will be able to learn the basics of programming language and Fundamental concepts of C Language. C0 1: Students will be able to learn and understand Concepts of basic programming with Conditional and Iterative Control statements. C0 2: Students will be familiar with the concept of Arrays, Pointers, Functions, categories of function, and recursion. C0 4: Students will be familiar with the concept of Arrays, Pointers, Functions, categories of function, and recursion. C0 4: Students will be familiar with File handling programs to perform read-write operations. C0 5: Students will be familiar with File handling programs to perform read-write operations. C0 5: Students will be familiar with File handling programs to perform read-write operations. C0 6: Students will be familiar with File handling programs to perform read-write operations. C0 7: Students will be familiar with File handling programs to perform read-write operations. C0 7: Students will be apported to develop a Program with Structure; learn Union and Complete String Operations. C0 7: Students will be familiar with File handling programs to perform read-write operations. C0 8: Students will be familiar with File handling programs to perform read-write operations.		CCS(DS) Semester: I	
Tractical:4Cr Title: Problem Solving using C Lab CS-NEP-105P If the Problem Solving using C Lab CS-NEP-105P Ourse Objectives: 201: Students will be able to learn the basics of programming language and Fundamental concepts of C Language. Students will be able to learn and understand Concepts of basic programming with Conditional and Iterative Control statements. 202: Students will be to miliar with the concept of Arrays, Pointers, Functions, categories of function, and recursion. Students will be to develop a Program with Structure; learn Union and Complete String Operations. 203: Students will be familiar with File handling programs to perform read-write operations. Students will be familiar with File handling programs to perform read-write operations. 204: Students will be familiar with File handling programs to perform read-write operations. Students will be familiar with File handling programs to perform read-write operations. 205: Students will be familiar with File handling programs to perform read-write operations. Students will be familiar with File handling programs to perform read-write operations. 206 Students will be familiar with File handling programs to perform read-write operations. Students will be familiar with File handling programs to perform read-write operations. 209 Hinimum Passing Marks/Credits:40% Marks Students will be familiar with File handling programs to perform read-write operations. 201 It Contents <	Credits	Subject: Problem Solving using C Lab	
Course Code: CS-NEP-105P Title: Problem Solving using C Lab Course Objectives: Title: Problem Solving using C Lab Course Objectives: Students will be able to learn the basics of programming language and Fundamental concepts of C Language. C0 1: Students will be able to learn and understand Concepts of basic programming with Conditional and Iterative Control statements. C0 3: Students will be familiar with the concept of Arrays, Pointers, Functions, categories of function, and recursion. C0 4: Students will be able to develop a Program with Structure; learn Union and Complete String Operations. C0 5: Students will be familiar with File handling programs to perform read-write operations. C3 5: Students will be familiar with File handling programs to perform read-write operations. C3 6: Students will be familiar with File handling programs to perform read-write operations. C3 7: Otherts No. of Lectures Minimum Passing Marks/Credits:40% Marks Contents C0 1: Vint a program to display "hello world" in C. C1 1 Write a program to find the largest and smallest among three entered numbers and also display whether the identified largest/smallest number is even or odd. 02 III Write a program to read a string and check for palindrome without using year is a leap if it is divisible by 4 and divisible by 100 or 400.) 02 IV Wr	Theory: 0		
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	Practical- 2 Unit I II III IV V	Hr. = 1 Credit 2 Hrs.=1Credit(4Hrs./Week=4Credits) Contents Write a program to display "hello world" in C. Write a program to find the largest and smallest among three entered numbers and also display whether the identified largest/smallest number is even or odd. Write a program to check whether the entered year is a leap year or not (a year is a leap if it is divisible by 4 and divisible by 100 or 400.) Write a program to read a string and check for palindrome without using string-related functions (a string is a palindrome if its half is mirror by itself. Write a program to find the biggest among three numbers using a pointer. Create a structure named company which has a name, address, phone, and as member variables. Read the name of the company, its address, phone, and no	Lectures Allotted 02 02 02 02 02
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VIII Write a program to show programming examples with unions and structures. 02 Reference / Text Books: 02	Practical- 2 Unit I II III IV V VI VI	Hr. = 1 Credit 2 Hrs.=1Credit(4Hrs./Week=4Credits) Contents Write a program to display "hello world" in C. Write a program to find the largest and smallest among three entered numbers and also display whether the identified largest/smallest number is even or odd. Write a program to check whether the entered year is a leap year or not (a year is a leap if it is divisible by 4 and divisible by 100 or 400.) Write a program to read a string and check for palindrome without using string-related functions (a string is a palindrome if its half is mirror by itself. Write a program to find the biggest among three numbers using a pointer. Create a structure named company which has a name, address, phone, and as member variables. Read the name of the company, its address, phone, and no Of Employee. Finally display these members' values. The BCT class and display the details from the function.	Lectures Allotted 02 02 02 02 02 02 02 02 02 02 02 02 02 02 02 02 02 02 02 02 02 02



*	The C	Programming Language" by Brian W. Kernighan and Dennis	M. Ritchie.
		gramming: A Modern Approach" by K. N. King.	
		Evaluation/Assessment Methodology	
			Max. Marks:50
1)	Class	tasks/ Sessional Examination	25
2)	Preser	ntations /Seminar	
3)	Assign	nments	
4)	Resea	rch Project Report	
	Semin	ar On Research Project Report	
5)	ESE		25
		Total:	50
Co	urse L	earning Outcomes:	
CO	1:	Students will be able to develop programs based on fundame	ental concepts of programming in
CO	2:	Students will be able to solve problems based on Co	nditional and Iterative Control
		Statements.	
CO	3:	Students will be able to learn Complete Programming Conc	cepts of Arrays, Pointers and get
		familiar with modular programming Concepts of C using Fund	ctions.
CO	94:	Students will be able to learn conceptual programming	with String, Structure, and its
		differentiation with Union.	
CO	5:	Students will be able to perform File handling programs with	read and write concepts



IIMTU-NEP IMPLEMENTATION Year-I/ Semester-II

Program	ne: Certificate Year: I	
Class:BS0	C CS(DS) Semester: II	
Credits	Subject: Linux Administration with Scripting(SPT-II)	
Theory:40	lr l	
Course C	ode: Title: Linux Administration with Scripting	
BCSNE	2-211	
Course O	bjectives:	
CO1:To u	inderstand and make effective use of Linux utilities and shell scripting langu	age to solve
problems		-
CO2: To i	mplement in C some standard Linux utilities like mv,cp,ls, etc.	
CO3: To I	Develop the skills the necessary for systems programming including file system	orogramming,
process an	d signal management and interposes communication	
CO4: To d	levelop the basic skills required to write network programs using sockets	
Nature of	Paper: Core	
Minimum	Passing Marks/Credits:40% Marks (ISE +ESE)	
L:4		
T:0		
P:4(In Ho	urs/Week)	
Theory - 1	Hr. = 1 Credit	
Practical-	2 Hrs.=1Credit(4Hrs./Week=4Credits)	
Unit	Contents	No. of
		Lectures
		Allotted
Ι	Linux History, overview, Principles, Getting started with GNOME and edit tex	
	files with gedit, Manage files graphically and access remote system with	
	Nautilus, Getting help in graphical environment, Installation overview, directory	
	structure, Installation Graphical, Configuring Local Services, date and time	,
	Configuration of printer, Basic commands vi editor, manage users and groups.	
II	Partition, Swap Creation Ivm, quota management and permanent mouting, Raid	
	Luks, Basic job control or cron use of helping command scp or ssh, filte	r
	command, Understand run levels.	
III	Package installation with rpm, package installation with yum, usehard links, sof	
	links, archives, Regular Expressions, Pipelines, and I/O Redirection, nfs, cifs and	
	autofs, Ldap, Controlling Access to files, Analyzing and Storing Logs, Managing	
	Processes, Tuning and Maintaining the Kernel, System Recovery Techniques	,
	Enchance User Security, Apache Server.	
IV	File Security with Gnupg, Route Network Traffic Secure Network Traffic, NTI	
	Server Configuration, Web Server Additional Configuration, Basic SMTI	
	Configuration, Caching-Only DNS Server, FTP, Squid, samba, dhcp, nis, pam	,
	iptables, TCP Wrappers, Bash Scripting and tools, basic Shell Scripting Graphical tools of Scripting (Zenity and dialogs)	,



	Max. Marks 100
	15
	10
	75
Total:	100
	Total:

CO1: Students will be able to understand the basic commands of Linux operating system and can write shell scripts.

CO2: Students will be able to create file systems and directories and operate them.

CO3: Students will be able to create processes background and fore ground etc.by fork() system calls.

CO4: Students will be creating shared memory segments, pipes, message queues and can exercise inter-process communication.



IIMTU-NEPIMPLEMENTATION Year-I/ Semester-II

Program	me: Certificate	Year:I	
Class:BS	C CS(DS)	Semester: II	
Credits	Subject: Environmen	t and Ecology	
Theory:3			
Course (nd Ecology	
NHU-	112		
)bjectives:		
		conmental problems among people	
-		the environment and its allied problems.	
	veloping an attitude of concern		
		environment protection and environment improven	
CO5: Gra	sp the significance and issues	related to ecosystems, biodiversity and natural resou	rces.
	f Paper: AECC		
Minimu	n Passing Marks/Credits:40%	% Marks(ISE+ESE)	
L:3			
T:0			
P:0(In Ho	ours/Week)		
Theory-1	Hr.=1Credit		
Unit		Contents	No.
			ofLectures
			Allotted
Ι	The Multidisciplinary Nature	e Of Environmental Studies:	8
	Definition, Scope and Importan	nce, Need for Public Awareness.	
II	Natural Resources: Renew	able And Non-Renewable Resources;	8
	Natural Resources and As	sociated Problems: -	
	A. Forest Resources: Use an	d Over-Exploitation, Deforestation, Case Studies.	
	Timber Extraction, Minin	g, Dams and Their Effects on Forests and Tribal	
	People.		
	B. Water Resources: Use an	d Over-Utilization of Surface and Ground Water,	
		s Over Water, Dams-Benefits and Problems.	
	C. Mineral Resources: Use	e and Exploitation, Environmental Effects of	
		eral Resources, Case Studies.	
	D. Food Resources: World Fo	ood Problems, Changes Caused by Agriculture and	
		Modern Agriculture, Fertilizer-Pesticide Problems,	
	Water Logging, Salinity, C		
		ng Energy Needs, Renewable and Non-renewable	
		Iternate Energy Sources, Case Studies	
		s a Resource, Land Degradation, Man Induced	
	Landslides, Soil Erosion a		
		Conservation Of Natural Resources; Equitable Use	
	of Resources for Sustainal	ble Lifestyles	
III	Ecosystems:		8



Concept of an Ecosystem; Structure and Function of an Ecosystem; P		
Consumers and Decomposers; Energy Flow in the Ecosystem; E	Ecological	
Succession; Food Chains, Food Webs and Ecological Pyramids; Intr	oduction,	
Types, Characteristic Features, Structure And Function of the I	Following	
Ecosystem: -		
A. Forest Ecosystem		
B. Grassland Ecosystem		
C. Desert Ecosystem		
D. Aquatic Ecosystems (Ponds, Streams, Lakes, Rivers, Oceans, Estua	ries)	
IV Biodiversity and Its Conservation:	8	
Introduction – Definition: Genetic, Species and Ecosystem	Diversity;	
Biogeographical Classification of India; Value of Biodiversity: Con		
Use, Productive Use, Social, Ethical, and Aesthetic and Option	-	
Biodiversity at Global, National and Local Levels; India as a Mega-		
Nation; Hot-Sports of Biodiversity; Threats to Biodiversity: Habi		
Poaching of Wildlife, Man-Wildlife Conflicts; Endangered and		
Species of India; Conservation of Biodiversity: In-Situ and		
Conservation of Biodiversity.		
V Environmental Pollution:	8	
Definition, Causes, Effects and Control Measures of Air Pollutio		
Pollution, Soil Pollution, Marine Pollution, Noise Pollution, Thermal		
Nuclear Pollution; Solid Waste Management: Causes, Effects and		
Measures of Urban and Industrial Wastes; Role of an Individual in P		
of Pollution; Pollution Case Studies; Disaster Management: Floods, Ea		
Cyclone and Landslides.	a unquano,	
Text Books:		
1. A. Basak, " <i>Environmental Studies</i> ", Pearson Education.		
2. Anil Kumar De, " <i>Environmental Studies</i> ", New Age International		
Reference:		
1. J. P. Sharma, " <i>Environmental Studies</i> ", University Science Press.		
Evaluation/Assessment Methodology		
	Max. Marks 50	
1) Class tasks/Sessional Examination	15	
2) Presentations /Seminar	10	
3) Assignments		
4) Research Project Report		
5) Seminar On Research Project Report		
6) ESE		
Total:	35 50	
10001.	50	



Prerequisites for the course: Nil

Course Learning Outcomes:

- CO1: Student will be able to recognize the physical and biological components of earth's system.
- CO2: Student will be able to examine all environmental issues.

CO3: Student will be able to do independent research on human interaction with the CO4: environment.

CO5: Student will be able to develop and attitude of concern for the environment.

Student will be able to motivate public to participate in environmental protection.



IIMTU-NEP IMPLEMENTATION Year-I/Semester-II

0	nme: Ce		Year:I	
	SC CS(D	/	Semester:II	
Credits		Subject:Mathematics-II		
Theory:				
Course		Title:Mathematics-II		
BCS-NE				
	Objectiv			
CO 1:		1 1	nciples to perform computations.	
CO 2:		nathematics to solve problems		
CO 3:			resentations of mathematical relationships.	
CO 4:		nicate mathematical knowled	6	
CO 5:		echnology tools to solve probl	ems.	
	of Paper			
	im Passii	ng Marks/Credits:40% Mar	KS (Internal +ESE)	
L:4				
T:0		alz)		
	lours/We · 1 Hr. =			
Unit	· 1 111. –	I Cledit	Contents	No. of
Unit			Contents	Lectures
				Allotted
Ι	Differe	ntial Equations: Linear dif	ferential equations of nth order with constant	moticu
1			on and Particular integral, Simultaneous linear	8
			econd order differential equations by changing	Ũ
		ent & independent variables,		
	-	-	Applications (without derivation).	
II			tions: Series solution of second order ordinary	8
		-	e coefficient (Frobenius method), Bessel and	
	Legend	re equations and their series	s solutions, Properties of Bessel function and	
		re polynomials.		
III	Laplac	e Transform: Laplace transf	Form, Existence theorem, Laplace transforms of	8
		U	final value theorems, Unit step function, Dirac-	
		-	f periodic function, Inverse Laplace transform,	
			to solve simple linear and simultaneous	
		ntial equations.		
IV			Functions having arbitrary periods, Periodic	8
			π , Change of interval, Even and odd functions,	
		nge sine and cosine series		
V			ution of first order partial differential equations	8
	• •	6	second order linear partial differential equations	
		nstant coefficients,		
	Classif	ication of second order partial	l differential equations, Method of separation of	



variables for solving partial differential equations, Solution of one-	and two-
dimensional wave and heat conduction equations, Laplace equation	in two-
dimension, Equation of transmission lines.	
Text Books:	
1. E. Kreyszig, "Advanced Engineering Mathematics", JohnWiley& Sons	
2. B. V. Ramana, "Higher Engineering Mathematics", Tata McGraw-Hill Publishi	ng Company Ltd
3. R.K. Jain & S.R.K. Iyenger, "Advance Engineering Mathematics", Narosa Publi	shing House.
Reference:	
1. H. K. Dass, "Introduction to Engineering Mathematics", S. Chand, New Delhi	
2. R. Wylie, "Advanced Engineering Mathematics", Mc. Graw-Hill.	
Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100
Prerequisites for the course: Mathematics-I	
Course Learning Outcomes:	
CO 1: Apply mathematical concepts and principles to perform computations.	
CO 2: Apply mathematics to solve problems.	
CO 3: Create, use and analyse graphical representations of mathematical relations	hips.
CO 4: Communicate mathematical knowledge and understanding	

CO 4: Communicate mathematical knowledge and understanding.

CO 5: Apply technology tools to solve problems.



IIMTU-NEP IMPLEMENTATION Year-I/ Semester-II

Program	me:Certificate		Year:I	
0	SC CS(DS)		Semester:II	
Credits		Subject:Optimizati	on Techniques	
Theory:4	Cr	0 1	1	
Course C	Code:	Title:Optimization	Techniques	
BCS-NEI	P-204	1	-	
Course C	Objectives:			
	numerate the roblems.	fundamental knowle	edge of Linear Programming and Dynamic	Programming
CO2: C	Operation resear	rch models using o	optimization techniques based upon the fun	damentals of
e	ngineering math	nematics (minimization	on and Maximization of objective function).	
		rmulation by using	linear, dynamic programming, game theory	and queuing
	nodels.			
			d continuous variables to control inventory and	simulation of
	-	-	tion decision making.	
-		nathematical models	for quantitative analysis of managerial problem	ns in industry.
	f Paper: DSE			
	n Passing Mar	ks/Credits:40% Ma	urks (ISE +ESE)	
L:4				
T:0				
	ours/Week)			
	1 11 1 0 1			
	1 Hr. = 1 Credit	t	Contractor	
Theory - Unit	1 Hr. = 1 Credit	t	Contents	No. of Lectures Allotted
-			Contents .P): Revised Simplex Method, Duel simplex	Lectures
Unit	LINEAR PR			Lectures Allotted
Unit	LINEAR PR Method, Sens DYNAMIC	OGRAMMING (La itivity Analysis PROGRAMMING	 .P): Revised Simplex Method, Duel simplex (D.P): Multistage decision processes. 	Lectures Allotted
Unit	LINEAR PR Method, Sens DYNAMIC Concepts of	OGRAMMING (La itivity Analysis PROGRAMMING sub optimization, F	.P): Revised Simplex Method, Duel simplex	Lectures Allotted
Unit	LINEAR PR Method, Sens DYNAMIC Concepts of	OGRAMMING (La itivity Analysis PROGRAMMING	 .P): Revised Simplex Method, Duel simplex (D.P): Multistage decision processes. 	Lectures Allotted 8
Unit	LINEAR PR Method, Sens DYNAMIC Concepts of method, LP as	OGRAMMING (La itivity Analysis PROGRAMMING sub optimization, F	.P): Revised Simplex Method, Duel simplex (D.P): Multistage decision processes. Recursive Relation-calculus method, tabular	Lectures Allotted
Unit	LINEAR PR Method, Sens DYNAMIC Concepts of method, LP as CLASSICAL Single variabl	OGRAMMING (La itivity Analysis PROGRAMMING sub optimization, F s a case of D.P. OPTIMIZATION e optimization witho	 .P): Revised Simplex Method, Duel simplex .G (D.P): Multistage decision processes. Recursive Relation-calculus method, tabular TECHNIQUES: put constraints, 	Lectures Allotted 8
Unit	LINEAR PR Method, Sens DYNAMIC Concepts of method, LP as CLASSICAI Single variabl Multi variable	OGRAMMING (La itivity Analysis PROGRAMMING sub optimization, F s a case of D.P. OPTIMIZATION e optimization withou	.P): Revised Simplex Method, Duel simplex (D.P): Multistage decision processes. Recursive Relation-calculus method, tabular TECHNIQUES: but constraints, at constraints, multivariable optimization with	Lectures Allotted 8
Unit	LINEAR PR Method, Sens DYNAMIC Concepts of method, LP as CLASSICAL Single variable Multi variable constraints-m	OGRAMMING (La itivity Analysis PROGRAMMING sub optimization, F s a case of D.P. OPTIMIZATION e optimization withou e optimization withou ethod of Lagrange m	.P): Revised Simplex Method, Duel simplex (D.P): Multistage decision processes. Recursive Relation-calculus method, tabular TECHNIQUES: but constraints, at constraints, multivariable optimization with multipliers, Kuhn-Tucker conditions.	Lectures Allotted 8
Unit	LINEAR PR Method, Sens DYNAMIC Concepts of method, LP as CLASSICAL Single variabl Multi variable constraints-m NUMERICA	OGRAMMING (La itivity Analysis PROGRAMMING sub optimization, F s a case of D.P. OPTIMIZATION e optimization withou e optimization withou ethod of Lagrange m L METHODS FOR	.P): Revised Simplex Method, Duel simplex G (D.P): Multistage decision processes. Recursive Relation-calculus method, tabular TECHNIQUES: put constraints, at constraints, multivariable optimization with multipliers, Kuhn-Tucker conditions. R OPTIMIZATION:	Lectures Allotted 8
Unit	LINEAR PR Method, Sens DYNAMIC Concepts of method, LP as CLASSICAI Single variabl Multi variable constraints-m NUMERICA Nelder Mead'	OGRAMMING (L. itivity Analysis PROGRAMMING sub optimization, F s a case of D.P. OPTIMIZATION e optimization without e optimization without the optimization without ethod of Lagrange m L METHODS FOR s Simplex search me	.P): Revised Simplex Method, Duel simplex (D.P): Multistage decision processes. Recursive Relation-calculus method, tabular TECHNIQUES: but constraints, at constraints, multivariable optimization with multipliers, Kuhn-Tucker conditions.	Lectures Allotted 8
Unit I	LINEAR PR Method, Sens DYNAMIC Concepts of method, LP as CLASSICAL Single variable Multi variable constraints-m NUMERICA Nelder Mead' method, Newt	OGRAMMING (La itivity Analysis PROGRAMMING sub optimization, F s a case of D.P. OPTIMIZATION e optimization withou ethod of Lagrange m L METHODS FOR s Simplex search me ton's method.	 .P): Revised Simplex Method, Duel simplex C (D.P): Multistage decision processes. Recursive Relation-calculus method, tabular TECHNIQUES: put constraints, at constraints, multivariable optimization with nultipliers, Kuhn-Tucker conditions. C OPTIMIZATION: ethod, Gradient of a function, Steepest descent 	Lectures Allotted 8
Unit	LINEAR PR Method, Sens DYNAMIC Concepts of method, LP as CLASSICAI Single variabl Multi variable constraints-m NUMERICA Nelder Mead' method, Newt	OGRAMMING (La itivity Analysis PROGRAMMING sub optimization, F s a case of D.P. OPTIMIZATION e optimization withou e optimization withou ethod of Lagrange m L METHODS FOR s Simplex search me ton's method. IETHODS OF OPT	.P): Revised Simplex Method, Duel simplex G (D.P): Multistage decision processes. Recursive Relation-calculus method, tabular TECHNIQUES: but constraints, at constraints, multivariable optimization with nultipliers, Kuhn-Tucker conditions. COPTIMIZATION: thod, Gradient of a function, Steepest descent TMIZATION:	Lectures Allotted 8
Unit I	LINEAR PR Method, Sens DYNAMIC Concepts of method, LP as CLASSICAI Single variabl Multi variable constraints-m NUMERICA Nelder Mead' method, Newt MODERN M GENETIC A	OGRAMMING (L. itivity Analysis PROGRAMMING sub optimization, F s a case of D.P. OPTIMIZATION e optimization without e optimization without tethod of Lagrange m L METHODS FOR s Simplex search me ton's method. IETHODS OF OPT LGORITHM (GA):	 .P): Revised Simplex Method, Duel simplex .P): Multistage decision processes. Recursive Relation-calculus method, tabular TECHNIQUES: but constraints, at constraints, multivariable optimization with multipliers, Kuhn-Tucker conditions. R OPTIMIZATION: ethod, Gradient of a function, Steepest descent TMIZATION: 	Lectures Allotted 8
Unit I	LINEAR PR Method, Sens DYNAMIC Concepts of method, LP as CLASSICAL Single variable Multi variable constraints-m NUMERICA Nelder Mead' method, Newt MODERN M GENETIC A Differences an	OGRAMMING (La itivity Analysis PROGRAMMING sub optimization, F a case of D.P. OPTIMIZATION e optimization withou ethod of Lagrange m L METHODS FOR s Simplex search me ton's method. IETHODS OF OPT LGORITHM (GA): nd similarities betwe	 .P): Revised Simplex Method, Duel simplex .P): Multistage decision processes. Recursive Relation-calculus method, tabular TECHNIQUES: but constraints, at constraints, multivariable optimization with nultipliers, Kuhn-Tucker conditions. COPTIMIZATION: thod, Gradient of a function, Steepest descent TIMIZATION: en conventional and evolutionary algorithms, 	Lectures Allotted 8
Unit I	LINEAR PR Method, Sens DYNAMIC Concepts of method, LP as CLASSICAI Single variabl Multi variable constraints-m NUMERICA Nelder Mead' method, Newt MODERN M GENETIC A Differences an working princ	OGRAMMING (La itivity Analysis PROGRAMMING sub optimization, F a case of D.P. OPTIMIZATION e optimization withou ethod of Lagrange m L METHODS FOR s Simplex search me ton's method. IETHODS OF OPT LGORITHM (GA): nd similarities betwe	 .P: Revised Simplex Method, Duel simplex G (D.P): Multistage decision processes. Recursive Relation-calculus method, tabular TECHNIQUES: Dut constraints, multivariable optimization with nultipliers, Kuhn-Tucker conditions. COPTIMIZATION: Dethod, Gradient of a function, Steepest descent TIMIZATION: : en conventional and evolutionary algorithms, ors- reproduction, crossover, mutation 	Lectures Allotted 8



	Principles of genetic programming, terminal sets, functional set			
	between GA & GP, Random population generation. Fuzzy Syste	ms: Fuzzy set		
	Theory, Optimization of Fuzzy systems		8	
	QUEUING THEORY			
	Queuing Model, poison and exponential distributions-Queues w	vith combined		
	arrivals and departures-random and series queues.			
	INTEGER PROGRAMMING:		8	
	Graphical Representation, Gomory's Cutting Plane Method, Bala	as' Algorithm		
	for Zero–One Programming, Branch-and-Bound Method.			
	APPLICATIONS OF OPTIMIZATION IN DES	IGN AND		
	MANUFACTURING SYSTEMS:			
	Formulation of model- optimization of path synthesis of a four-ba			
	minimization of weight of a cantilever beam, general optimization			
	machining process, optimization of arc welding parameters,	and general		
	procedure in optimizing machining operations sequence.			
Text Book				
1. J. K. Sł	narma, "Operations Research", Macmillan, 5 th Edition, 2012.			
2. R. Pann	nerselvan, "Operations Research", 2 nd Edition, PHI Publications, 2	006.		
Reference				
1. A. M. M	Natarajan, P. Balasubramani, A. Tamilarasi, "Operations Research"	", Pearson Educ	cation, 2013.	
	e Saseini, ArhurYaspan, Lawrence Friedman, "Operation	s Research:	Methods &	
Probler	ns",1 st Edition, 1959.			
	Evaluation/Assessment Methodology			
		Ma		
1) Class	asks/ Sessional Examination		<u>x. Marks 100</u>	
2) Presen		15	<u>x. Marks 100</u>	
3) Assign	tations /Seminar	15	<u>x. Marks 100</u>	
4) Research Project Report 10				
4) Resea	aments		<u>x. Marks 100</u>	
,	aments		<u>x. Marks 100</u>	
,	nments rch Project Report		x. Marks 100	
Semin	nments rch Project Report ar On Research Project Report	10 75	<u>x. Marks 100</u>	
Semin 5) ESE	nments rch Project Report ar On Research Project Report Total:	10	x. Marks 100	
Semin 5) ESE Prerequisit	Total: es for the course: Problem Solving using C	10 75	x. Marks 100	
Semin 5) ESE Prerequisite Course Le	Total: ar On Research Project Report Total: as for the course: Problem Solving using C arning Outcomes:	10 75 100		
Semin 5) ESE Prerequisite Course Le CO1: Ide	Inments The Project Report ar On Research Project Report Total: To	10 75 100		
Semin 5) ESE Prerequisite Course Le CO1: Ide ind	Total: Total:	10 75 100 blems involved	l in various	
Semin 5) ESE Prerequisite Course Le CO1: Ide ind CO2: De	Total: Total:	10 75 100 blems involved	l in various	
Semin 5) ESE Prerequisite Course Le CO1: Ide ind CO2: De CO3: mit	Internets Total: Tot	10 75 100 blems involved g transportatio	l in various n model to	
Semin 5) ESE Prerequisite COUrse Lee CO1: Ide ind CO2: De CO3: mit Fir	Total: Total:	10 75 100 blems involved g transportatio e the process of	l in various n model to assignment.	
Semin 5) ESE Prerequisite CO1: Ide ind CO2: De CO3: mit Fir CO4: Ap	Total: Total:	10 75 100 blems involved g transportatio e the process of	l in various n model to assignment.	
Semin 5) ESE Prerequisite CO1: Ide ind CO2: De CO3: mit Fir CO4: Ap ide	Total: Total:	10 75 100 blems involved g transportatio e the process of rld competitive	l in various n model to assignment. situations to	



IIMTU-NEP IMPLEMENTATION Year-I/ Semester –II

Progra	mme:UG		Year: I		
0	B.SC. CS(DS)	Semester: II		
Credits	5	Subject: Data Struct	ure and algorithm using C Lab		
Practica	al: 2				
Course	se Code: Title:Data Structure and algorithm using C Lab				
BCS-N	EP-205P				
	Objectives:				
		1	c Data Structure using C		
	11.		ta Structure in Problem Solving.		
		Searching and Sortin	g Algorithm.		
	of Paper: C				
	um Passing	Marks/Credits:40%	Marks		
L:0					
T:0	T /TT 1				
•	Hours/Week)				
	-1 Hr. $= 1$ C	redit(4Hrs./Week=4C	(radita)		
Unit	$1 - 2 \Pi S = 1C$	10010(4118.) week=40	Contents		No. of
Umt			Contents		Lectures
					Allotted
Ι	Basic of Da	ata Structure Program	s- Looping, Data Manipulation, array.		2
II			namic Memory allocations.		2
	U				
III	Array Impl	ementation of Stacks	and queues		2
		ementation of Stacks t Implementation of S	*		2 2
III	Linked List	t Implementation of S	tacks and Queues		$\begin{array}{c} 2 \\ \hline 2 \\ \hline 2 \\ \hline 2 \end{array}$
III IV	Linked List Application		tacks and Queues		2
III IV V	Linked List Application Implement	t Implementation of S n of Stacks and Queue	tacks and Queues s raversals		2 2
III IV V VI	Linked List Application Implementa Implementa	t Implementation of S n of Stacks and Queue ation of Trees, Tree T	tacks and Queues s raversals n Trees		2 2 2
III IV V VI VI	Linked List Application Implementa Implementa	t Implementation of S n of Stacks and Queue ation of Trees, Tree T ation of Binary Search ation of Linear search	tacks and Queues s raversals n Trees	ort.	2 2 2 2 2
III IV V VI VII VIII	Linked List Application Implementa Implementa	t Implementation of S n of Stacks and Queue ation of Trees, Tree T ation of Binary Search ation of Linear search ation of Insertion Sort	tacks and Queues rs raversals n Trees and Bianry Search	ort.	2 2 2 2 2 2 2
III IV V VI VII VIII	Linked List Application Implementa Implementa	t Implementation of S n of Stacks and Queue ation of Trees, Tree T ation of Binary Search ation of Linear search ation of Insertion Sort	tacks and Queues s raversals n Trees and Bianry Search ,Bubble Sort,Quick Sort and Merge Sc		2 2 2 2 2 2 2
III IV VI VII VIII IX 1) Class	Linked List Application Implementa Implementa Implementa ss tasks/ Sess	t Implementation of S n of Stacks and Queue ation of Trees, Tree T ation of Binary Search ation of Linear search ation of Insertion Sort Evaluat sional Examination	tacks and Queues s raversals n Trees and Bianry Search ,Bubble Sort,Quick Sort and Merge Sc		2 2 2 2 2 2 2 2
III IV VI VII VIII IX 1) Clas 2) Pres	Linked List Application Implementa Implementa Implementa ss tasks/ Sess sentations /Se	t Implementation of S n of Stacks and Queue ation of Trees, Tree T ation of Binary Search ation of Linear search ation of Insertion Sort Evaluat sional Examination	tacks and Queues s raversals n Trees and Bianry Search ,Bubble Sort,Quick Sort and Merge Sc	M	2 2 2 2 2 2 2 2
III IV V VI VII VIII IX 1) Clas 2) Pres 3) Ass	Linked List Application Implements Implements Implements ss tasks/ Sess sentations /Se ignments	t Implementation of S n of Stacks and Queue ation of Trees, Tree T ation of Binary Search ation of Linear search ation of Insertion Sort Evaluat sional Examination eminar	tacks and Queues s raversals n Trees and Bianry Search ,Bubble Sort,Quick Sort and Merge Sc	M	2 2 2 2 2 2 2 2
IIIIVVVIVIIVIIIIX1) Class2) Press3) Ass4) Ress	Linked List Application Implementa Implementa Implementa Ss tasks/ Sess sentations /Se ignments earch Project	t Implementation of S n of Stacks and Queue ation of Trees, Tree T ation of Binary Search ation of Linear search ation of Insertion Sort Evaluat sional Examination eminar	tacks and Queues s raversals n Trees and Bianry Search ,Bubble Sort,Quick Sort and Merge Sc	M	2 2 2 2 2 2 2 2
IIIIVVVIVIIVIIIININClass2)Press3)Ass4)RessSen	Linked List Application Implementa Implementa Implementa ss tasks/ Sess sentations /Se ignments earch Project ninar On Res	t Implementation of S n of Stacks and Queue ation of Trees, Tree T ation of Binary Search ation of Linear search ation of Insertion Sort Evaluat sional Examination eminar	tacks and Queues s raversals n Trees and Bianry Search ,Bubble Sort,Quick Sort and Merge Sc	M 25	2 2 2 2 2 2 2 2
III IV VI VII VIII IX 1) Clas 2) Pres 3) Ass 4) Res	Linked List Application Implementa Implementa Implementa ss tasks/ Sess sentations /Se ignments earch Project ninar On Res	t Implementation of S n of Stacks and Queue ation of Trees, Tree T ation of Binary Search ation of Linear search ation of Insertion Sort Evaluat sional Examination eminar	tacks and Queues s raversals n Trees and Bianry Search ,Bubble Sort,Quick Sort and Merge Sc	M	2 2 2 2 2 2 2 2



Course Learning Outcomes:

CO1: Write basic and advanced Program in C using Linear and Non Linear Data Structure.

CO2: Implement Data Structure using C.

CO3: Choose appropriate Sorting Algorithm for an application and implement it in a modularized way.

CO4: Linear data structures and their applications such as Stacks, Queues and Lists and Non-Linear Data Structures and their Applications such as Trees.



IIMTU-NEP IMPLEMENTATION Year- I / Semester- II

Program	nme:UG		Year: I			
Class:BS	SC CS(DS)		Semester: II			
Credits		Subject:Linux and administration lab(SPT-II)				
Practical	: 2Cr					
Course	Code:					
BCS-NE	P-212P					
	Objectives:					
		script programs to sol				
			utilities such as ls.cpetc using system calls.			
		twork based application	ons.			
	of Paper: C					
	m Passing	Marks/Credits:40%	Marks			
L:0						
T:0		х.				
· · · ·	lours/Week					
	1 Hr. = 1 C					
	- 2 Hrs.=1C	Credit(4Hrs./Week=4C		NT C		
Unit			Contents	No. of Lectures		
				Allotted		
Ι	Write a s	hell script that accent	t a file name starting and ending line numbers as	2		
		1 1	hes between given line no.	2		
II			Il lines containing a specified word.	2		
III			ctorial of given integer	2		
IV			list of file names as arguments count and report the	2		
		e of each word	C 1			
V	Write a av	wk script to find the 1	number of characters, words and lines in a file? 16	2		
		respectively				
VI	Write a C	Program that makes a	copy of a file using standard I/O and system calls?	2		
VII	Write a sh	ell script that receives	any number of file names as arguments checks if	2		
	every argu	ment supplied is a file	e or a directory and reports accordingly. whenever			
1		ant is a file on dimentar				
	the argum	ent is a file or director	y.			



Evaluation/Assessment Methodology		
	Max. Marks:50	
1) Class tasks/ Sessional Examination	25	
2) Presentations /Seminar		
3) Assignments		
4) Research Project Report		
Seminar On Research Project Report		
5) ESE	25	
Total:	50	
Course Learning Outcomes: Student will be able to:		
CO1: To demonstrate the basic knowledge of Linux commands and file handling utilities	by using Linux	
shell environment.		

CO2: To understand the concept of client-server communication by using sockets.



IIMTU-NEPIMPLEMENTATION Year-II/ Semester-III

Programme:Diploma			Year: II		
Class:BS	C CS(D	S)	Semester:III		
Credits	· · · · · · · · · · · · · · · · · ·				
Theory:40	Cr				
Course C	rse Code: Title:Data Analytics				
BCS-NEP	- 302				
Course O	bjectiv	es:			
CO1:	Unders	stand item sets, Clusteri	ng, frame works & Visualizations.		
CO2:			nd evaluating real time applications.		
CO3:		nent various Data strear	e 11		
CO4:	1	stand and apply Data A			
CO5:			of Data Analytics through discovery, planning and l	ouilding.	
Nature of				U	
-	-	g Marks/Credits:40%	Marks (ISE+ESE)		
L:4		<u> </u>			
T:0					
P:0(In Ho	urs/Wee	ek)			
Theory-1H					
Unit			Contents	No. of	
				Lectures	
				Allotted	
Ι	Introd	uction to Data Analy	tics: Sources and nature of data, classification of	8	
	data	(structured, semi-struc	ctured, unstructured), characteristics of data,		
	introdu	iction to Big Data plat	form, need of data analytics, evolution of analytic		
		e 1	and tools, analysis vs reporting, modern data		
		c tools, applications of			
	Data Analytics Lifecycle : Need, key roles for successful analytic projects,				
		· ·	ics lifecycle – discovery, data preparation, model		
			nmunicating results, operation alization		
II			odeling, multivariate analysis, Bayesian modeling,	8	
			orks, support vector and kernel methods, analysis		
			s analysis & nonlinear dynamics, rule induction,		
	Neural	-			
	Netwo	rks: Learning and	generalization, competitive learning, principal		
		0	al networks, fuzzy logic: extracting fuzzy models		
	-	•	s, stochastic search methods.		
III			luction to streams concepts, stream data model and	8	
		6	ng, sampling data in a stream, filtering streams,		
		, 1	a stream, estimating moments, counting oneness in		
		vindow, decaying	window, Real-time Analytics Platform		
		, , , , ,	idies – Real time sentiment analysis, stock market		
	predict				
	Predict				



IV	Frequent Itemset and Clustering: Mining frequent item sets, market	et based	8
1,	modelling, Apriori algorithm, handling large data sets in main mem		0
	pass algorithm, counting frequent itemsets in a stream, Clustering		
	hierarchical, K-means, clustering high dimensional data, CLIQU	1	
	CLUS, frequent pattern-based clustering methods, clustering		
	Euclideanspace, clustering for streams and parallelism.	· · · · · · · · · · · · · · · · · · ·	
V	Frame Works and Visualization: Map Reduce, Hadoop, Pig, Hive,	HBase,	8
	Map R, Sharding, No SQL Databases, S3, Hadoop Distributed Fi		
	Visualization: visual data analysis techniques, interaction techniqu	-	
	and applications.	, Ç	
Text Bo			
1. John	Garrett, "Data Analytics for IT Networks: Developing Innovative	e Use Cases	", Pearsor
Educa	ation.		
2. Mich	ael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Ar	alytics: Eme	rging
3. Busir	ess Intelligence and Analytic Trends for Today's Businesses", Wiley.		
Referen	ce Book:		
1. Pete '	Warden, "Big Data Glossary", O'Reilly.		
2. Gleni	n J. Myatt, "Making Sense of Data", John Wiley & Sons.		
	Evaluation/Assessment Methodology		
		Max. Ma	arks 100
·	tasks /Sessional Examination	1.	5
2) Prese	ntations /Seminar		
3) Assig	nments		
,	Project Report 1		
Semi	nar On Research Project Report		
5) ESE		7.	5
	Total:	10	00
Prerequis	sites for the course: NIL		
Course	Learning Outcomes:		
	Able to Perform data gathering of large data from a range of data source	s.	
	Able to Critically analyse existing Big Data datasets and implementati		racticality
	and usefulness matrices into consideration	01	5

- and usefulness metrics into consideration. CO3: Able to perform the role of statistics in the analysis of large of datasets.
- CO4: Able to apply advanced knowledge of statistical data analytics as applied to large data sets.
- CO5: Employ advanced statistical analytical skills to test assumptions, and to generate and present new information and insights from large datasets.



IIMTU-NEP IMPLEMENTATION Year-II/ Semester-III

Programme	Diploma	Year: II	
Class: BSC CS(DS)		Semester: III	
Credits Subject: Object Oriented Programming Using Java			
Theory:4Cr			
Course Code	Title: Object	Oriented Programming Using Java	
BCS-NEP-30	5		
Course Obje			
•		e use of OOPs concepts.	
		ld problems using OOP techniques.	
	le to understand the		
		use of Packages and Interface in java.	
		nderstand exception handling, multithreaded applications with	
	ichronization.		
Nature of Pa			
		lits:40% Marks (ISE +ESE)	
L:4			
T:0			
P:0(In Hours	(Week)		
Theory - 1 H	/		
•	Irs.=1Credit(4Hrs./\	Week=4Credits)	
Unit	Contents		No. of
			Lectures
			Allotted
Ι	Introduction to O	OPs and Java: OOPs Concepts, Top-Down Approach and	12
		pach, Introduction to Java, History of Java, Features of Java,	
		JRE, JDK, JIT, Java Applications, Character Set, Identifiers,	
	-	ts, Keyword, Data Type, Operators, Conditional Statements,	
		ents, Array Declaration, Creation, Initialization, String	
	1 0	fined Functions in String, String Methods, Vectors,	
	Command-Line A		
II		and Methods: Object Class, Defining Class, Adding	12
		g Methods, Creating Objects, Constructors, Types of	
		& static keyword, Garbage Collection, Inheritance, Types of	
		ting Multilevel Hierarchy, Method Over Loading &	
		nic Method Dispatching, final keyword, Abstract Class.	
III		ckages: Defining Interfaces, Extending and Implementing	12
		ing Packages, Access Protection, Importing Packages,	
		ng: Exception Types, Multiple Catch Clauses, Nested Try	
	-	w, Throws, Finally, Java's Built-in Exceptions, Creating	
		tion Subclasses. Multithreaded Programming: Thread Life	
	-	hreads, Thread Methods, Thread Priority	
IV		iles: Introduction, Streams, Stream Classes, File Class,	12



Creation of Files, Reading and Writing to File, Buffering Access Files, Interactive I/O. GUI Programming: GUI Cor				
Swings, Event Handling.				
V Introduction to Applet Programming: Introduction to Applet, Applet 12 Architecture, Applet Life Cycle, Applet Class, Applet Tag, Applet Methods, 12 Running the Applet. JDBC: Accessing Databases with Java Database Database				
Text Books:	· · · ·			
1. Patrick Naughton and Herbertz Schildt, "Java-2 The Complete Reference	e", McGraw Hill.			
2. Ivor Horton, "Beginning Java-2", Wiley Publishing.				
3. Balaguruswamy, "Programming with Java: A Primer", Tata McGraw Hil	l Education.			
Reference:				
1. Horetmann Cay and Cornell Gary, "Core Java Volume – I", Pearson Edu				
2. Horetmann Cay and Cornell Gary, "Core Java2, Volume II – Advanced I	Features", Pearson Education.			
Evaluation/Assessment Methodology				
	Max. Marks 100			
1) Class tasks/ Sessional Examination	15			
2) Presentations /Seminar				
3) Assignments	10			
4) Research Project Report	10			
Seminar On Research Project Report	75			
5) ESE	75			
Total:	100			
Prerequisites for the course: NIL				
Course Learning Outcomes:				
CO 1: Able to understand the use of OOPs concepts.CO 2: Able to solve real world problems using OOP techniques.				
CO 2: Able to solve real world problems using OOP techniques. CO 3: Able to understand the use of abstraction.				
CO 4: Able to understand the use of Packages and Interface in java.				
CO 5: Able to develop and understand exception handling, mult synchronization.	ithreaded applications with			



IIMTU-NEP IMPLEMENTATION Year-II/Semester-III

Program	nme: Diploma Year:II		
-	SC CS(DS) Semester:III		
Credits	Subject: Communication Skill & Personality Development		
Theory:4	4Cr		
Course	Course Code: Title: Communication Skill & Personality Development		
BCS-NE	EP-303		
Course	Objectives:		
CO1: To	o understand the concept, process and importance of communication.		
CO2: To	develop skills of effective communication both written and oral.		
CO3: To	help acquaint with application of communication skills in the world of business.		
CO4: To	o understand the concept of personality and personality development and its signification	ance.	
CO5: To	understand and develop various traits required for personality development.		
Nature of	of Paper: AECC		
Minimu	m Passing Marks/Credits:40% Marks (ISE +ESE)		
L:4			
T:0			
P:0(In H	Tours/Week)		
Theory -	1 Hr. = 1 Credit		
Practical	- 2 Hrs.=1Credit(4Hrs./Week=4Credits)		
Unit	Unit Contents		
		Lectures	
1			
		Allotted	
Ι	Introduction to Communication	Allotted 8	
Ι	Meaning and Definition, Process, Functions, Objectives, Importance, Essentials of	Allotted 8 of	
Ι	Meaning and Definition, Process, Functions, Objectives, Importance, Essentials of Good Communication, Communication Barriers, Overcoming Communication	Allotted 8 of	
	Meaning and Definition, Process, Functions, Objectives, Importance, Essentials of Good Communication, Communication Barriers, Overcoming Communication Barriers.	Allotted 8 of n	
I	 Meaning and Definition, Process, Functions, Objectives, Importance, Essentials of Good Communication, Communication Barriers, Overcoming Communication Barriers. Written Communication: Need and functions of business letters, Planning and Statement Sta	Allotted 8 of n	
	 Meaning and Definition, Process, Functions, Objectives, Importance, Essentials of Good Communication, Communication Barriers, Overcoming Communication Barriers. Written Communication: Need and functions of business letters, Planning an layout of business letters, Advantages and limitations of written communication. 	Allotted 8 of 1 0 1 1 1	
	 Meaning and Definition, Process, Functions, Objectives, Importance, Essentials of Good Communication, Communication Barriers, Overcoming Communication Barriers. Written Communication: Need and functions of business letters, Planning an layout of business letters, Advantages and limitations of written communication. Oral Communication: Meaning, nature and scope, Principles of Effective Oral Communication. 	Allotted 8 of 0 0 0 0 0	
	 Meaning and Definition, Process, Functions, Objectives, Importance, Essentials of Good Communication, Communication Barriers, Overcoming Communication Barriers. Written Communication: Need and functions of business letters, Planning an layout of business letters, Advantages and limitations of written communication. Oral Communication: Meaning, nature and scope, Principles of Effective Ora Communication, Techniques of Effective Speech, The Art of Listening, Principles 	Allotted Allotted 8 of 0 0 0 0 0	
II	 Meaning and Definition, Process, Functions, Objectives, Importance, Essentials of Good Communication, Communication Barriers, Overcoming Communication Barriers. Written Communication: Need and functions of business letters, Planning an layout of business letters, Advantages and limitations of written communication. Oral Communication: Meaning, nature and scope, Principles of Effective Ora Communication, Techniques of Effective Speech, The Art of Listening, Principle of Good Listening, Advantages and Limitations of Oral Communication. 	Allotted 8 6 7 8 1 8 1 8 1 8 1 8 1 1	
	 Meaning and Definition, Process, Functions, Objectives, Importance, Essentials of Good Communication, Communication Barriers, Overcoming Communication Barriers. Written Communication: Need and functions of business letters, Planning an layout of business letters, Advantages and limitations of written communication. Oral Communication: Meaning, nature and scope, Principles of Effective Ora Communication, Techniques of Effective Speech, The Art of Listening, Principles of Good Listening, Advantages and Limitations of Oral Communication. Personality Development: The concept of personality, Dimensions of personality 	Allotted 8 6 7 8 1 8 1 8 1 8 1 8 1 1	
II	 Meaning and Definition, Process, Functions, Objectives, Importance, Essentials of Good Communication, Communication Barriers, Overcoming Communication Barriers. Written Communication: Need and functions of business letters, Planning an layout of business letters, Advantages and limitations of written communication. Oral Communication: Meaning, nature and scope, Principles of Effective Ora Communication, Techniques of Effective Speech, The Art of Listening, Principle of Good Listening, Advantages and Limitations of Oral Communication. Personality Development: The concept of personality, Dimensions of personality Term personality development, Significance. 	Allotted8of1011 </td	
II	 Meaning and Definition, Process, Functions, Objectives, Importance, Essentials of Good Communication, Communication Barriers, Overcoming Communication Barriers. Written Communication: Need and functions of business letters, Planning an layout of business letters, Advantages and limitations of written communication. Oral Communication: Meaning, nature and scope, Principles of Effective Ora Communication, Techniques of Effective Speech, The Art of Listening, Principle of Good Listening, Advantages and Limitations of Oral Communication. Personality Development: The concept of personality, Dimensions of personality Term personality development, Significance. Attitude and Motivation : Attitude, Concept, Significance, Factors affection 	Allotted 8 of 0	
II	 Meaning and Definition, Process, Functions, Objectives, Importance, Essentials of Good Communication, Communication Barriers, Overcoming Communication Barriers. Written Communication: Need and functions of business letters, Planning an layout of business letters, Advantages and limitations of written communication. Oral Communication: Meaning, nature and scope, Principles of Effective Ora Communication, Techniques of Effective Speech, The Art of Listening, Principle of Good Listening, Advantages and Limitations of Oral Communication. Personality Development: The concept of personality, Dimensions of personality Term personality development, Significance. Attitude and Motivation : Attitude, Concept, Significance, Factors affecting attitudes, Positive attitude, Advantages, Negative attitude, Disadvantages, Ways to State S	Allotted 8 of 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
II	 Meaning and Definition, Process, Functions, Objectives, Importance, Essentials of Good Communication, Communication Barriers, Overcoming Communication Barriers. Written Communication: Need and functions of business letters, Planning an layout of business letters, Advantages and limitations of written communication. Oral Communication: Meaning, nature and scope, Principles of Effective Ora Communication, Techniques of Effective Speech, The Art of Listening, Principle of Good Listening, Advantages and Limitations of Oral Communication. Personality Development: The concept of personality, Dimensions of personality Term personality development, Significance. Attitude and Motivation : Attitude, Concept, Significance, Factors affectin attitudes, Positive attitude, Advantages, Negative attitude, Disadvantages, Ways t develop positive attitude, Difference between Personalities having Positive and States. 	Allotted 8 9 9 1 1 1 2 3 3 4 4 5 5 7 7 8 8 8 7 8 8 8 7 8 8 8 8 8 8 8 8 8 8 8 8 8	
II	 Meaning and Definition, Process, Functions, Objectives, Importance, Essentials of Good Communication, Communication Barriers, Overcoming Communication Barriers. Written Communication: Need and functions of business letters, Planning an layout of business letters, Advantages and limitations of written communication. Oral Communication: Meaning, nature and scope, Principles of Effective Ora Communication, Techniques of Effective Speech, The Art of Listening, Principle of Good Listening, Advantages and Limitations of Oral Communication. Personality Development: The concept of personality, Dimensions of personality Term personality development, Significance. Attitude and Motivation : Attitude, Concept, Significance, Factors affectin attitudes, Positive attitude, Advantages, Negative attitude, Disadvantages, Ways t develop positive attitude, Difference between Personalities having Positive an Negative Attitude, Concept of motivation, Significance, Internal and externation. 	Allotted 8 9 9 1 1 1 2 3 3 4 4 5 5 7 7 8 8 8 7 8 8 8 7 8 8 8 8 8 8 8 8 8 8 8 8 8	
II	 Meaning and Definition, Process, Functions, Objectives, Importance, Essentials of Good Communication, Communication Barriers, Overcoming Communication Barriers. Written Communication: Need and functions of business letters, Planning an layout of business letters, Advantages and limitations of written communication. Oral Communication: Meaning, nature and scope, Principles of Effective Ora Communication, Techniques of Effective Speech, The Art of Listening, Principle of Good Listening, Advantages and Limitations of Oral Communication. Personality Development: The concept of personality, Dimensions of personality Term personality development, Significance. Attitude and Motivation : Attitude, Concept, Significance, Factors affectin attitudes, Positive attitude, Advantages, Negative attitude, Disadvantages, Ways t develop positive attitude, Difference between Personalities having Positive an Negative Attitude, Concept of motivation, Significance, Internal and externation motives, Importance of self-motivation, Factors leading to demotivation. 	Allotted 8 of 1 2 3 4 8 3 4 8 4 8 9 0 11	
II	 Meaning and Definition, Process, Functions, Objectives, Importance, Essentials of Good Communication, Communication Barriers, Overcoming Communication Barriers. Written Communication: Need and functions of business letters, Planning an layout of business letters, Advantages and limitations of written communication. Oral Communication: Meaning, nature and scope, Principles of Effective Ora Communication, Techniques of Effective Speech, The Art of Listening, Principle of Good Listening, Advantages and Limitations of Oral Communication. Personality Development: The concept of personality, Dimensions of personality Term personality development, Significance. Attitude and Motivation : Attitude, Concept, Significance, Factors affectin attitudes, Positive attitude, Difference between Personalities having Positive an Negative Attitude, Concept of motivation, Significance, Internal and externation motives, Importance of self-motivation, Factors leading to demotivation. Self-Esteem: Term self-esteem, Symptoms, Advantages, Do's and Don'ts to the self-motivation and the self-motivation and the self-motivation and the self-motivation. 	Allotted 8 of 1 2 7, 8 9 0 8	
II	 Meaning and Definition, Process, Functions, Objectives, Importance, Essentials of Good Communication, Communication Barriers, Overcoming Communication Barriers. Written Communication: Need and functions of business letters, Planning an layout of business letters, Advantages and limitations of written communication. Oral Communication: Meaning, nature and scope, Principles of Effective Ora Communication, Techniques of Effective Speech, The Art of Listening, Principles of Good Listening, Advantages and Limitations of Oral Communication. Personality Development: The concept of personality, Dimensions of personality Term personality development, Significance. Attitude and Motivation : Attitude, Concept, Significance, Factors affectina attitudes, Positive attitude, Advantages, Negative attitude, Disadvantages, Ways to develop positive attitude, Difference between Personalities having Positive an Negative Attitude, Concept of motivation, Significance, Internal and externation motives, Importance of self-motivation, Factors leading to demotivation. Self-Esteem: Term self-esteem, Symptoms, Advantages, Do's and Don'ts to develop positive selfesteem, Low self-esteem, Symptoms, Personality having low 	Allotted 8 of 1 2 7, 8 9 0 8	
II	 Meaning and Definition, Process, Functions, Objectives, Importance, Essentials of Good Communication, Communication Barriers, Overcoming Communication Barriers. Written Communication: Need and functions of business letters, Planning an layout of business letters, Advantages and limitations of written communication. Oral Communication: Meaning, nature and scope, Principles of Effective Ora Communication, Techniques of Effective Speech, The Art of Listening, Principle of Good Listening, Advantages and Limitations of Oral Communication. Personality Development: The concept of personality, Dimensions of personality Term personality development, Significance. Attitude and Motivation : Attitude, Concept, Significance, Factors affectin attitudes, Positive attitude, Difference between Personalities having Positive an Negative Attitude, Concept of motivation, Significance, Internal and externation motives, Importance of self-motivation, Factors leading to demotivation. Self-Esteem: Term self-esteem, Symptoms, Advantages, Do's and Don'ts to the self-motivation and the self-motivation and the self-motivation and the self-motivation. 	Allotted 8 of 1 2 7, 8 9 0 8	



		1			
	Interpersonal relationships, Teaming, Developing positive personal	ality, Analysis of			
	strengths and weaknesses.				
V					
	goal-setting fails- SMART (Specific, Measurable, Achievable,	Realistic, Time-			
	bound) goals, Art of Prioritisation, Do's and Don'ts about goals.				
	Essential soft skills Assertiveness - Lateral thinking - Work ethic	es, good manners			
	and etiquettes Concept, significance.				
Text B					
1. Clo	ninger, S.C., "Theories of Personality: Understanding Person", Pearso	on, New York, 200	$08, 5^{th}$		
	tion.				
2. Lut	hans F, "Organizational Behaviour", McGraw Hill, New York, 2005,	12^{th} edition.			
3. Bar	ron, R.A. & Brian D, "Social Psychology", Prentice Hall of India, 19	98, 8th edition			
Refere	nce				
1. Adl	ler R.B., Rodman G. & Hutchinson C.C., "Understanding Hum	an Communicatio	on", Oxford		
Uni	iversity Press : New York, 2011.				
	Evaluation/Assessment Methodology				
		Max.	Marks 100		
1) Cla	ss tasks/ Sessional Examination	15			
2) Pre	sentations /Seminar				
3) Ass	signments				
4) Res	earch Project Report	50			
Sen	ninar On Research Project Report				
5) ESI	E	35			
	Total: 100				
Prerequ	usites for the course: Problem Solving using C				
Course	e Learning Outcomes:				
CO1: I	dentify different concept of Personality				
CO2: A	Able to Compare and contrast different personal grooming pertains.				
CO3: A	Able to explore communication beyond language.				
CO4: A	Able to manage oneself while communicating.				
CO5: A	Able to acquire good communication skills and develop confidence.				

CO5: Able to acquire good communication skills and develop confidence.



IIMTU-NEP IMPLEMENTATION Year-II/ Semester-III

Programm	e:DIPLOMA Year:II			
0	Class:BSC CS(DS) Semester:III			
Credits				
Theory:4Ci	Theory:4Cr			
Course Co	Course Code: Title: Computer System Architecture			
BCS-NEP-	302			
Course Ob	jectives:			
CO1: To le	CO1: To learn the concepts regarding microprocessor with 8 bit. To learn the concepts regarding			
Microproce	ssor with 16 bit.			
	nderstand the programming techniques of w		ramming.	
	derstand the basic concept of parallel comp			
	derstand significance of pipelining and par		orm	
	to the need of the designer so as to have app			
	iderstand the concepts of Pipeline schedulir	ng theory		
	Paper: DSE			
	Passing Marks/Credits:40% Marks (Inte	ernal +ESE)		
L:4				
T:0				
P:0(In Hou	,			
	Hr. = 1 Credit			
Unit	Conte	ents	No. of	
			Lectures	
т			Allotted	
Ι	Basic Computer Organization and Desig		8	
	Computer Registers, Timing and Contro			
	and Micro Operations-Registration Tr			
	Instructions, Bus and Memory Transfe			
	Micro-Operations, Shift Micro-Operati			
	Memory-Reference Instructions, Input			
	Computer Description, Design of Basic	c Computer, Design of Accumulator		
т	Logic. Central Processing Unit: General Regis	tar Organization Stacks Organization	8	
II			δ	
	Instruction Formats, Addressing Mode	•		
	Pipelining, Instruction and Arithmetic	Pipenne, vector Processing, Matrix		
111	Multiplication, Array Processors.	htmation Algorithma Multiplication	0	
III	Computer Arithmetic: Addition, Su		8	
	Algorithms: Shift and Add Algorithms, B			
	Floating Point Representations, Arith			
IV/	Numbers, Decimal Arithmetic Operations		0	
IV	Input-Output Organization: Peripher		8	
	Asynchronous Data Transfer, Mode of			
1	Memory Address (DMA), Input/	Output Processor (IOP), Serial		



	Communication.		
V	Memory Organization: Memory Hierarchy, Main Mem Memory, Associative Memory, Cache Memory, Virtual Me Management Hardware		
	Books:		
	ris Manno, "Computer System Architecture", Pearson Education.		
	Stallings, "Computer Organisation and Architecture", Pearson Education	on.	
	, "Prospective in Computer Architecture", Prentice Hall of India		
2. John	n P. Hayes, "Computer Architecture and Organization", McGraw-Hill.		
	Evaluation/Assessment Methodology		
		Max. Marks 100	
· ·	ass tasks/ Sessional Examination	15	
/	esentations /Seminar		
<i>,</i>	signments	10	
	search Project Report	10	
5) ES	minar On Research Project Report E	75	
	Total:	100	
Prereq	uisites for the course: NIL		
Cours	e Learning Outcomes:		
CO1:	For a microprocessor system, student should be able to deal with the and 16 bit microprocessor to analyze the working operation and to kn the respective microprocessor. A student should be good enough to do or externally.	now the pin configuration for leal with interrupts internally	
CO2:	He/she should be able to understand the basic concepts of Assembly l particular data instruction set, student should be having a clear idea programs using kit. He/she shall be having an idea to tackle with cour	of solving machine language	
CO3:	He/she should be able to know the concept of pipelining and parallelism in uniprocessor system for hazard detection. Understand the basic concept of Parallel computing.		
CO4:	A student should have a basic idea of job levels that are governed b basis. He/she should know the Pipeline scheduling theory.	y an organization on priority	
CO5:	For good networking, a student should be able to draw SIMD intercor or a butterfly method system for collision prevention and vector di able to make Cube Interconnection Network, Shuffle-Exchange and C	spatching. He/she should be	



IIMTU-NEP IMPLEMENTATION Year-II/ Semester-III

Programm	e: Certificate Year:II	
Class:BSC		
Credits	Subject:Data Structure Algorithms using C	
Theory:4Ci		
Course Co		
BCS-NEP-		
Course Ob		
	nonstrate familiarity with major algorithms and data structures.	
	alyze performance of algorithms and choose the appropriate data structure and	algorithm
	ign method for a specified application.	argonum
	ermine which algorithm or data structure to use in different scenarios and be far	miliar with
	ting recursive methods.	iiiiiai wiui
	nonstrate understanding of the abstract properties of various data structures such	as stacks
	ues, lists, trees and graphs and use various data structures effectively in application	
	nonstrate understanding of various sorting algorithms, including bubble sort, ins	
	ection sort, heap sort and quick sort.	,
	Paper: Core	
	Passing Marks/Credits:40% Marks (ISE +ESE)	
L:4		
T:0		
P:0(In Hou	rs/Week)	
•	Hr. = 1 Credit	
•	Hrs.=1Credit(4Hrs./Week=4Credits)	
Unit	Contents	No. of
		Lectures
		Allotted
Ι	Introduction: Basic Terminology, Data Structures, Classification of Data	8
	Structures, Data Structure Operations, Complexity.	_
	Array: Definition, Declaration, Initialization of Array, Accessing Elements of	
	Array, Multidimensional Arrays, Sparse Matrix, Lower and Upper Triangular	
	Matrices, Vector, Memory Representation of Array- Row Major and Column	
	Major, Address Calculation of Array, Insertion and Deletion on Array	
II	Linked List: Introduction, Dynamic Memory Allocation, Singly Linked Lists,	8
	Operations on Linked List Such as Traversal, Insertion, Deletion and Searching,	
	Use of Headers, Introduction to Circularly Linked Lists and Doubly Linked	
l	Lists, Two-Way Lists.	
III	Stacks and Queues: Introduction and Primitive Operations on Stack, Stack	8
III		8
III	Stacks and Queues: Introduction and Primitive Operations on Stack, Stack Applications; Infix, Postfix, Prefix Expressions; Evaluation of Postfix Expression; Conversion among Prefix, Infix and Postfix; Recursion; Introduction	8
III	Stacks and Queues: Introduction and Primitive Operations on Stack, Stack Applications; Infix, Postfix, Prefix Expressions; Evaluation of Postfix	8
III IV	Stacks and Queues: Introduction and Primitive Operations on Stack, Stack Applications; Infix, Postfix, Prefix Expressions; Evaluation of Postfix Expression; Conversion among Prefix, Infix and Postfix; Recursion; Introduction	8



Linked List, Recursive algorithms for Tree Operations such			
Deletion, Traversal; Traversal of Binary Trees; Application of H	Binary Trees;		
Binary Search Tree (BST), Insertion and Deletion in BST, B-Tree.			
V Searching & Sorting Techniques: Bubble Sort, Insertion sort, S			
Merge Sort, Heap Sort, Linear Search, Binary Search and Hashing.			
Text Books:			
1) Tenenbaum, "Data Structures Using C", Pearson Education.			
2) Samir Kumar Bandyopadhyay, K. N. Dey, "Data Structures Using C", Pears			
3) Lipschutz (Schaum's Series), "Data Structure with C", Tata McGraw Hill E	ducation		
Reference:			
1) Robert Kruse, C. L.Tondo, "Data Structures and Program Design in C", Pe	arson Education.		
2) E. Horowitz, S. Sahni& D. Mehta, "Fundamentals of Data Structures", Galg	otia Publications.		
3) R. S. Salaria, "Data Structures & Algorithms", Khanna Book Publishing Co.	(P) Ltd.		
Evaluation/Assessment Methodology			
	Max. Marks 100		
1) Class tasks/ Sessional Examination	15		
2) Presentations /Seminar			
3) Assignments			
4) Research Project Report	10		
Seminar On Research Project Report			
5) ESE	75		
Total:	100		
Prerequisites for the course: Problem Solving using C			
Course Learning Outcomes:			
CO1: Demonstrate familiarity with major algorithms and data structures.			
CO2: Analyze performance of algorithms and choose the appropriate data	a structure and algorithm		
design method for a specified application.			
CO3: Determine which algorithm or data structure to use in different scena	rios and be familiar with		
writing recursive methods.			
CO4: Demonstrate understanding of the abstract properties of various data			
queues, lists, trees and graphs and Use various data structures effectively	11 1 0		
Demonstrate understanding of various sorting algorithms, including b	ubble sort, insertion sort		
CO5: selection sort, heap sort and quick sort			



IIMTU-NEPIMPLEMENTATION Year-II/Semester-III

Prograi	mme:Diploma Year:II		
Class:B	Class:BSC CS(DS) Semester:III		
Credits	edits Subject: Machine learning		
Theory:	heory:4Cr		
	Durse Code: Title: Machine learning		
BCS-NE	EP-311		
Course	Objectives:		
CO1:	To understand the basic theory underlying r	e	
CO2:	To understand to formulate machine learning problems corresponding to different applications.		
	To understand a range of machine lear	rning algorithms along with their	strengths and
CO3:	weaknesses.		
G A A	To apply machine learning algorithms to so		
CO4:	To apply the algorithms to a real-world prob		d report on the
CO5:	expected accuracy that can be achieved by a	applying the models.	
	of Paper: Core Course		
	um Passing Marks/Credits:40% Marks (IS)	E+ESE)	
L:4			
T:0	I /X / 1 ->		
	Iours/Week) IHr.=1Credit		
	ll-2Hrs.=1Credit(4Hrs./Week=4Credits)		
Unit	Content	te	No. of
Omt	Conten		Lectures
			Allotted
Ι		Science Data Vigualization in	
	Introduction to Python, Python for Data	a Science, Data visualisation in	10
	Introduction to Python, Python for Data Python, Math for Machine Learning.	a Science, Data Visualisation in	
II	Python, Math for Machine Learning. Statistics and Exploratory Data Analysis	a Science, Data visualisation in	
II	Python, Math for Machine Learning.	a Science, Data visualisation in	10
II	Python, Math for Machine Learning.Statistics and Exploratory Data Analysis	a Science, Data visualisation in	10
II	 Python, Math for Machine Learning. Statistics and Exploratory Data Analysis Exploratory Data Analysis 	a science, Data visualisation in	10
II	 Python, Math for Machine Learning. Statistics and Exploratory Data Analysis Exploratory Data Analysis Cloud Essentials: Intro to Git&Github 	a science, Data visualisation in	10
	 Python, Math for Machine Learning. Statistics and Exploratory Data Analysis Exploratory Data Analysis Cloud Essentials: Intro to Git&Github Inferential Statistics 		10 10
	 Python, Math for Machine Learning. Statistics and Exploratory Data Analysis Exploratory Data Analysis Cloud Essentials: Intro to Git&Github Inferential Statistics Machine Learning Algorithms 	a science, Data visualisation in	10 10
	 Python, Math for Machine Learning. Statistics and Exploratory Data Analysis Exploratory Data Analysis Cloud Essentials: Intro to Git&Github Inferential Statistics Machine Learning Algorithms Supervised Learning 	a Science, Data Visualisation in	10 10
	 Python, Math for Machine Learning. Statistics and Exploratory Data Analysis Exploratory Data Analysis Cloud Essentials: Intro to Git&Github Inferential Statistics Machine Learning Algorithms Supervised Learning Regression 		10 10
	 Python, Math for Machine Learning. Statistics and Exploratory Data Analysis Exploratory Data Analysis Cloud Essentials: Intro to Git&Github Inferential Statistics Machine Learning Algorithms Supervised Learning Regression Linear Regression 		10 10
	Python, Math for Machine Learning.Statistics and Exploratory Data Analysis• Exploratory Data Analysis• Cloud Essentials: Intro to Git&Github• Inferential StatisticsMachine Learning AlgorithmsSupervised Learning• Regression• Linear Regression• Logistic Regression		10 10
	Python, Math for Machine Learning.Statistics and Exploratory Data Analysis• Exploratory Data Analysis• Cloud Essentials: Intro to Git&Github• Inferential StatisticsMachine Learning AlgorithmsSupervised Learning• Regression• Linear Regression• Logistic Regression• Naive Bayes• k-Nearest Neighbours		10 10
	 Python, Math for Machine Learning. Statistics and Exploratory Data Analysis Exploratory Data Analysis Cloud Essentials: Intro to Git&Github Inferential Statistics Machine Learning Algorithms Supervised Learning Regression Linear Regression Logistic Regression Naive Bayes 		10 10
	Python, Math for Machine Learning.Statistics and Exploratory Data Analysis• Exploratory Data Analysis• Cloud Essentials: Intro to Git&Github• Inferential StatisticsMachine Learning AlgorithmsSupervised Learning• Regression• Linear Regression• Logistic Regression• Naive Bayes• k-Nearest Neighbours• Support Vector Machine• Decision Tree Models		10 10
	Python, Math for Machine Learning.Statistics and Exploratory Data Analysis• Exploratory Data Analysis• Cloud Essentials: Intro to Git&Github• Inferential StatisticsMachine Learning AlgorithmsSupervised Learning• Regression• Linear Regression• Logistic Regression• Naive Bayes• k-Nearest Neighbours• Support Vector Machine		10 10



	K Mada Chastaria	
IV	K-Mode Clustering Deep Learning	10
1 V	 Introduction to Neural Networks 	10
	Convolutional Neural Networks (CNN)	
X 7	Recurrent Neural Networks (RNN)	10
V	Natural Language Processing	10
	Lexical Processing	
	Syntactical Processing	
Text B	Semantic Processing	
2. Eth	co Gori , Machine Learning: A Constraint-Based Approach, Morgan em Alpaydin, Machine Learning: The New AI, MIT Press-2016	Kaufmann. 2017
Refer		
-	zard, S., Michalski, J. G. Carbonell and Tom M. Mitchell, Machir	e Learning: An Artificial
	lligence Approach, Volume 1, Elsevier. 2014	
2. Step	bhen Marsland, Taylor & Francis 2009. Machine Learning: An Algori	thmic Perspective.
	Evaluation/Assessment Methodology	
		Max. Marks 10
/	ss tasks/ Sessional Examination	15
/	sentations /Seminar	
	ignments	
,	earch Project Report	10
	ninar On Research Project Report	
5) ESH		75
	Total:	100
-	isites for the course: NIL	
	Learning Outcomes:	
CO1:	Able to understand the fundamentals of deep learning.	
CO2:	Able to design and implement deep neural network systems.	
CO3:	Able to identify reasonable work goals and estimate their source	es required to achieve the
ao i	objectives.	
CO4:	Able to apply these techniques in applications which involve learning.	perception, reasoning an
a o =		

CO5: Able to apply topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning.



IIMTU-NEP IMPLEMENTATION Year-II / Semester –III

Program		Year: II			
	SC CS(DS)	Semester:I II			
Credits		Subject: Machine learning Lab (SPT-III))		
Practical					
Course		Title: Machine learning Lab			
BCS-NE					
	Objectives:				
	CO1: Design and evaluate the unsupervised models through python in built functions.				
	-	s reinforcement algorithms to solve real ti			
		le for recommender system using Natural	Language processing.		
	of Paper: C				
	m Passing	Marks/Credits: 40% Marks			
L:0					
T:0	ATT1 \				
`	ours/Week)	radit			
	1 Hr. = 1 C	redit redit(4Hrs./Week=4Credits)			
Unit	- 2 111510	Contents		No. of	
Umt		Contents		Lectures	
				Allotted	
Ι	Write a pr	ogram to implement k-Nearest Neighbor a	algorithm	2	
I	Apply EM algorithm to cluster a set of data stored in a CSV file.		2		
III	Write a program to construct a Bayesian network considering medical data		2		
IV		rogram to implement the naïve Bayesi			
1,		ta set stored as a .CSV file.		_	
V	-	Artificial Neural Network by implemen	ting the Back propagation	1 2	
		and test the same using appropriate data se			
VI	Write a p	rogram to demonstrate the working of the	he decision tree based ID?	3 2	
	algorithm.	0			
VII	-	and demonstrate the FIND-S algorithm		2	
VIII	implement and demonstrate the Candidate-Elimination algorithm		2		
Referen	ce / Text Bo	ooks:			
1. Marc	o Gori, Ma	chine Learning: A Constraint-Based Appro	oach, Morgan Kaufmann. 2	017	
		Evaluation/Assessment Me	thodology		
				Max. Marks:50	
1) Class	s tasks/ Sess	ional Examination	25		
2) Prese	entations /Se	eminar			
· •	gnments				
,	arch Project	1			
Semi	nar On Res	earch Project Report			
5) ESE			25		



Course Learning Outcomes:

Student will be able to:

CO1: Design the unsupervised models through python in built functions

CO2: Understand the basic concepts of reinforcement algorithms.

CO3: Implement various reinforcement algorithms to solve real time complex problems.



IIMTU-NEP IMPLEMENTATION Year-II/ Semester-IV

0	:DIPLOMA	Year:II	
Class:B.SC.CS(DS) Semester:IV			
Credits Subject: Artificial Intelligence (SPT-IV)			
Theory:4Cr			
	Course Code: Title: Artificial Intelligence		
BCS-NEP-4			
Course Obj			
CO1: To understand about Artificial Intelligence, AI tasks and AI problem solving technique.CO2: To study the concepts Propositional logics, predicate Logic.			е.
	• • •	emantics Net, Partitions Net, Conceptual Dependencies a	and Sorinta
		blog and Implement the Prolog Program.	ind Scripts.
	earning concepts of Exper	0 1 0 0	
	aper: CORE	t system and Leanning.	
		0% Marks (Internal +ESE)	
L:4			
T:0			
P:0(In Hours	/Week)		
Theory - 1 H	r. = 1 Credit		
Practical-2	Hrs.=1Credit(4Hrs./Week	=4Credits)	
Unit		Contents	No. of
			Lectures
			Allotted
Ι		ion to Artificial Intelligence, Task Domains of AI, AI	9
	1	ormulation, Production systems, Control strategies,	
	U	em characteristics, Production system characteristics,	
	Best First Search and Pr	eadth First Search, Heuristic Search (Hill Climbing,	
II		tation: Approaches, Types and Properties of	9
11		al Logic, Properties of Statements, Equivalence Law,	7
	• •	t Order Predicate Logic, Properties of Wffs,	
		in First Order Predicate Logic, Conversion to Clausal	
		Resolution, No deductive Inference Methods, Rules.	
III		Representation: Semantic Nets, Partitioned Semantic	9
		r Wffs and Predicate Logic, Property Inheritance	
Algorithm, Frame Structures, Conceptual Dependencies and Scripts			
	Algorithm, Frame Struct	tures, Conceptual Dependencies and Scripts	
IV		acts, Rules, Variables, Operators, Control Structures,	9
IV	Prolog: Introduction, F		9
IV	Prolog: Introduction, F Matching, Backtracking	acts, Rules, Variables, Operators, Control Structures,	9
IV V	Prolog: Introduction, F Matching, Backtracking Databases, Implementati Expert System : Need a	acts, Rules, Variables, Operators, Control Structures, g, Cuts, Recursion, Lists, Input/output and Streams, ion of All Concepts in Prolog. and Justification of Expert System, Representing and	9 9
	Prolog: Introduction, F Matching, Backtracking Databases, Implementati Expert System : Need a Using Domain Specific	acts, Rules, Variables, Operators, Control Structures, g, Cuts, Recursion, Lists, Input/output and Streams, ion of All Concepts in Prolog. and Justification of Expert System, Representing and Knowledge, Knowledge Acquisition, Expert System	
	Prolog: Introduction, F Matching, Backtracking Databases, Implementati Expert System : Need a Using Domain Specific Shells, Inference Engine	acts, Rules, Variables, Operators, Control Structures, g, Cuts, Recursion, Lists, Input/output and Streams, ion of All Concepts in Prolog. and Justification of Expert System, Representing and	



in Problem Solving, Learning from Example-Induction, Exp	lanation Based			
learning.				
Text Books:				
. Elaine Rich& Kevin Knight, "Artificial Intelligence", Tata McGraw Hill. Dan W				
Patterson, "Introduction to Artificial Intelligence & Expert Systems", PHI.				
2. S. K. Sarkar, "Discrete Mathematics", S. Chand & Co.				
Referential Books:				
1. Stuart J. Russell & Peter Norvig, "Artificial Intelligence-A Modern Appro	oach", Prentice Hall.			
2. George F. Luger, "Artificial Intelligence-Structures and Strategies for	Complex Problem Solving",			
Pearson Education.				
Evaluation/Assessment Methodology				
	Max. Marks 100			
1) Class tasks/ Sessional Examination 15				
2) Presentations /Seminar				
3) Assignments				
4) Research Project Report 10				
Seminar On Research Project Report				
5) ESE	75			
Total:	100			
Prerequisites for the course: Artificial Intelligence				
Course Learning Outcomes:				
CO 1: Learn about Artificial Intelligence, AI tasks and AI problem solving	g technique.			
CO 2: Learn study the concepts Propositional logics, predicate Logic	Ĩ			
CO 3: Learn the concepts Semantics Net, Partitions Net, Conceptual Depe	ndencies and Scripts			
CO 4: Learn concepts of Prolog and Implement the Prolog Program.	-			
CO 5: Learn concepts of Expert system and Learning.				



IIMTU-NEP IMPLEMENTATION Year-II/ Semester-IV

0	me:Diplo		Year: II	
	SC CS(DS)		Semester: IV	
Credits		Subject: Data Mining	g	
Theory:4				
Course (Title:Data Mining		
BCS-NE	P-404			
Course (Objectives			
	o introduc	e students to basic ap	pplications, concepts, and techniques of data mining.	
СО2: Т	To develop	skills for using recen	nt data mining software to solve practical problems in	a variety of
d	lisciplines.			
СО3: Т	o extract	knowledge from data	a repository for data analysis, frequent pattern, classif	fication and
р	rediction.			
CO4: U	Jnderstand	and implement class	ical models and algorithms in data warehouses and dat	a mining.
CO5: N	Aaster data	a mining techniques	in various applications like social, scientific and env	vironmental
С	ontext.			
Nature o	f Paper: I	DSE		
Minimur	m Passing	Marks/Credits:40%	6 Marks (ISE +ESE)	
L:4				
T:0				
P:0(In Ho	ours/Week	.)		
Theory -	1 Hr. = 1	Credit		
Unit			Contents	No. of
				Lectures
				Allotted
Ι		•	Overview, Motivation, Definition & Functionalities,	
Ι	Major i	ssues in Data Minin	Overview, Motivation, Definition & Functionalities, ng, Integration of Data Mining System with Data	Allotted
Ι	Major is Warehou	ssues in Data Minin use System.	ng, Integration of Data Mining System with Data	Allotted
Ι	Major i Warehou Data P	ssues in Data Minin use System. reprocessing : Descri	ng, Integration of Data Mining System with Data ptive Data Summarization, Data Cleaning-Missing	Allotted
Ι	Major in Warehou Data P Values, I	ssues in Data Minin use System. reprocessing : Descri Noisy Data, Data Integ	ng, Integration of Data Mining System with Data ptive Data Summarization, Data Cleaning-Missing gration and Transformation, Data Reduction-Data Cube	Allotted
I	Major ia Warehou Data P Values, J Aggrega	ssues in Data Minin use System. reprocessing : Descri Noisy Data, Data Integ tion, Attribute Subse	ng, Integration of Data Mining System with Data ptive Data Summarization, Data Cleaning-Missing gration and Transformation, Data Reduction-Data Cube et Selection, Dimensionality Reduction, Numerosity	Allotted
	Major i Warehou Data P Values, I Aggrega Reductio	ssues in Data Minin use System. reprocessing: Descri Noisy Data, Data Integ tion, Attribute Subse on, Discretization and O	ng, Integration of Data Mining System with Data ptive Data Summarization, Data Cleaning-Missing gration and Transformation, Data Reduction-Data Cube et Selection, Dimensionality Reduction, Numerosity Concept Hierarchy.	Allotted 10
I	Major i Warehou Data P Values, I Aggrega Reduction	ssues in Data Minin use System. reprocessing: Descri Noisy Data, Data Integ tion, Attribute Subse on, Discretization and C tion Rules: Introduct	ng, Integration of Data Mining System with Data ptive Data Summarization, Data Cleaning-Missing gration and Transformation, Data Reduction-Data Cube et Selection, Dimensionality Reduction, Numerosity Concept Hierarchy. tion, Frequent Item-sets, Closed Item-sets, Methods	Allotted
	Major in Warehou Data P Values, I Aggrega Reduction Association to Discon	ssues in Data Minin use System. reprocessing: Descri Noisy Data, Data Integ tion, Attribute Subse on, Discretization and O tion Rules: Introduct over Association Rule	ng, Integration of Data Mining System with Data ptive Data Summarization, Data Cleaning-Missing gration and Transformation, Data Reduction-Data Cube et Selection, Dimensionality Reduction, Numerosity Concept Hierarchy. tion, Frequent Item-sets, Closed Item-sets, Methods es, Apriori Algorithm, Multilevel Association Rule	Allotted 10
II	Major in Warehou Data P Values, I Aggrega Reduction Associa to Disco Mining,	ssues in Data Minin use System. reprocessing: Descri Noisy Data, Data Integ tion, Attribute Subse on, Discretization and C tion Rules: Introduct over Association Rule and Rule Evaluation	ng, Integration of Data Mining System with Data ptive Data Summarization, Data Cleaning-Missing gration and Transformation, Data Reduction-Data Cube et Selection, Dimensionality Reduction, Numerosity <u>Concept Hierarchy.</u> tion, Frequent Item-sets, Closed Item-sets, Methods es, Apriori Algorithm, Multilevel Association Rule Metrics.	Allotted 10 10
	Major in Warehou Data P Values, I Aggrega Reduction Association to Discon Mining, Classifie	ssues in Data Minin use System. reprocessing: Descri Noisy Data, Data Integ tion, Attribute Subse on, Discretization and C tion Rules: Introduct over Association Rule and Rule Evaluation cation and Prediction	ng, Integration of Data Mining System with Data ptive Data Summarization, Data Cleaning-Missing gration and Transformation, Data Reduction-Data Cube et Selection, Dimensionality Reduction, Numerosity <u>Concept Hierarchy.</u> tion, Frequent Item-sets, Closed Item-sets, Methods es, Apriori Algorithm, Multilevel Association Rule Metrics. on: Classification Techniques-Decision Tree, Rule-	Allotted 10
II	Major in Warehou Data P Values, J Aggrega Reduction Associan to Disco Mining, Classifie Based (ssues in Data Minin use System. reprocessing: Descri Noisy Data, Data Integ tion, Attribute Subse on, Discretization and O tion Rules: Introduct over Association Rule and Rule Evaluation cation and Predictio Classification, Bayes	ng, Integration of Data Mining System with Data ptive Data Summarization, Data Cleaning-Missing gration and Transformation, Data Reduction-Data Cube et Selection, Dimensionality Reduction, Numerosity Concept Hierarchy. tion, Frequent Item-sets, Closed Item-sets, Methods es, Apriori Algorithm, Multilevel Association Rule Metrics. on: Classification Techniques-Decision Tree, Rule- sian Classification, k-Nearest-Neighbor Classifier,	Allotted 10 10
II	Major in Warehou Data P Values, I Aggrega Reduction Associan to Disco Mining, Classifie Based O Linear R	ssues in Data Minin use System. reprocessing: Descri Noisy Data, Data Integ tion, Attribute Subse on, Discretization and C tion Rules: Introduct over Association Rule and Rule Evaluation cation and Predictio Classification, Bayes Regression, Accuracy	ng, Integration of Data Mining System with Data ptive Data Summarization, Data Cleaning-Missing gration and Transformation, Data Reduction-Data Cube et Selection, Dimensionality Reduction, Numerosity Concept Hierarchy. tion, Frequent Item-sets, Closed Item-sets, Methods es, Apriori Algorithm, Multilevel Association Rule Metrics. on: Classification Techniques-Decision Tree, Rule- sian Classification, k-Nearest-Neighbor Classifier, and Error Measures	Allotted 10 10 10 10
II	Major in Warehou Data P Values, I Aggrega Reduction Associan to Disco Mining, Classifie Based O Linear R Cluster	ssues in Data Minin use System. reprocessing: Descri Noisy Data, Data Integ tion, Attribute Subse on, Discretization and C tion Rules: Introduct over Association Rule and Rule Evaluation cation and Prediction Classification, Bayes Regression, Accuracy Analysis: Introducti	ng, Integration of Data Mining System with Data ptive Data Summarization, Data Cleaning-Missing gration and Transformation, Data Reduction-Data Cube et Selection, Dimensionality Reduction, Numerosity <u>Concept Hierarchy</u> . tion, Frequent Item-sets, Closed Item-sets, Methods es, Apriori Algorithm, Multilevel Association Rule Metrics. on: Classification Techniques-Decision Tree, Rule- sian Classification, k-Nearest-Neighbor Classifier, and Error Measures on, Types of Data, Partitioning Methods- k-Means	Allotted 10 10
II	Major in Warehou Data P Values, J Aggrega Reduction Associan to Discon Mining, Classifie Based O Linear R Cluster and k-M	ssues in Data Minin use System. reprocessing: Descri Noisy Data, Data Integ tion, Attribute Subse on, Discretization and O tion Rules: Introduct over Association Rule and Rule Evaluation cation and Prediction Classification, Bayes Regression, Accuracy Analysis: Introducti Iedoids, Hierarchical	ng, Integration of Data Mining System with Data ptive Data Summarization, Data Cleaning-Missing gration and Transformation, Data Reduction-Data Cube et Selection, Dimensionality Reduction, Numerosity Concept Hierarchy. tion, Frequent Item-sets, Closed Item-sets, Methods es, Apriori Algorithm, Multilevel Association Rule Metrics. on: Classification Techniques-Decision Tree, Rule- sian Classification, k-Nearest-Neighbor Classifier, and Error Measures on, Types of Data, Partitioning Methods- k-Means Clustering- Chameleon, Density Based Methods-	Allotted 10 10 10 10
II	Major in Warehou Data P Values, I Aggrega Reduction Associan to Disco Mining, Classifie Based O Linear R Cluster and k-M DBSCA	ssues in Data Minin use System. reprocessing: Descri Noisy Data, Data Integ tion, Attribute Subse on, Discretization and C tion Rules: Introduct over Association Rule and Rule Evaluation cation and Prediction Classification, Bayes Regression, Accuracy Analysis: Introducti Iedoids, Hierarchical N, OPTICS. Grid I	ng, Integration of Data Mining System with Data ptive Data Summarization, Data Cleaning-Missing gration and Transformation, Data Reduction-Data Cube et Selection, Dimensionality Reduction, Numerosity <u>Concept Hierarchy.</u> tion, Frequent Item-sets, Closed Item-sets, Methods es, Apriori Algorithm, Multilevel Association Rule <u>Metrics.</u> on: Classification Techniques-Decision Tree, Rule- sian Classification, k-Nearest-Neighbor Classifier, and Error Measures on, Types of Data, Partitioning Methods- k-Means I Clustering- Chameleon, Density Based Methods- Based Methods- STING, Model Based Methods-	Allotted 10 10 10 10
II	Major in Warehou Data P Values, I Aggrega Reduction Associan to Discon Mining, Classifie Based O Linear R Cluster and k-M DBSCA Neural N	ssues in Data Minin use System. reprocessing: Descri Noisy Data, Data Integ tion, Attribute Subse on, Discretization and C tion Rules: Introduct over Association Rule and Rule Evaluation cation and Prediction Classification, Bayes Regression, Accuracy Analysis: Introducti Iedoids, Hierarchical N, OPTICS. Grid I Network Approach, O	ng, Integration of Data Mining System with Data ptive Data Summarization, Data Cleaning-Missing gration and Transformation, Data Reduction-Data Cube et Selection, Dimensionality Reduction, Numerosity <u>Concept Hierarchy.</u> tion, Frequent Item-sets, Closed Item-sets, Methods es, Apriori Algorithm, Multilevel Association Rule <u>Metrics.</u> on: Classification Techniques-Decision Tree, Rule- sian Classification, k-Nearest-Neighbor Classifier, and Error Measures on, Types of Data, Partitioning Methods- k-Means I Clustering- Chameleon, Density Based Methods- Based Methods- STING, Model Based Methods-	Allotted 10 10 10 10



Mining,	Multimedia	Data	Mining,	Applications	of	data	mining	in	finance,
business	, social netwo	orks.							

Text Books: 1. Jiawei Han, Jian Pei, Micheline Kamber, "Data Mining: Concepts and Techniques", Elsevier.

Reference:

- 1. Margaret H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education.
- 2. Arun K. Pujari, "Data Mining Techniques", Universities Press.
- 3. Pieter Adriaans & Dolf Zantinge, "Data Mining", Pearson Education.

Evaluation/Assessment Methodology
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	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100

Prerequisites for the course: NIL

Course Learning Outcomes:

CO1: Understand the functionality of the various data mining and data warehousing component.

CO2: Appreciate the strengths and limitations of various data mining and data warehousing models.

CO3: Explain the analyzing techniques of various data

CO4: Describe different methodologies used in data mining and data ware housing.

CO5: Compare different approaches of data ware housing and data mining with various technologies.



IIMTU-NEP IMPLEMENTATION Year-II/ Semester-IV

Program	nme: Dip	loma	Year: II	
0	BSC CS(D		Semester: IV	
Credits	,	Subject: Software Eng		
Theory:				
Course		Title: Software Engine	ering	
BCS-NE			8	
	Objective	es:		
CO 1:			oftware development process models.	
CO 2:		1	uirements specifications for different projects.	
CO 3:		2 1	ware architecture/design.	
CO 4:	-		mportance of Software project management concep	ts like cost
		on, scheduling and review		
CO 5:			gging techniques and analyzing their effectiveness.	
Nature	of Paper:			
Minimu	ım Passin	g Marks/Credits:40%	Marks (ISE +ESE)	
L:4		~	·	
T:0				
P:0(In H	Iours/Wee	ek)		
Theory -	- 1 Hr. = 1	Credit		
Practica	l- 2 Hrs.=	1Credit(4Hrs./Week=4C	Credits)	
Unit	Conten	ts		No. of Lectures Allotted
Ι	Softwar Quality Process	e Engineering Layers, Attribute and Metric Models Water Fall Mod	cteristics and Applications, Software Engineering, Software Process Framework, CMM, Software s, Software Development Life Cycle, Software del, Prototyping Model, RAD Model, Spiral Model,	10
		· · ·	ent-based Development Model	10
II	Analysis Modelir Softwar Feasibil Informa Specific Analysis	ments, Requirement s and Negotiating Re- ng, Requirements Val e Requirements Speci- ity Study, Elements of tion Modeling- DFD, B cation, Data Dictionary, s Model.	gineering and Analysis Modeling: Software Engineering Process, Elicitation Requirements, equirements, Requirement Specification, System idation, Requirement Management, Creating a ification Document, IEEE Standards for SRS, f Analysis Model, Data Modeling- ER Diagram, ehavioral Modeling, Control Specification, Process Software Quality Framework, Quality Metrics for	10
III	Concept Informa Docume	ts-Abstraction, Archite tion Hiding, Functior entation, Design Strate	entation: Design Process, Principles, and Design cture, Refinement, Modularity, Data Structure, nal Independence, Cohesion, Coupling; Design gies-Top Down and Bottom Up Design; Design s, Architectural Design, User Interface Design,	10



 Prese Assig Resea Semi ESE 	a tasks/ Sessional Examination entations /Seminar gnments arch Project Report nar On Research Project Report <u>Total:</u> <u>Sites for the course: NIL</u> <u>Learning Outcomes:</u> Select and implement different software development process mode Extract and analyze software requirements specifications for differe Develop some basic level of software architecture/design. Define the basic concepts and importance of Software project man estimation, scheduling and reviewing the progress.	nt projects.	
 2) Prese 3) Assig 4) Resea Semine 5) ESE Prerequise Course I CO 1: CO 2: CO 3:	entations /Seminar gnments arch Project Report nar On Research Project Report Sites for the course: NIL Learning Outcomes: Select and implement different software development process mode Extract and analyze software requirements specifications for differe Develop some basic level of software architecture/design.	15 10 75 100 ls. nt projects.	
 2) Prese 3) Assig 4) Resea 5) ESE Prerequise Course I CO 1: CO 2:	entations /Seminar gnments arch Project Report nar On Research Project Report <u>Total:</u> sites for the course: NIL Learning Outcomes: Select and implement different software development process mode Extract and analyze software requirements specifications for differe	15 10 75 100 ls.	i 100
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 2) Prese 3) Assig 4) Resea 5) ESE Prerequise Course I	entations /Seminar gnments arch Project Report nar On Research Project Report Total: sites for the course: NIL Learning Outcomes:	15 10 75 100	i 100
 Prese Assig Resea Semi ESE 	entations /Seminar gnments arch Project Report nar On Research Project Report Total: sites for the course: NIL	15 10 75	i 100
 Prese Assig Resear Semining ESE 	entations /Seminar gnments arch Project Report nar On Research Project Report Total:	15 10 75	i 100
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 Prese Assig Resea Semit 	entations /Seminar gnments arch Project Report	15 10	100
 Prese Assig Resea 	entations /Seminar gnments arch Project Report	15	<u>: 100</u>
 Prese Assig 	entations /Seminar gnments	15	<u>: 100</u>
2) Prese	entations /Seminar		i 100
/			100
			100
	Evaluation/Assessment Methodology		
Engir	neering", Pearson Education India		
4. Subra	amanian Chandramouli, SaikatDutt, Chandramouli Seetharaman,	B. G Geetha,	"Software
	s Peter, W. Pedrycz, "Software Engineering: An Engineering Approa	ch", John Wiley &	z Sons.
	mmerville, "Software Engineering", Pearson Education.		
	Aggarwal & Yogesh Singh "Software Engineering", New Age Intern	national.	
Reference		UI .	
0	r S. Pressman, "Software Engineering: A Practitioner's Approach", A aj Jalote, "An Integrated Approach to Software Engineering", Spring	•	
Text Boo		ddison Wasley	
Torrt D	Control, Change Control, Configuration Audit, Metrics for Mainten	ance.	
	Issues in Maintenance, Software Configuration Management, Versi		
	Reverse Engineering, Reengineering; Factors affecting Software Ma		
	Software, Software Maintenance Process, Software Maintenance	-	
	(Perceptive, Preventive, Adoptive, Corrective), Cost of Maintenand		
V	Software Maintenance: Nature and Need of Maintenance, Types		10
	Quality Metrics for Testing.	-	
	Control Structure Testing, Black Box Testing, Test Plan, Test	0	
I	Regression Testing, Test Characteristics, White Box Testing, Basi		
	Integration Testing, Validation Testing, System Testing, Accep		10
1 V	Code. Software Testing: Verification, Validation, Testing Objectives,	Unit Testing	10
IV		odel and Source	
IV	Programming Support Environment, Quality Metrics for Design Mo	1 1 1 0	



IIMTU-NEP IMPLEMENTATION Year- II/Semester- IV

Program	nme: Diploma Year:II		
Class: B	SSC CS(DS) Semester:IV		
Credits	Subject: Numerical Analysis		
Theory:2			
Course			
BCS-NE	EP-404		
Course	Objectives:		
CO1:	Basic understanding of numerical Algorithms.		
CO2:	Adequate exposure to learn alternative methods	and analyze mathematical problems to	determine
	the suitable numerical techniques.		
CO3:	Use the concepts of interpolation, eigen value	problem techniques for mathematical	l problems
	arising in various fields.		
CO4:	Solve initial value and boundary value probler		engineering
	practice using ordinary and partial differential e	-	_
CO5:	Demonstrate elementary programming language	ge, implementation of algorithms and	l computer
	programs to solve mathematical problems.		
	of Paper: DSE		
	m Passing Marks/Credits:40% Marks (ISE +)	ESE)	
L:4			
T:0			
	lours/Week)		
	\cdot 1 Hr. = 1 Credit		
Practical			
	I- 2 Hrs.=1Credit(4Hrs./Week=4Credits)		
Unit	l- 2 Hrs.=1Credit(4Hrs./Week=4Credits) Contents		No. of
			Lectures
Unit	Contents		Lectures Allotted
	Contents Introduction: Numbers representation of	on a computing machine with	Lectures
Unit	Introduction: Numbers representation organization	on a computing machine with recision, quadrupleprecision and the	Lectures Allotted
Unit	Contents Introduction: Numbers representation of particularization to single precision, double p Intel 86 family of processors. Definitions	on a computing machine with recision, quadrupleprecision and the of numerical rounding error and	Lectures Allotted
Unit	Introduction: Numbers representation of particularization to single precision, double p Intel 86 family of processors. Definitions chopping error, Discussion of major sources o	on a computing machine with recision, quadrupleprecision and the of numerical rounding error and f error in numerical analysis	Lectures Allotted 8
Unit	Introduction:Numbersrepresentationorparticularization to single precision, double pIntel86 family of processors.Definitionschopping error,Discussion of major sources oSolution of algebraic equations:Description	on a computing machine with recision, quadrupleprecision and the of numerical rounding error and f error in numerical analysis on of: Bijection algorithm and its	Lectures Allotted
Unit	Introduction: Numbers representation o particularization to single precision, double p Intel 86 family of processors. Definitions chopping error, Discussion of major sources o Solution of algebraic equations: Descriptic coding; Method of False Position and its coding Solution Solution	on a computing machine with recision, quadrupleprecision and the of numerical rounding error and f error in numerical analysis on of: Bijection algorithm and its ding; The Secant algorithm and its	Lectures Allotted 8
Unit	Introduction: Numbers representation organization particularization to single precision, double p Intel 86 family of processors. Definitions chopping error, Discussion of major sources of Solution of algebraic equations: Descriptic coding; Method of False Position and its coding; The Newton-Raphson algorithm and	on a computing machine with recision, quadrupleprecision and the of numerical rounding error and <u>f error in numerical analysis</u> on of: Bijection algorithm and its ding; The Secant algorithm and its I its coding. Brief discussion of the	Lectures Allotted 8
Unit	Introduction: Numbers representation oparticularization oparticularization <thoparticularization< th=""> oparticularization</thoparticularization<>	on a computing machine with recision, quadrupleprecision and the of numerical rounding error and <u>f error in numerical analysis</u> on of: Bijection algorithm and its ding; The Secant algorithm and its l its coding. Brief discussion of the algorithms. Properties of the fixed-	Lectures Allotted 8
Unit	Introduction:NumbersrepresentationContentsIntroduction:Numbersrepresentationoparticularization to single precision, double pIntel 86 family of processors.Definitionschopping error, Discussion of major sources oSolution of algebraic equations:Descriptioncoding;Method of False Position and its cocoding;The Newton-Raphson algorithm androbustness and relative performance of thesepoint algorithm xn+1 = g(xn) given x0.	on a computing machine with recision, quadrupleprecision and the of numerical rounding error and <u>f error in numerical analysis</u> on of: Bijection algorithm and its ding; The Secant algorithm and its l its coding. Brief discussion of the algorithms. Properties of the fixed- ion of the Lipshitz condition and the	Lectures Allotted 8
Unit	Introduction:NumbersrepresentationContentsIntroduction:Numbersrepresentationoparticularization to single precision, double pIntel 86 family of processors.Definitionschopping error, Discussion of major sources oSolution of algebraic equations:Descripticoding;Method of False Position and its cocoding;The Newton-Raphson algorithm androbustness and relative performance of thesepoint algorithm xn+1 = g(xn) given x0.Definitnotion of a contraction algorithm.	on a computing machine with recision, quadrupleprecision and the of numerical rounding error and <u>f error in numerical analysis</u> on of: Bijection algorithm and its ding; The Secant algorithm and its I its coding. Brief discussion of the algorithms. Properties of the fixed- ion of the Lipshitz condition and the itions for convergence of $xn+1 =$	Lectures Allotted 8
Unit	Introduction: Numbers representation of particularization to single precision, double p Intel 86 family of processors. Definitions chopping error, Discussion of major sources o Solution of algebraic equations: Descripti coding; Method of False Position and its co coding; The Newton-Raphson algorithm and robustness and relative performance of these point algorithm $xn+1 = g(xn)$ given x0.Definit notion of a contraction algorithm Cond g(xn),Error estimation for algorithm $xn+1 = g(xn)$	on a computing machine with recision, quadrupleprecision and the of numerical rounding error and <u>f error in numerical analysis</u> on of: Bijection algorithm and its ding; The Secant algorithm and its l its coding. Brief discussion of the algorithms. Properties of the fixed- ion of the Lipshitz condition and the itions for convergence of $xn+1 = g(xn)$, General notion of the order of	Lectures Allotted 8
Unit	Introduction: Numbers representation of particularization to single precision, double p Intel 86 family of processors. Definitions chopping error, Discussion of major sources o Solution of algebraic equations: Descripti coding; Method of False Position and its co coding; The Newton-Raphson algorithm and robustness and relative performance of these point algorithm $xn+1 = g(xn)$ given x0.Definit notion of a contraction algorithm Cond g(xn),Error estimation for algorithm $xn+1 = g(xn)$	on a computing machine with recision, quadrupleprecision and the of numerical rounding error and <u>f error in numerical analysis</u> on of: Bijection algorithm and its ding; The Secant algorithm and its l its coding. Brief discussion of the algorithms. Properties of the fixed- ion of the Lipshitz condition and the itions for convergence of $xn+1 = g(xn)$, General notion of the order of	Lectures Allotted 8
Unit	Contents Introduction: Numbers representation of particularization to single precision, double p Intel 86 family of processors. Definitions chopping error, Discussion of major sources o Solution of algebraic equations: Descripti coding; Method of False Position and its co coding; The Newton-Raphson algorithm and robustness and relative performance of these point algorithm $xn+1 = g(xn)$ given x0.Definit notion of a contraction algorithm Cond g(xn),Error estimation for algorithm $xn+1 = gan iterative algorithm, Aitken acceleration andsystems of algebraic equations$	on a computing machine with recision, quadrupleprecision and the of numerical rounding error and <u>f error in numerical analysis</u> on of: Bijection algorithm and its ding; The Secant algorithm and its l its coding. Brief discussion of the algorithms. Properties of the fixed- ion of the Lipshitz condition and the itions for convergence of $xn+1 =$ g(xn),General notion of the order of d Steffensen's algorithm,Solution of	Lectures Allotted 8
Unit	ContentsIntroduction: Numbers representation of particularization to single precision, double p Intel 86 family of processors. Definitions chopping error, Discussion of major sources oSolution of algebraic equations: Descripti coding; Method of False Position and its co coding; The Newton-Raphson algorithm and robustness and relative performance of these point algorithm xn+1 = $g(xn)$ given x0.Definit notion of a contraction algorithm xn+1 = $g(xn)$, Error estimation for algorithm xn+1 = $g(xn)$ given x0.Definit notion algorithm, Aitken acceleration and systems of algebraic equations:Numerical Interpolation: Polynomial interp	on a computing machine with recision, quadrupleprecision and the of numerical rounding error and <u>f error in numerical analysis</u> on of: Bijection algorithm and its ding; The Secant algorithm and its l its coding. Brief discussion of the algorithms. Properties of the fixed- ion of the Lipshitz condition and the itions for convergence of $xn+1 =$ g(xn),General notion of the order of d Steffensen's algorithm,Solution of olation., Definition of the Lagrange	Lectures Allotted 8
Unit	Contents Introduction: Numbers representation of particularization to single precision, double p Intel 86 family of processors. Definitions chopping error, Discussion of major sources o Solution of algebraic equations: Descripti coding; Method of False Position and its co coding; The Newton-Raphson algorithm and robustness and relative performance of these point algorithm $xn+1 = g(xn)$ given x0.Definit notion of a contraction algorithm Cond g(xn),Error estimation for algorithm $xn+1 = gan iterative algorithm, Aitken acceleration andsystems of algebraic equations$	on a computing machine with recision, quadrupleprecision and the of numerical rounding error and <u>f error in numerical analysis</u> on of: Bijection algorithm and its ding; The Secant algorithm and its l its coding. Brief discussion of the algorithms. Properties of the fixed- ion of the Lipshitz condition and the itions for convergence of $xn+1 =$ g(xn),General notion of the order of d Steffensen's algorithm,Solution of olation., Definition of the Lagrange ed on the Lagrange interpolating	Lectures Allotted 8



	underlying polynomial interpolation based on, Rolle's theorem.	•	
	Economization and itsoptimality, Piecewise linear spline, Sul	1 1	
	spline, Construction of the cubic spline, Least-squares data fitt	ing; its use and	
	implementation		
IV	Solution of linear equations: Concept of Gaussian elimination	-	8
	pivoting and asimple illustration of why pivoting is needed,LU		
	matrices with and without partial/full pivoting, The Choleski factor		
	inversionIterative methods,The concept of a matrix norm with s		
	e.g. the Frobenius norm, The Jacobi iteration algorithm, Th	ne Gauss-Seidel	
	algorithm, The Gauss-Seidel algorithm with over-relaxation		
V	Numerical calculation of matrix eigenvalues: Gershgorin's the		8
	example - The Power algorithm, The Inverse Power algorith		
	transformation, The Householder transformation, Construction	n of the Upper	
	Hessenberg matrix, The QR algorithm		
Text Bo			
	. Patel. Numerical Analysis. Harcourt Brace, College Publishers, 199		
	Cheney and D. Kincaid. Numerical Mathematics and Compu-	ting. Brooks/Cole	Publishing
	pany, 2003.		
Reference	re		
1. Num	erical Analysis. 9 th ed. R.L. Burden and J.D. Faires: EditionBroo	ks / cole: -73563	-538-0-978
1. Num .2011	erical Analysis. 9 th ed. R.L. Burden and J.D. Faires: EditionBrood 1136.		
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IIMTU-NEP IMPLEMENTATION Year-II / Semester-IV

Progra	mme: Certificate/I	Diploma/Degree/	Year: II	
UG(R)	/PG/Ph.D.Certifica	te	Semester:IV	
Class: A	All UG Classes of I	IMT University		
Credit	S	Subject:Human va	alues and professional ethics	
Theory	- 3Cr			
	e Code Theory	Title:Human value	es and professional ethics	
UVE-4				
	e Objectives:			
CO1:			nd human values of which we are the custoe	
CO2:			hich are broader indicators of desirable	actions vis-à-vis
a 00	undesirable action			
CO3:	•	-	lues and ethics for internal and external stal	
CO4:			r value-based and ethical practices in the h	igner educational
CO5:		g to implementation		
CO3. CO6:			a value-based and ethical culture in HEIs. programmes for nurturing human values and	ethics in HEIs
		SE/SEC/GE/AECC		t curres in TILIS.
			-ALCC	
Vinnm	um Doccing Morl	c/Crodits 10% Mo	mlza	
	um Passing Mark	s/Credits:40% Ma	rks	
L:3	um Passing Mark	s/Credits:40% Ma	ırks	
L:3 T:0		<u>ss/Credits:40% Ma</u>	ırks	
L:3 T:0 P: 0 (Ii	n Hours/Week)	s/Credits:40% Ma	ırks	
L:3 T:0 P: 0 (Ii				No. of Lectures
L:3 T:0 P: 0 (Ii Theory	n Hours/Week)		nts(Theory)	No. of Lectures Allotted
L:3 T:0 P: 0 (Ii Theory	n Hours/Week) - 1 Hr. = 1 Credit	Conten		
L:3 T:0 P: 0 (In Theory Unit	n Hours/Week) - 1 Hr. = 1 Credit	Conten	its(Theory)	Allotted
L:3 T:0 P: 0 (In Theory Unit I	n Hours/Week) - 1 Hr. = 1 Credit Course Introduct Education	Conten tion - Need, Basic C	nts(Theory) Guidelines, Content and Process for Value	Allotted 6
L:3 T:0 P: 0 (In Theory Unit I	n Hours/Week) - 1 Hr. = 1 Credit Course Introduct Education Understanding H	Conten tion - Need, Basic C Iarmony in the Hum	nts(Theory) Guidelines, Content and Process for Value nan Being - Harmony in Myself	Allotted
L:3 T:0 P: 0 (In Theory Unit I	n Hours/Week) - 1 Hr. = 1 Credit Course Introduct Education Understanding H Understanding H	Conten tion - Need, Basic C Iarmony in the Hum Harmony in the Fa	nts(Theory) Guidelines, Content and Process for Value	Allotted 6 6
L:3 T:0 P: 0 (In Theory Unit I II	n Hours/Week) - 1 Hr. = 1 Credit Course Introduct Education Understanding H Understanding H Human Relation	Conten tion - Need, Basic C Iarmony in the Hum Harmony in the Fa ship	ats(Theory) Guidelines, Content and Process for Value nan Being - Harmony in Myself mily and Society- Harmony in Human-	Allotted 6 6 6
L:3 T:0 P: 0 (In Theory Unit I	n Hours/Week) - 1 Hr. = 1 Credit Course Introduct Education Understanding H Understanding H Human Relation Understanding F	Conten tion - Need, Basic C Iarmony in the Hum Harmony in the Fa ship	nts(Theory) Guidelines, Content and Process for Value nan Being - Harmony in Myself	Allotted 6 6
L:3 T:0 P: 0 (In Theory Unit I II III	n Hours/Week) - 1 Hr. = 1 Credit Course Introduct Education Understanding H Understanding H Human Relation Understanding H Co-existence	Conten tion - Need, Basic C Iarmony in the Hum Harmony in the Fa ship Harmony in the Nat	ats(Theory) Guidelines, Content and Process for Value nan Being - Harmony in Myself mily and Society- Harmony in Human- ture and Existence - Whole existence as	Allotted 6 6 6 6
L:3 T:0 P: 0 (In Theory Unit I II III	n Hours/Week) - 1 Hr. = 1 Credit Course Introduct Education Understanding H Human Relation Understanding F Co-existence Implications of	Conten tion - Need, Basic C Iarmony in the Hum Harmony in the Fa ship Harmony in the Nat	ats(Theory) Guidelines, Content and Process for Value nan Being - Harmony in Myself mily and Society- Harmony in Human-	Allotted 6 6 6
L:3 T:0 P: 0 (In Theory Unit I II III IV V	n Hours/Week) - 1 Hr. = 1 Credit Course Introduct Education Understanding H Understanding H Human Relation Understanding F Co-existence Implications of Professional Eth	Conten tion - Need, Basic C Iarmony in the Hum Harmony in the Fa ship Harmony in the Nat f the above Hol- ics	ats(Theory) Guidelines, Content and Process for Value nan Being - Harmony in Myself mily and Society- Harmony in Human- ture and Existence - Whole existence as	Allotted 6 6 6 6
L:3 T:0 P: 0 (In Theory Unit I II III IV V Sugges	n Hours/Week) - 1 Hr. = 1 Credit Course Introduct Education Understanding H Understanding H Human Relation Understanding F Co-existence Implications of Professional Eth sted Readings: Fo	Conten tion - Need, Basic C Iarmony in the Hum Harmony in the Fa ship Harmony in the Nat E the above Hol ics or Theory	Its (Theory) Guidelines, Content and Process for Value han Being - Harmony in Myself mily and Society- Harmony in Human- ture and Existence - Whole existence as istic Understanding of Harmony on	Allotted 6 6 6 6 6
L:3 T:0 P: 0 (In Theory Unit I II III IIV V Sugges 1. I ¹	n Hours/Week) - 1 Hr. = 1 Credit Course Introduct Education Understanding H Understanding H Human Relation Understanding H Co-existence Implications of Professional Eth sted Readings: Fo van Illich, 1974, Er	Conten tion - Need, Basic C Iarmony in the Hum Harmony in the Fa ship Harmony in the Nat f the above Holt ics or Theory hergy & Equity, The	ats(Theory) Guidelines, Content and Process for Value nan Being - Harmony in Myself mily and Society- Harmony in Human- ture and Existence - Whole existence as istic Understanding of Harmony on e Trinity Press, Worcester, and Harper Colli	Allotted 6 6 6 6 6 ins, USA
L:3 T:0 P: 0 (In Theory Unit I II III III IV V Suggess 1. In 2. E	n Hours/Week) - 1 Hr. = 1 Credit Course Introduct Education Understanding H Understanding H Human Relation Understanding F Co-existence Implications of Professional Eth sted Readings: Fo van Illich, 1974, Er 2.F. Schumacher, 1	Conten tion - Need, Basic C Iarmony in the Hum Harmony in the Fa ship Harmony in the Nat f the above Holt ics or Theory hergy & Equity, The	Its (Theory) Guidelines, Content and Process for Value han Being - Harmony in Myself mily and Society- Harmony in Human- ture and Existence - Whole existence as istic Understanding of Harmony on	Allotted 6 6 6 6 6 ins, USA
L:3 F:0 P:0 (In Fheory Unit I II III IV V Sugges 1. I ⁴ 2. E E	n Hours/Week) - 1 Hr. = 1 Credit Course Introduct Education Understanding H Understanding H Human Relation Understanding F Co-existence Implications of Professional Eth ited Readings: Fo van Illich, 1974, Er E.F. Schumacher, 1 Briggs, Britain.	Contention - Need, Basic Contention - Need, Basic Content Harmony in the Hum Harmony in the Hum Harmony in the Nate The above Holt ics For Theory hergy & Equity, The 973, Small is Beau	ats(Theory) Guidelines, Content and Process for Value nan Being - Harmony in Myself mily and Society- Harmony in Human- ture and Existence - Whole existence as istic Understanding of Harmony on e Trinity Press, Worcester, and Harper Colli	Allotted 6 6 6 6 ins, USA attered, Blond &

4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.

5. A Nagraj, 1998, JeevanVidya Ek Parichay, Divya Path Sansthan, Amarkantak.



- 6. P L Dhar, RR Gaur, 1990, Science and Humanism, Common wealth Publishers.
- 7. A N Tripathy, 2003, Human Values, New Age International Publishers.
- 8. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
- 9. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press
- 10. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
- 11. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.

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- 12. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted2008.
- 13. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and ProfessionalEthics.

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	Evaluation/Assessment Methodology	
		Max. Marks
1) Clas	ss tasks/ Sessional Examination	10 marks
2) Pres	sentations /Seminar	05 marks
3) Ass	ignments	NA
4) Res	earch Project Report	NA
Sem	ninar On Research Project Report	35
5) ESE	E	
	Total:	15+35 Internal+External
Prerequ	isites for the course: First year must be clear for appearing in IIIrd	/IVth for the study of this
Audit/Q	Qualifying course- for theory	-
Second	year must be clear for appearing in VithSem for the study of this au	dit/Qualifying Course - for
theory		
Course	Learning Outcomes:	
CO1:	The learning process for holistic development.	
CO2:	Impeccable governance.	
CO3:	Effective institutional management.	
CO4:	Well laid system of rewards and chastisement.	
CO5:	Institutional climate where 'rights' enjoy and 'wrongs' are discourage	ed.



IIMTU-NEP IMPLEMENTATION Year- II / Semester –IV

Programme	• UG		Year:II		
Class:BSC			Semester:IV		
Credits		Subject · Artificial	intelligence lab(SPT-IV)		
Practical: 20	T r	Subject.			
Course Cod		Title:Artificial int	elligence lab		
BCS-NEP-4					
Course Obj					
•		v standard practic	es and methodologies in software	develon	ment and project
management		y standard practic	es and methodologies in software	uevelop	ment and project
0	CO2: Apply various search algorithms of artificial intelligence.				
11.		concept of Artificial	e		
Nature of P			intenigence.		
		arks/Credits:40%	Marks		
L:0					
T:0					
P:4(In Hours	s/Week)				
Theory - 1 H	/	dit			
		dit(4Hrs./Week=4C	(redits)		
Unit			Contents		No. of Lectures
					Allotted
I V	Vrite a prog	gram in prolog to in	nplement simple facts and Queries		2
II V	Vrite a prog	gram in prolog to in	nplement simple arithmetic		2
			olve Monkey banana problem		2
			olve Tower of Hanoi		2
			olve 8 Puzzle problems		2
			olve 4-Queens problem		2
VII V	Vrite a prog	gram in prolog to so	blve Traveling salesman problem.		2
		gram in prolog for V			2
Reference /					
1. Elaine R	ich& Kevi	n Knight, "Artificia	l Intelligence", Tata McGraw Hill.		
			ificial Intelligence& Expert Systems",	PHI.	
	·				
		Evaluat	ion/Assessment Methodology		
			<u>_</u>		Max. Marks:50
1) Class tas	sks/ Sessio	nal Examination		25	
2) Presenta	tions /Sem	inar			
3) Assignm	nents				
4) Research	h Project R	eport			
Seminar	On Resear	rch Project Report			
5) ESE				25	
			Total:	50	



Course Learning Outcomes:

Student will be able to:

CO1: To Understand the concept of Artificial intelligence.

CO2: To understand the design principles of pattern recognition with estimation and apply classification technique.

CO3: To apply knowledge representation and reasoning techniques.



IIMTU-NEP IMPLEMENTATION Year- II / Semester- IV

Program		Year:II	
	C CS(DS)	Semester:IV	
Credits		Subject:Software Engineering Lab	
Practical:			
Course C		Title:Software Engineering Lab	
BCS-NEI	P-405P		
	Objectives:		
		Describe basic concept of UML, design, implementation of test c	ases and OO
-	using java		
		lyses how to develop software requirements specifications for a given	n problem.
		d DFD models	
		develop various structure and behavior UML diagrams.	
		wledge of project management tool Demonstrate how to manage file	e using Projec
·	ject managen		_
	f Paper: Cor		
Minimur	n Passing Ma	arks/Credits:40% Marks	
L:0			
T:0			
	ours/Week)		
•	1 Hr. = 1 Cre		
	2 Hrs.=1Cre	dit(4Hrs./Week=4Credits)	
Unit		Contents	No. of
			Lectures
			Allotted
Ι		se case diagram and specify the role of each of the actors. Also	2
		econdition, post condition and function of each use case	
II	-	of Software Requirement Specification Document, Design	2
	Documents		
III	-	e classes. Classify them as weak and strong classes and draw the	2
	class diagra		
IV	Preparation	of Software Configuration Management and Risk Management	2
	related docu		
V	Study and u	usage of any Design phase CASE tool	2
VI	Prepare a S	RS document in line with the IEEE recommended standards.	2
VII	Develop tes	st cases for unit testing and integration testing	2
VIII	Develop tes	st cases for various white box and black box testing techniques.	2
IX	Draw the ac	ctivity diagram	2
Х	Draw the st	ate chart diagram.	
Referenc	e / Text Boo		
1. RS Pr	essman, Soft	ware Engineering: A Practitioners Approach, McGraw Hill.	
		vare Engineering, Wiley	
		nentals of Software Engineering PHI Publication	

3. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.



4. KK Aggarwal and Yogesh Singh, Software Engineering, New Age Internation	onal Publishers.
Evaluation/Assessment Methodology	
	Max. Marks:50
1) Class tasks/ Sessional Examination	25
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	
5) Seminar On Research Project Report	
6) ESE	25
Total:	50
Course Learning Outcomes:	
Student will be able to:	
CO1: Draw a class diagram after identifying classes and association among the	
CO2: Graphically represent various UML diagrams, and associations among the	em and identify the logical
sequence of activities undergoing in a system, and represent them pictorially	
CO3: Able to use modern engineering tools for specification, design, implement	ation and testing
CO4: Develop test cases for various white box and black box testing techniques	



IIMTU-NEP IMPLEMENTATION Year-III/ Semester-V

Program	U		Year:III	
Class:BS	C CS(DS	,	Semester:V	
Credits		Subject:ERP		
Theory:40	Cr			
Course C	Code:	Title:ERP		
BCS-NEF	P-503			
Course C	bjective	s:		
CO1: T	o provid	e a contemporary and	l forward-looking on the theory and practice of	Enterprise
	-	Planning Technology.		
CO2: T	o focus	on a strong emphasis	upon practice of theory in Applications and Pract	icaloriented
	oproach.			
-		he students to develop	the basic understanding of how ERP enriches the	ne business
		ons in achieving a multi	•	
			ing towards business processes.	
			technological competitive and make them ready to s	elf-upgrade
		gher technical skills.		10
Nature of	f Paper:I	DSE		
	-	g Marks/Credits:40%	Marks (ISE +ESE)	
L:4		2		
T:0				
P:0(In Ho	urs/Weel	K)		
Theory -				
•		Credit(4Hrs./Week=4C	redits)	
Unit			Contents	No. of
				Lectures
				Allotted
Ι	Introdu	iction to ERP: Evoluti	on of ERP;. what is ERP?, Reasons for the Growth	8
			tion of ERP in India;. Evaluation of ERP; Various	-
		s of ERP;. Advantage o		
II		verview of Enterpris		8
			iness Modelling; ERP for Small Business; ERP for	U
			siness Process Mapping for ERP Module Design;.	
		_	Selection for ERP Implementation	
III			gies: ERP and Related Technologies; Business	8
			R);. Management Information System (MIS);.	0
			(EIS); Decision support System (DSS); Supply	
		Janagement (SCM).	(LID),: Decision support bystem (DDD),: Suppry	
IV	ERP N		SAP AG, Baan Company, Oracle Corporation,	8
T A			Id Solutions Co, System Software Associates, Inc.	0
	-		Assessment and Selection of ERP Packages and	
	Module		Assessment and Selection of LIXE Lackages and	
V			cle: Issues in Implementing ERP Packages;. Pre-	8
v		nprementation Litecy	cit. issues in implementing Livi Tackages, FIC-	0



evaluation Screening;. Package Evaluation;. Project Planni	ng Phase: Gan			
Analysis; Reengineering; Configuration; Implementation;				
Testing; Going Live; End-User Training; Post Implementation	-			
Mode).				
Text Books:				
1. Daniel E.O'Leary, Enterprise Resource Planning Systems, Cambridge U	niversity Press, 2002.			
2. Ellen Monk, Bret Wagner, Concepts in Enterprise resource planning, Ce	-			
2009.				
Reference				
1. Enterprise Resource Planning – Alexis Leon – Second Edition – TMH				
2. Manufacturing Resource Planning (MRP II) with Introduction to ERI	P; SCM; an CRM by Khalid			
Sheikh, Publisher: McGraw-Hill				
Evaluation/Assessment Methodology				
	Max. Marks 100			
1) Class tasks/ Sessional Examination	15			
2) Presentations /Seminar				
3) Assignments				
4) Research Project Report	10			
Seminar On Research Project Report				
5) ESE	75			
Total:	100			
Prerequisites for the course: Problem Solving using C				
Course Learning Outcomes:				
CO1: Make basic use of Enterprise software, and its role in integrating bus	siness functions.			
CO2: Analyze the strategic options for ERP identification and adoption.				
CO3: Design the ERP implementation strategies.				
CO4: Analyse the strategic options for ERP identification and adoption.				
CO5: Create reengineered business processes for successful ERP impleme	ntation.			



IIMTU-NEPIMPLEMENTATION Year-III/Semester-V

Program	me:Degre	e	Year: III	
Class:BS	C CS(DS)		Semester:V	
Credits	Sı	ubject: Big Data	•	
Theory:40	Cr			
Course C		itle:Big Data		
BCS-NEF	P-503			
Course O	bjectives	:		
CO1: D	emonstrate	e knowledge of Bi	g Data Analytics concepts and its applications in	business.
			mponents of Map Reduce Framework and HDFS	
	1 1	eries in NoSQL en		
			g Map Reduce based distributed processing applic	ations.
			g applications using HBASE, Pig etc.	
Nature of	_			
	n Passing	Marks/Credits:4	0% marks (ISE+ESE)	
L:4				
T:0		N		
P:0(In Ho	,			
Unit	Hr.=1Cred	llt	Contonto	No. of
Unit			Contents	Lectures
				Allotted
Ι	Introdu	ction to Big Dat	a : Types of digital data, history of Big Data	8
1		-	b Big Data platform, drivers for Big Data, Big	Ũ
			paracteristics, 5 Vs of Big Data, Big Data	
			Big Data importance and applications, Big Data	
		UI	pliance, auditing and protection, Big Data	
			Data Analytics, Challenges of conventional	
		_	nalysis, nature of data, analytic processes and	
	tools, an	alysis vs reporting	g, modern data analytic tools.	
Π	-	1	ce framework and basics, how Map Reduce	8
	,	1 0 1	Reduce application, unit tests with MR unit,	
			natomy of a Map Reduce job run, failures, job	
		-	ort, task execution, Map Reduce types, input	
		- · · · · · · · · · · · · · · · · · · ·	Iap Reduce features, Real-world Map Reduce.	
III		-	uted File System): Design of HDFS, HDFS	8
	-		hallenges, file sizes, block sizes and block	
			a replication, how does HDFS store, read, and	
			s to HDFS, command line interface, Hadoop	
			the flow, data ingest with Flume and Scoop,	
	-	· ·	I/O: Compression, serialization, Avroand file- oop Environment: Setting up a Hadoop cluster,	
	cluster			
	cluster	specification,	cluster setup and installation, Hadoop	



1		
	configuration, security in Hadoop,	
IV	Hadoop Eco System and YARN: Hadoop ecosystem components,	8
	schedulers, fairand capacity, Hadoop 2.0 New Features - Name Node	
	high availability, HDFS federation, MRv2, YARN, Running MRv1 in	
	YARN.	
	NoSQL Databases: Introduction to NoSQL Mongo DB: Introduction,	
	data types, creating, updating and deleing documents, querying,	
	introduction to indexing, capped collections	
V	Hadoop Eco System Frameworks: Applications on Big Data using Pig,	8
	Hive and HBase.	
	Pig: Introduction to PIG, Execution Modes of Pig, Comparison of Pig	
	with	
	Databases, Grunt, Pig Latin, User Defined Functions, Data Processing	
	operators,	
	HBase-Hbase concepts, clients, example, Hbasevs RDBMS, advanced	
	usage, schema design, advance indexing, Zookeeper - how it helps in	
	monitoring a cluster, how to build applications with Zookeeper. IBM Big	
	Data strategy, introduction toInfo sphere, BigInsights and Big Sheets,	
	introduction to Big SQL.	
Fext Boo	k:	
I. Micha	el Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Ana	lytics: Emerging
Busine	ess Intelligence and Analytic Trends for Today's Businesses", Wiley.	
2. Big-D	ata Black Book, DT Editorial Services, Wiley.	
Reference	e Book.	

Reference Book:

Glenn J. Myatt, "Making Sense of Data", John Wiley & SonsPete Warden, "Big Data Glossary", O'Reilly

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total	100
Prerequisites for the course: NIL	

Course Learning Outcomes:

- CO1: Able to understand the concept of HDFS and map reduce.
- CO2: Able to gather large data from a range of data sources.
- CO3: Able to understand the Hadoop ecosystem components
- CO4: Able to explain the architecture of pig and hive with different operations.
- CO5: Able to understand the importance and challenges of big data.



IIMTU-NEP IMPLEMENTATION Year-III/ Semester-V

Program	mo.Degr	20	Year:III	
Class:BS	0		Semester:V	
Credits	C CD(DD	Subject:Data Science(
Theory:4	\mathbf{r}	Subject.Data Science(
Course C		Title:Data Science(SP	T-V)	
BCS-NEI		The Data Science (SI	1-V)	
Course C		X •		
		• fundamentals of statis	stics	
	U		ty to build conditional probability.	
	1 0	0 0 1	s for conditional probability problems.	
	-	actical experience in too		
		-	nd techniques used in data science.	
			la techniques used in data science.	
Nature of			Mowles (ISE + ESE)	
	n Passing	g Marks/Credits:40%	viarks (IDE +EDE)	
L:4				
T:0		-)		
P:0(In Ho		/		
Theory -			14. 1	
	2 Hrs.=1	Credit(4Hrs./Week=4C	,	
Unit			Contents	No. of
				Lectures
				Allotted
Ι			· Quantitative and Qualitative Data ,Population -	8
			and its types - Descriptive vs. Inferential Statistics	
			dency - Mean, Median and Mode. Quartiles,	
			tiles, Dispersion and its measurement-Index of	
			spersion, Interquartile Range. Moments and its	
	-		trical data and asymmetrical data. Skewness-	
		<u> </u>	osis–Platykurtic, Leptokurtic and Mesokurtic.	
II		• 1	nents and Probabilities - Random Experiments,	8
			n to probability - sampling and sample space,	
	events,	empirical definition	of probability. Types of events - Simple and	
		-	of probability. Types of events - Simple and dependent, impossible and sure, equally, likely,	
	compou	nd, dependent and ind		
	compou exhaust	nd, dependent and indive, etc. Logical co	dependent, impossible and sure, equally, likely,	
	compou exhaust (Conjur	nd, dependent and indive, etc. Logical conduction) and, (Disjunction)	dependent, impossible and sure, equally, likely, onnectivity in probability - Negation (not),	
	compou exhaust (Conjur only if.	nd, dependent and indive, etc. Logical control of the control of t	dependent, impossible and sure, equally, likely, onnectivity in probability - Negation (not), n) or, (Conditional) if then, (Biconditional) if and alles of probability - Addition Rule, Multiplication	
III	compou exhaust (Conjur only if. Rule, C	nd, dependent and indive, etc. Logical condition) and, (Disjunction) General Probability Ru conditional Probability, I	dependent, impossible and sure, equally, likely, onnectivity in probability - Negation (not), n) or, (Conditional) if then, (Biconditional) if and alles of probability - Addition Rule, Multiplication Law of total probability.	8
III	compou exhaust (Conjur only if. Rule, C Baye's	nd, dependent and indive, etc. Logical control action) and, (Disjunction General Probability Ru conditional Probability, I Theorem, prior and post	dependent, impossible and sure, equally, likely, onnectivity in probability - Negation (not), n) or, (Conditional) if then, (Biconditional) if and les of probability - Addition Rule, Multiplication Law of total probability. terior probability, More on Conditional Probability	8
III	compou exhaust (Conjur only if. Rule, C Baye's (numeri	nd, dependent and ind ive, etc. Logical co action) and, (Disjunction General Probability Ru onditional Probability, I Theorem, prior and post cal), and Multiplication	dependent, impossible and sure, equally, likely, onnectivity in probability - Negation (not), n) or, (Conditional) if then, (Biconditional) if and alles of probability - Addition Rule, Multiplication Law of total probability. terior probability, More on Conditional Probability n Theorem on Probability (numerical). Bernoulli	8
III	compou exhaust (Conjur only if. <u>Rule, C</u> Baye's (numeri Trials A	nd, dependent and ind ive, etc. Logical co action) and, (Disjunction General Probability Ru onditional Probability, I Theorem, prior and pos- cal), and Multiplication and Binomial Distribut	dependent, impossible and sure, equally, likely, onnectivity in probability - Negation (not), n) or, (Conditional) if then, (Biconditional) if and alles of probability - Addition Rule, Multiplication Law of total probability. terior probability, More on Conditional Probability n Theorem on Probability (numerical). Bernoulli ion, and its approach of Probability. Discrete and	8
III	compou exhaust (Conjur only if. Rule, C Baye's (numeri Trials A Continu	nd, dependent and ind ive, etc. Logical co action) and, (Disjunction General Probability Ru onditional Probability, I Theorem, prior and post cal), and Multiplication and Binomial Distribution ous models in probab	dependent, impossible and sure, equally, likely, onnectivity in probability - Negation (not), n) or, (Conditional) if then, (Biconditional) if and alles of probability - Addition Rule, Multiplication Law of total probability. terior probability, More on Conditional Probability n Theorem on Probability (numerical). Bernoulli	8



Binomial Distribution, Poisson Distribution, Normal (Gaussi	· ·	
Understanding Normal (or Gaussian) Distribution character		
variance.Standard Normal Distribution curve and area un	nder the curve,	
Interquartile range, box and whisker plot.		
IVExploratory Data Analysis (EDA): Introduction to Inferential	Statistics.What is	8
EDA. Population and Sampling, Central Limit Theorem.		
Basics of Hypothesis Testing. Statistical and Practical Signif		
Alternate Hypothesis. Errors – Type 1 and Type 2. Z tables –		
Values. The p-Value. Testing for means, variances and proportion	-	
z test, t test, proportions test and variance test. Two sample $-z$		
unequal variances and paired), proportions test and variance	test.Analysis of	
Variance (ANOVA).Goodness of Fitness.		
V Correlation and Regression: Correlation Coefficient. ,Pre	U	8
Regression and Classification. Linear models - Linear regress	0	
regression. Linear regression equation. Errors – mean absolute	error and mean	
squared error. Classification with Logistic regression. Model accu	racy evaluation.	
Text Books:		
1. Mining of Massive Datasets. v2.1, Jure Leskovek, An and Rajaraman at	nd Jefrey Ullman.,	Cambridge
University Press. (2019). (free online)	-	_
2. Big Data Analytics, paperback 2nd ed., Seema Acharya, Subhasini Chell	appan, Wiley (201	9).
Reference		
1. Doing Data Science, Straight Talk from The Frontline, Cathy O'Neil	and Rachel Schu	tt, O'Reilly
(2014).		
2. Data Mining: Concepts and Techniques", Third Edition, Jiawei Han, M	ichelineKamber an	nd Jian Pei,
ISBN 0123814790,(2011).		
3. Big Data and Business Analytics, Jay Liebowitz, CRC press (2013)		
Evaluation/Assessment Methodology		
	Max.	Marks 100
1) Class tasks/ Sessional Examination	15	
2) Presentations /Seminar		
3) Assignments		
4) Research Project Report	10	
Seminar On Research Project Report		
5) ESE	75	
Total:	100	
Prerequisites for the course: Problem Solving using C		
Course Learning Outcomes:		
CO1: Apply data visualization in statistics analytics		
CO2: Apply data pre-processing techniques		
CO3: Able to use distinct approach of probability.		
CO4: Able to utilize EDA and inference.		
CO5: Able to use correlation and regression techniques.		



IIMTU-NEPIMPLEMENTATION Year-III/ Semester-V

Progra	amme: Certi	ficate	Year:III	
Class: BSC CS(DS)			Semester:V	
Credit	S	Subject: Data co	ommunication network	
Theory	/:4Cr			
Course	e Code:	Title: Data comm	nunication network	
BCS-N	NEP-503			
Course	e Objectives	3:		
		• 1	of computer networks.	
	-	he various layers o		
		UDP and TCP M		
	•	various application		
		ate the TCP/IP and	d OSI models	
	e of Paper:			
	num Passing	Marks/Credits:4	40% Marks (ISE+ESE)	
L:4				
T:0				
	Hours/Week	· · · · · · · · · · · · · · · · · · ·		
•	/-1Hr.=1Cree			
	al-2Hrs.=1C	redit(4Hrs./Week=		
Unit			Contents	No. of
Unit			Contents	Lectures
	Data Carr	Com		Lectures Allotted
I			nponents – Direction of Data flow – Networks –	Lectures
	Componen	ts and Categories	nponents – Direction of Data flow – Networks – – Types of Connections – Topologies –Protocols	Lectures Allotted
	Componen and Standa	ts and Categories ards – ISO / OSI	nponents – Direction of Data flow – Networks – – Types of Connections – Topologies –Protocols model, Example Networks such as ATM, Frame	Lectures Allotted
	Componen and Standa Relay, Tra	ts and Categories ards – ISO / OSI ansmission modes	nponents – Direction of Data flow – Networks – – Types of Connections – Topologies –Protocols	Lectures Allotted
I	Componen and Standa Relay, Tra Circuit Swi	ts and Categories ards – ISO / OSI ansmission modes atched Networks	nponents – Direction of Data flow – Networks – – Types of Connections – Topologies –Protocols model, Example Networks such as ATM, Frame s, Multiplexing, Transmission Media, Switching,	Lectures Allotted 10
	Componen and Standa Relay, Tra Circuit Swi Data link 1	ts and Categories ards – ISO / OSI ansmission modes atched Networks ayer: Introduction	nponents – Direction of Data flow – Networks – – Types of Connections – Topologies –Protocols model, Example Networks such as ATM, Frame s, Multiplexing, Transmission Media, Switching, , Framing, and Error – Detection and Correction –	Lectures Allotted
I	Componen and Standa Relay, Tra Circuit Swi Data link 1 Parity – LI	ts and Categories ards – ISO / OSI ansmission modes atched Networks ayer: Introduction RC – CRC Hamm	nponents – Direction of Data flow – Networks – – Types of Connections – Topologies –Protocols model, Example Networks such as ATM, Frame s, Multiplexing, Transmission Media, Switching, n, Framing, and Error – Detection and Correction – ning code, Flow and Error Control, HDLC, Point to	Lectures Allotted 10
I	Componen and Standa Relay, Tra Circuit Swi Data link 1 Parity – LI Point Proto	ts and Categories ards – ISO / OSI ansmission modes atched Networks ayer: Introduction RC – CRC Hamm bools. ALOHA, CS	nponents – Direction of Data flow – Networks – – Types of Connections – Topologies –Protocols model, Example Networks such as ATM, Frame s, Multiplexing, Transmission Media, Switching, n, Framing, and Error – Detection and Correction – ning code, Flow and Error Control, HDLC, Point to SMA/CD, LAN – Ethernet IEEE 802.3, IEEE 802.5	Lectures Allotted 10
I	Componen and Standa Relay, Tra Circuit Swi Data link 1 Parity – Li Point Proto – IEEE 802	ts and Categories ards – ISO / OSI unsmission modes itched Networks ayer: Introduction RC – CRC Hamm ocols. ALOHA, CS 2.11, Random acce	nponents – Direction of Data flow – Networks – – Types of Connections – Topologies –Protocols model, Example Networks such as ATM, Frame s, Multiplexing, Transmission Media, Switching, , Framing, and Error – Detection and Correction – hing code, Flow and Error Control, HDLC, Point to SMA/CD, LAN – Ethernet IEEE 802.3, IEEE 802.5 ess, Controlled access, Channelization.	Lectures Allotted 10
I	Componen and Standa Relay, Tra Circuit Swi Data link 1 Parity – LI Point Proto – IEEE 802 Transport	ts and Categories ards – ISO / OSI insmission modes atched Networks ayer: Introduction RC – CRC Hamm bools. ALOHA, CS 2.11, Random acce Layer: Process to	nponents – Direction of Data flow – Networks – – Types of Connections – Topologies –Protocols model, Example Networks such as ATM, Frame s, Multiplexing, Transmission Media, Switching, h, Framing, and Error – Detection and Correction – hing code, Flow and Error Control, HDLC, Point to SMA/CD, LAN – Ethernet IEEE 802.3, IEEE 802.5 ess, Controlled access, Channelization.	Lectures Allotted 10
I II III	Componen and Standa Relay, Tra Circuit Swi Data link 1 Parity – LI Point Proto – IEEE 802 Transport	ts and Categories ards – ISO / OSI insmission modes itched Networks ayer: Introduction RC – CRC Hamm cols. ALOHA, CS 2.11, Random acce Layer: Process to ngestion, Congesti	nponents – Direction of Data flow – Networks – – Types of Connections – Topologies –Protocols model, Example Networks such as ATM, Frame s, Multiplexing, Transmission Media, Switching, n, Framing, and Error – Detection and Correction – ning code, Flow and Error Control, HDLC, Point to SMA/CD, LAN – Ethernet IEEE 802.3, IEEE 802.5 ess, Controlled access, Channelization. Process Delivery, UDP and TCP protocols, Data ion Control, QoS, Integrated Services,	Lectures Allotted 10 10 10
I	Componen and Standa Relay, Tra Circuit Swi Data link 1 Parity – LI Point Proto – IEEE 802 Transport Traffic, Co Network la	ts and Categories ards – ISO / OSI insmission modes atched Networks ayer: Introduction RC – CRC Hamm ocols. ALOHA, CS 2.11, Random acce Layer: Process to ngestion, Congesting ayer: Logical Add	 aponents – Direction of Data flow – Networks – Types of Connections – Topologies –Protocols model, Example Networks such as ATM, Frame s, Multiplexing, Transmission Media, Switching, a, Framing, and Error – Detection and Correction – and control, HDLC, Point to SMA/CD, LAN – Ethernet IEEE 802.3, IEEE 802.5 ess, Controlled access, Channelization. Process Delivery, UDP and TCP protocols, Data ion Control, QoS, Integrated Services, ressing, Internetworking, Address mapping, ICMP, 	Lectures Allotted 10
I II III	Componen and Standa Relay, Tra Circuit Swi Data link 1 Parity – LI Point Proto – IEEE 802 Transport 1 Traffic, Co Network la IGMP, For	ts and Categories ards – ISO / OSI ansmission modes atched Networks ayer: Introduction RC – CRC Hamm bools. ALOHA, CS 2.11, Random acce Layer: Process to ngestion, Congestin ayer: Logical Add warding, Uni-Cast	nponents – Direction of Data flow – Networks – – Types of Connections – Topologies –Protocols model, Example Networks such as ATM, Frame s, Multiplexing, Transmission Media, Switching, n, Framing, and Error – Detection and Correction – ning code, Flow and Error Control, HDLC, Point to SMA/CD, LAN – Ethernet IEEE 802.3, IEEE 802.5 ess, Controlled access, Channelization. Process Delivery, UDP and TCP protocols, Data ion Control, QoS, Integrated Services, ressing, Internetworking, Address mapping, ICMP, t Routing Protocols, Multicast Routing Protocols.	Lectures Allotted 10 10 10 10
I II III IV	Componen and Standa Relay, Tra Circuit Swi Data link 1 Parity – LH Point Proto – IEEE 802 Transport Traffic, Co Network la IGMP, For Application	ts and Categories ards – ISO / OSI insmission modes itched Networks ayer: Introduction RC – CRC Hamm cols. ALOHA, CS 2.11, Random acce Layer: Process to ngestion, Congesti ayer: Logical Add warding, Uni-Cast n Layer: Domain n	 aponents – Direction of Data flow – Networks – Types of Connections – Topologies –Protocols model, Example Networks such as ATM, Frame s, Multiplexing, Transmission Media, Switching, a, Framing, and Error – Detection and Correction – and control, HDLC, Point to SMA/CD, LAN – Ethernet IEEE 802.3, IEEE 802.5 ess, Controlled access, Channelization. Process Delivery, UDP and TCP protocols, Data ion Control, QoS, Integrated Services, ressing, Internetworking, Address mapping, ICMP, 	Lectures Allotted 10 10 10
I II III IV	Componen and Standa Relay, Tra Circuit Swi Data link 1 Parity – LI Point Proto – IEEE 802 Transport Traffic, Co Network la IGMP, For Application FTP, WWV	ts and Categories ards – ISO / OSI ansmission modes atched Networks ayer: Introduction RC – CRC Hamm bools. ALOHA, CS 2.11, Random acce Layer: Process to ngestion, Congestin ayer: Logical Add warding, Uni-Cast	nponents – Direction of Data flow – Networks – – Types of Connections – Topologies –Protocols model, Example Networks such as ATM, Frame s, Multiplexing, Transmission Media, Switching, n, Framing, and Error – Detection and Correction – ning code, Flow and Error Control, HDLC, Point to SMA/CD, LAN – Ethernet IEEE 802.3, IEEE 802.5 ess, Controlled access, Channelization. Process Delivery, UDP and TCP protocols, Data ion Control, QoS, Integrated Services, ressing, Internetworking, Address mapping, ICMP, t Routing Protocols, Multicast Routing Protocols.	Lectures Allotted 10 10 10 10
I II III IV V Text B	Componen and Standa Relay, Tra Circuit Swi Data link 1 Parity – LI Point Proto – IEEE 802 Transport 7 Traffic, Co Network la IGMP, For Application FTP, WWY	ts and Categories ards – ISO / OSI insmission modes itched Networks ayer: Introduction RC – CRC Hamm cols. ALOHA, CS 2.11, Random acce Layer: Process to ngestion, Congesti ayer: Logical Add warding, Uni-Cast n Layer: Domain n W, HTTP, SNMP.	nponents – Direction of Data flow – Networks – – Types of Connections – Topologies –Protocols model, Example Networks such as ATM, Frame s, Multiplexing, Transmission Media, Switching, n, Framing, and Error – Detection and Correction – ning code, Flow and Error Control, HDLC, Point to SMA/CD, LAN – Ethernet IEEE 802.3, IEEE 802.5 ess, Controlled access, Channelization. Process Delivery, UDP and TCP protocols, Data ion Control, QoS, Integrated Services, ressing, Internetworking, Address mapping, ICMP, t Routing Protocols, Multicast Routing Protocols.	Lectures Allotted 10 10 10 10 10 10

2. Computer Networks, Andrew S Tanenbaum, 4th Edition. Pearson Education, PHI.



Reference:

- 1. Data communications and Computer Networks, P.C. Gupta, PHI.
- 2. An Engineering Approach to Computer Networks, S. Keshav, 2nd Edition, Pearson Education.
- 3. Computer Networking: A Top-Down Approach Featuring the Internet. James Kurose& Keith W. Ross, 3rd Edition, Pearson Education.

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	75
Total:	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO1. Students should understand and explore the basics of Computer	Networks and Various
Protocols.	

- CO2. Students will be in a position to administrate a network and flow of information.
- CO3. Able to understand the World Wide Web Concepts.
- CO4. Able to understand the concepts of network security
- CO5. Able to secure device from network issues.



IIMTU-NEP IMPLEMENTATION Year- III / Semester –V

Program Class:BS Credits Practical: Course C BCS-NEI Course C CO1: Und CO2: Exp CO3: Und Nature o Minimur L:0 T:0
Credits Practical: Course C BCS-NEI Course C CO1: Und CO2: Exp CO3: Und Nature o Minimum L:0
Practical: Course C BCS-NEI Course C CO1: Und CO2: Exp CO3: Und Nature o Minimur L:0
Course C BCS-NEI Course C CO1: Und CO2: Exp CO3: Und Nature o Minimum L:0
BCS-NEI Course C CO1: Und CO2: Exp CO3: Und Nature of Minimum L:0
Course C CO1: Und CO2: Exp CO3: Und Nature o Minimum L:0
CO1: Und CO2: Exp CO3: Und Nature of Minimum L:0
CO2: Exp CO3: Uno Nature o Minimur L:0
Nature of Minimum L:0
Minimun L:0
L:0
T:0
P:4(In Ho
Theory -
Practical-
Unit
Ι
VI
X/II
VIII
Defenere
1) Class
/
,
, U
5) ESE
II III IV V VI VII VII Referenc 1. Rache Octob I 1) Class 2) Presen 3) Assig 4) Resea Semir



Total: 50

Course Learning Outcomes:

Student will be able to:

- CO1: Ensure the development of students applied skills in data science related areas.
- CO2: Able to identify the elements involved in analyses of data.
- CO3: Students will gain knowledge in apply a number of different data science tools to a given scenario.
- CO4: Able to implement data collection and preservation.
- CO5: Able to analyze acquisition methods for data to be use in correlation and regression techniques.



IIMTU-NEP IMPLEMENTATION Year/-III / Semester-VI

Frugraffi	me:Degree Year:III				
Class:BS	C CS(DS) Semester:VI				
Credits	Subject: Advance Data Science(SPT-VII)				
Theory:40	Lr l				
Course C	ode: Title: Advance Data Science				
BCS-NEF	-611				
Course C	bjectives:				
CO1: Bui	ding the fundamentals of python pandas.				
CO2: Imp	arting design thinking capability to build big-data				
CO3: Iden	tify the techniques for analysing different types of Data.				
CO4: Pro	vide the concepts and need of Data Visualization.				
CO5: Pro	vide different Use cases of Data Science Applications.				
Nature of	Paper: CORE				
Minimun	n Passing Marks/Credits:40% Marks (ISE +ESE)				
L:4					
T:0					
P:0(In Ho	urs/Week)				
Theory -	Hr. = 1 Credit				
Practical-	2 Hrs.=1Credit(4Hrs./Week=4Credits)				
Unit	Contents	No. of			
		Lectures			
		Allotted			
Ι	Numerical Python Pandas plotting:	8			
	Numpy recap – numpy arrays, array indexing, data-types, transposing flattening,				
	and reshaping arrays, array mathematics, array broadcasting. Pandas - series and				
	dataframes, viewing data, data selection, operations (functions), handling missing				
	dataframes, viewing data, data selection, operations (functions), nandling missing				
	data. Plotting with matplotlib – linear and scatter plots, subplots.				
II	data. Plotting with matplotlib – linear and scatter plots, subplots. Imputation of Missing values:	8			
II	data. Plotting with matplotlib – linear and scatter plots, subplots.Imputation of Missing values:Type of missing values, values considered "missing" (in pandas), handling	8			
Ш	data. Plotting with matplotlib – linear and scatter plots, subplots. Imputation of Missing values: Type of missing values, values considered "missing" (in pandas), handling missing values – mean, median and mode, Univariate feature imputation	8			
II	data. Plotting with matplotlib – linear and scatter plots, subplots. Imputation of Missing values: Type of missing values, values considered "missing" (in pandas), handling missing values – mean, median and mode, Univariate feature imputation (sklearn.impute.SimpleImputer), multivariate feature imputation, nearest	8			
II	data. Plotting with matplotlib – linear and scatter plots, subplots. Imputation of Missing values: Type of missing values, values considered "missing" (in pandas), handling missing values – mean, median and mode, Univariate feature imputation	8			
П	data. Plotting with matplotlib – linear and scatter plots, subplots. Imputation of Missing values: Type of missing values, values considered "missing" (in pandas), handling missing values – mean, median and mode, Univariate feature imputation (sklearn.impute.SimpleImputer), multivariate feature imputation, nearest	8			
II	data. Plotting with matplotlib – linear and scatter plots, subplots. Imputation of Missing values: Type of missing values, values considered "missing" (in pandas), handling missing values – mean, median and mode, Univariate feature imputation (sklearn.impute.SimpleImputer), multivariate feature imputation, nearest neighbors imputation (sklearn.impute.KNNImputer), filling of missing values with machine learning models (decision trees). Time Series Analysis:	8			
II	data. Plotting with matplotlib – linear and scatter plots, subplots. Imputation of Missing values: Type of missing values, values considered "missing" (in pandas), handling missing values – mean, median and mode, Univariate feature imputation (sklearn.impute.SimpleImputer), multivariate feature imputation, nearest neighbors imputation (sklearn.impute.KNNImputer), filling of missing values with machine learning models (decision trees). Time Series Analysis: Introduction, Autocorrelation and Partial Autocorrelation, Time Series –	8			
Π	data. Plotting with matplotlib – linear and scatter plots, subplots. Imputation of Missing values: Type of missing values, values considered "missing" (in pandas), handling missing values – mean, median and mode, Univariate feature imputation (sklearn.impute.SimpleImputer), multivariate feature imputation, nearest neighbors imputation (sklearn.impute.KNNImputer), filling of missing values with machine learning models (decision trees). Time Series Analysis: Introduction, Autocorrelation and Partial Autocorrelation, Time Series – Stationarity and Seasonality, Autoregressive Model, Autocorrelation Function	8			
II	data. Plotting with matplotlib – linear and scatter plots, subplots. Imputation of Missing values: Type of missing values, values considered "missing" (in pandas), handling missing values – mean, median and mode, Univariate feature imputation (sklearn.impute.SimpleImputer), multivariate feature imputation, nearest neighbors imputation (sklearn.impute.KNNImputer), filling of missing values with machine learning models (decision trees). Time Series Analysis: Introduction, Autocorrelation and Partial Autocorrelation, Time Series – Stationarity and Seasonality, Autoregressive Model, Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF), Moving Average Model,	8			
II	data. Plotting with matplotlib – linear and scatter plots, subplots. Imputation of Missing values: Type of missing values, values considered "missing" (in pandas), handling missing values – mean, median and mode, Univariate feature imputation (sklearn.impute.SimpleImputer), multivariate feature imputation, nearest neighbors imputation (sklearn.impute.KNNImputer), filling of missing values with machine learning models (decision trees). Time Series Analysis: Introduction, Autocorrelation and Partial Autocorrelation, Time Series – Stationarity and Seasonality, Autoregressive Model, Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF), Moving Average Model, Autoregressive Moving Average (ARMA) Model, Autoregressive Moving	8			
	data. Plotting with matplotlib – linear and scatter plots, subplots. Imputation of Missing values: Type of missing values, values considered "missing" (in pandas), handling missing values – mean, median and mode, Univariate feature imputation (sklearn.impute.SimpleImputer), multivariate feature imputation, nearest neighbors imputation (sklearn.impute.KNNImputer), filling of missing values with machine learning models (decision trees). Time Series Analysis: Introduction, Autocorrelation and Partial Autocorrelation, Time Series – Stationarity and Seasonality, Autoregressive Model, Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF), Moving Average Model, Autoregressive Moving Average (ARMA) Model, Autoregressive Moving Average (ARMA) Model, Autoregressive Integrated Moving Average (ARIMA).				
II	data. Plotting with matplotlib – linear and scatter plots, subplots. Imputation of Missing values: Type of missing values, values considered "missing" (in pandas), handling missing values – mean, median and mode, Univariate feature imputation (sklearn.impute.SimpleImputer), multivariate feature imputation, nearest neighbors imputation (sklearn.impute.KNNImputer), filling of missing values with machine learning models (decision trees). Time Series Analysis: Introduction, Autocorrelation and Partial Autocorrelation, Time Series – Stationarity and Seasonality, Autoregressive Model, Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF), Moving Average Model, Autoregressive Moving Average (ARMA) Model, Autoregressive Moving Average (ARMA) Model, Autoregressive Integrated Moving Average (ARIMA). Remote Data Access:	8			
	data. Plotting with matplotlib – linear and scatter plots, subplots. Imputation of Missing values: Type of missing values, values considered "missing" (in pandas), handling missing values – mean, median and mode, Univariate feature imputation (sklearn.impute.SimpleImputer), multivariate feature imputation, nearest neighbors imputation (sklearn.impute.KNNImputer), filling of missing values with machine learning models (decision trees). Time Series Analysis: Introduction, Autocorrelation and Partial Autocorrelation, Time Series – Stationarity and Seasonality, Autoregressive Model, Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF), Moving Average Model, Autoregressive Moving Average (ARMA) Model, Autoregressive Moving Average (ARMA) Model, Autoregressive Integrated Moving Average (ARIMA).				



		St Louis EED (EDED)				
		St.Louis FED (FRED).				
		Handling and Visualization of Geospatial data:	Doon Streat			
	Basemap introduction, plotting maps with basemaps, introduction to Open Street					
	Map (OSM), introduction osmnx, geo-dataframes – nodes and edges, plotting					
	geo-dataframes and maps with osmnx, finding loading and plotting gpx (gps)					
	13.7	files, making maps attractive with folium.		0		
	IV	Introduction to Big Data:		8		
		Introduction, characteristics of big data, advantage of big data proc				
		cases and challenges. Apache Hadoop, Hadoop architecture, Hadoop				
		File System (HDFS), YARN (Yet Another Resource Negotiator				
		MapReduce. Apache Spark, Directed Acyclic Graph (DAG), Spark en				
		Spark Core, Spark SQL, Apache Spark MLlib (Machine Learning) and	GraphX			
	V	Big Data Analysis – PySpark:		8		
	Spark Session, creating spark DataFrame, Untyped Dataset Operations (aka					
		DataFrame Operations), scalar and aggregate functions, read and writi	ng (saving)			
		DataFrame, Resilient Distributed Datasets (RDDs) - parallelized	collections,			
		RDD Operations, transformations and actions. Running SQL Queries o	n RDD.			
Τe	ext Boo	ks:				
1.	Cathy	O'Neil and Rachel Schutt. Doing Data Science, Straight Talk from the H	Frontline. O'	Reilly.		
2.	Jure I	eskovek, AnandRajaraman and Jeffrey Ullman. Mining of Massive D	atasets.v2.1,	Cambridge		
		rsity Press.		C		
Re	ferenc	e				
1.	Joel G	rus, Data Science from Scratch, O'Reilly Publications.				
		Ceilen, Introducing Data Science: Big Data, Machine Learning, and Mo	re. Using Pv	thon Tools.		
		Tech Publications.	, -			
		Evaluation/Assessment Methodology				
		U	Max.	Marks 100		
1)	Class	tasks/ Sessional Examination	15			
2)		tations /Seminar				
3)		nments				
	0	rch Project Report	10			
т)			10			
Seminar On Research Project Report755) ESE75						
		Total:	100			
	-	tes for the course: Problem Solving ability				
		earning Outcomes:				
		tify the various steps to numpy plotting for data.				
CC	02: Unc	lerstand the need of data collection, storage and processing of data for be	etter insights.			
CC	03: App	bly the different statistical measures for data analysis with confidence				
		tify the appropriate techniques for understanding data through Visualiza	tion			

CO4: Identify the appropriate techniques for understanding data through Visualization CO5: Able to identify and type of data science techniques for analysis.



IIMTU-NEP IMPLEMENTATION Year-III/ Semester-VI

Progran	me:Degree	Year:III			
Class:B.	SC. CS(DS)	Semester:VI			
Credits	Subject:E-Commerc	ce			
Theory:4	Cr				
Course	Code: Title:E-Commerce				
BCS-NE	P-603				
Course	Objectives:				
CO1: Im	part the students with knowled	ge and understanding of contemporary trends in e-com	merce.		
CO2: Ex	plain electronic system and Int	ernet.			
CO3: De	scribe the use of e-commerce s	security.			
		and understanding about E-Com practices to the student	s.		
CO5: Ur	derstand the usage of planning	and marketing for e-commerce.			
Nature of	of Paper: DSE				
Minimu	m Passing Marks/Credits:40 ^o	% Marks (ISE +ESE)			
L:4					
T:0					
	ours/Week)				
	1 Hr. = 1 Credit				
Unit		Contents	No. of		
			Lectures		
			Allotted		
Ι		nic Commerce: What is E-Commerce (Introduction	8		
		ties E-Commerce. Goals of E-Commerce, Technical			
	1	rce, Functions of E-Commerce, Advantages and			
	-	rce, Scope of E-Commerce, Electronic Commerce			
		mmerce and Electronic Business(C2C)(C2G;G2G,			
	B2G, B2P, B2A, P2P, B2A, C				
II		Evolution of Internet, Domain Names and Internet	8		
		l, .gov, .net etc.), Types of Networks, Internet Service			
		b, Internet & Extranet, Role of Internet in B2B			
		website, Cost, Time, Reach, Registering a Domain			
		et email, Barter, Exchange, Shopping Bots	<u> </u>		
III	÷	ransaction, Computer Monitoring, Privacy on Internet,	8		
		Computer Crime(Laws, Types of Crimes), Threats,			
	1 1	Software Packages for privacy, Hacking, Computer			
		problem, virus protection, Encryption and Decryption,			
		ES, Public Key Encryption, RSA, Authorization and			
TT 7	Authentication, Firewall, Dig				
IV		: Introduction, Concepts of EDI and Limitation,	8		
		vantages of EDI, EDI model, Electronic Payment			
	System: Introduction, Types of Electronic Payment System, Payment Types, Value				
	Exchange System, Credit Ca	rd System, Electronic Fund Transfer, Paperless bill,			



	Modern Payment Cash, Electronic Cash					
V Planning for Electronic Commerce: Planning Electronic Commerce initiate						
	Linking Objectives to business strategies, Measuring cost object					
	benefits to Costs, Strategies for developing electronic commerce w					
Internet Marketing; The PROS and CONS of online shopping, The cons of						
online shopping. Justify an Internet business, Internet marketing techniques, The						
	E-cycle of Internet marketing, Personalization e-commerce.					
	Books:					
	S.V.Murthy, E-Commerce Concepts, Models, Strategies: - Himalaya P	ublishing House, 1	2011.			
	mlesh K Bajaj and Debjani Nag, E- Commerce, 2005.					
Refere						
	ay P. Schneider, Electronic commerce, International Student Edition, 2	2011.				
2. E-C	Commerce, Fundamentals and Applications, Wiely Student Edition,					
	Evaluation/Assessment Methodology					
			Marks 100			
/	ss tasks/ Sessional Examination	15				
/	sentations /Seminar					
	signments					
	search Project Report	10				
	ninar On Research Project Report					
5) ES		75				
_	Total:	100				
-	uisites for the course: Problem Solving using C					
	e Learning Outcomes:					
CO1:	Identify and explain fundamental web site tools including design to	ools, programming	g tools, and			
~ ~ ~	data processing tools.					
CO2:	Apply the solutions on finding major electronic payment issues and o	1				
CO3:	CO3: Acquire the knowledge of security issues and explain procedures used to protect against security					
a a t	threats.					
CO4:	Communicate effectively in ways appropriate to the discipline, audie					
CO5:	Implement the corrective measures to management issues und including organizational structure, strategic planning, goal setting.	lerlying e-Comm	erce issues			



IIMTU-NEP IMPLEMENTATION Year-III/ Semester-VI

Program	me:Degr	ee	Year:III			
Class:BS	•		Semester:VI			
Credits	,	Subject: Mobile Comp	buting			
Theory:4	Cr		8			
-	Course Code: Title: Mobile Computing					
	BCS-NEP-603					
Course Ol						
	0	nd the basic concepts of	mobile computing.			
		basics of mobile data m	1 0			
			er protocols and Ad-Hoc networks.			
			application layer protocols.			
CO5: To	gain know	wledge about different n	nobile platforms and application development.			
Nature o	f Paper:	DSE				
Minimur	n Passing	g Marks/Credits:40%	Marks (ISE +ESE)			
L:4						
T:0						
P:0(In Ho	ours/Weel	k)				
Theory -	1 Hr. = 1	Credit				
Unit			Contents	No. of		
				Lectures		
				Allotted		
Ι	Mobile	Computing: Issues in	Mobile Computing, Wireless Telephony, Digital	8		
	Cellular	Standards, Bluetooth	Technology, Wireless Multiple Access Protocols,			
	Channe	l Allocation in Cellular	Systems. Wireless Application Protocol, WRITE A			
	PROGR	RAM technology, Mo	bile Information device, Mobile Computing			
	Applica					
II			obility, Wireless Communication and Portability,	8		
			tion Schemes, Basic Concept of Multihopping,			
			Network, Multicluster Architecture.			
III		6	on Based Services, Automatically Locating	8		
			anizing Services, Issues and Future Directions,			
		IP, Comparison of TCP				
IV		U	Data Dissemination, Cache Consistency, Mobile	8		
	Transaction Processing, Mobile Database Research Directions, Security Fault					
	Tolerance for Mobile N/W.					
V	What is Ad-hoc Network?Problems with Message Routing in Wireless Ad-hoc8					
	Mobile Networks, Routing scheme based on signal strength, Link state and					
	Distance Vector routing protocols, Ad-hoc on Demand Distance Vector.					
Text Bo		11 41111 ~~~				
	1. Shambhu Upadhyaya, Abhijeet Chaudhary, Kevin Kwiat, Mark Weises, "Mobile Computing",					
	Kluwer Academic Publishers.					
2. UWE Hansmann, Lothar Merk, Martin-S-Nickious, Thomas Stohe, "Principles of Mobile						



Computing", Springer International Edition.				
3. Wireless and Mobile Networks Architectures, by Yi-Bing Lin & Imrich Chlamtac, John Wiley				
&Sons, 2001.				
Reference				
1. Mobile and Personal Communication systems and services, by Raj Pa	andya, Prentice Hall of India,			
2001.				
2. Wireless Web Development, Ray Rischpater, Springer Publishing, 2000				
Evaluation/Assessment Methodology				
	Max. Marks 100			
1) Class tasks/ Sessional Examination	15			
2) Presentations /Seminar				
3) Assignments				
4) Research Project Report	10			
Seminar On Research Project Report				
5) ESE	75			
Total:	100			
Prerequisites for the course: Problem Solving using C				
Course Learning Outcomes:				
CO1: Understand about mobile communication with their different routing algorithms.				
CO2: Apply different data backup schemes used in mobile network to store the data.				
CO3: Able to explain about location management that is much important for mobile network.				
CO4: Build the knowledge of how transactions are done through mobile, different security issues while				
mobile transaction.				
CO5: Appraise different routing protocols used for routing the path like Al	DDV, DSR, FSR etc.			



IIMTU-NEP IMPLEMENTATION Year-III/ Semester-VI

Program	me:Degree Yea	r:III				
	ε	ester:VI				
Credits	Subject:Real Time System					
Theory:40	ů l					
Course C						
BCS-NEF	BCS-NEP-603					
Course C	Objectives:					
CO1: To	study the basic of tasks and schedulin	g.				
CO2: To	understand programming languages an	nd databases.				
CO3: To	analyze real time communication.					
		ability models for Hardware Redundancy.				
CO5: To	understand clock synchronization.					
Nature of	f Paper: DSE					
Minimun	n Passing Marks/Credits:40% Mar	ks (ISE +ESE)				
L:4						
T:0						
	ours/Week)					
Theory -	1 Hr. = 1 Credit					
Unit		Contents	No. of			
			Lectures			
			Allotted			
Ι	INTRODUCTION TO TASK SCI		8			
		Computing, Structure of a Real Time System,				
		for Real time Systems, Task Assignment and				
	U 1	r scheduling algorithms, RM algorithm with				
	different cases.					
II	UNI AND MULTI PROCESSOR		8			
		sks, Task assignment, Utilization balancing –				
		ne - Focused addressing and bidding- Buddy				
		-Aperiodic scheduling - Spring algorithm.				
III	REAL TIME COMMUNICATIO		8			
		CSMA- Deterministic collision resolution				
		cket messages-dynamic planning based-				
	Communication with periodic and a	periodic messages.				
IV	REAL TIME DATABASES:		8			
		General purpose databases, Main Memory				
	· · · · · · · · · · · · · · · · · · ·	ansaction Aborts, Concurrency control issues,				
	Disk Scheduling Algorithms, Maintaining Serialization Consistency, Databases					
	forHard Real Time System.		<u> </u>			
V	REAL-TIME MODELING AND		8			
		me modeling, Air traffic controller system -				
	Distributed air defence system.					



Text Books:

- 1. Jane W. S. Liu, "Real-time systems", 1st Edition, Prentice Hall, 2000.
- 2. Philips A. Laplante, "Real-Time System Design and Analysis", 3rd Edition, John Wiley & Sons, 2004.
- 3. C. Siva Ram Murthy, G. Manimaran, "Resource management in real-time systems and networks", PHI, 2009.

Reference

- 1. C.M. Krishna, Kang G. Shin, "Real Time Systems", Tata McGraw Hil, 2010.
- 2. Giorgio C. Buttazzo, "Hard real-time computing systems: predictable scheduling algorithms and applications", Springer, 2008.

Evaluation/Assessment Methodology				
	Max. Marks 100			
1) Class tasks/ Sessional Examination	15			
2) Presentations /Seminar				
3) Assignments	10			
4) Research Project Report				
5) Seminar On Research Project Report				
6) ESE	75			
Total:	100			
Prerequisites for the course: Problem Solving using C				
Course Learning Outcomes:				
CO1. Understand the factories and standards of any distribution for the Content in the Content i				

CO1: Understand the features and structures of practical Operating System implementations.

CO2: Acquire practical knowledge Real Time Operating Systems used in embedded system.

CO3: Understand the use of multitasking techniques in Real Time Systems.

CO4: Compare different scheduling algorithms and the schedule ability criteria.

CO5: Analyze real time systems with regard to keeping time and resource restrictions.



IIMTU-NEP IMPLEMENTATION Year-III / Semester –VI

Program	ne:UG		Year: III			
Class:BSc	CS (DS)		Semester: VI			
Credits		Subject:Advanced	Data Science Lab (SPT- VII)			
Practical:	2Cr					
Course C	ode:	Title: Advanced Da	ta Science Lab (SPT- VII)			
BCS-NEP	BCS-NEP-612P					
Course O	bjectives:					
CO1: Perf	orm variou	s operations on num	py arrays			
CO2: Imp	orting data	from different file for	ormats using pandas.			
		types of charts using	matplotlib.			
Nature of	Paper: Co	re				
Minimum	n Passing N	Iarks/Credits:40%	Marks			
L:0						
T:0						
P:4(In Ho	,					
•	Hr. = 1 Cr					
	2 Hrs.=1Cr	edit(4Hrs./Week=4C	Credits)			
Unit			Contents	No. of		
				Lectures		
				Allotted		
Ι	-	a NumPy Array		2		
		ndarray				
	b. Array					
	c. Array					
		om numbers in ndarr				
II		e and Reshaping of		2		
		nsions of NumPy arr	ay			
	1	e of Num Py array				
		of Num Py array				
		ping a Num Py array				
III	-	ng and Squeezing a N		2		
	-	nding a Num Py array				
	-	zing a Num Py array				
TT 7		ig in Num Py Arrays				
IV		following operations	using pandas	2		
	a. Creating data frame					
	b. conca					
	c. Setting conditions					
		ng a new column				
V		following file forma	ts using pandas	2		
	a. Text f					
	b. CSV	tiles				



	c. Excel files					
	d. JSON files					
VI						
VII						
X / T T T	Feature Scaling, Feature Standardization, Label Encoding	2				
VIII						
	Bar Graph, Pie Chart, Box Plot, Histogram, Line Chart and Subplots, Scatter Plot					
Reference	/ Text Books:					
	rus, "Data Science from Scratch: First Principles with Python", O	Reilly Media.	2015.			
	Harrison, "Learning the Pandas Library: Python Tools for D	•				
	ization, O'Reilly, 2016.	88	, <i>j</i> ,			
	se is available as Generic Elective, then the students of following	departments n	nav opt it.			
	Evaluation/Assessment Methodology					
			Max. Marks:50			
1) Class t	asks/ Sessional Examination	25				
· ·	tations /Seminar					
3) Assign	ments					
4) Resear	ch Project Report					
	ar On Research Project Report					
5) ESE		25				
*	Total:	50				
Course Le	earning Outcomes:					
Student wi	ill be able to :					
CO1: App	ly principles of NumPy and Pandas to the analysis of data.					
CO2: Mak	e use of various file formats in loading and storage of data.					
CO3: Iden	tify and apply the need and importance of pre-processing technique	ies.				
CO4: Show	w the results and present them in a pictorial format.					



School of Computer Science & Applications ACADEMIC HAND BOOK



Ordinance & Academic Regulations For Master of Computer Applications (MCA) (Established by Govt. of U.P. Vide U.P act No.32 of 2016) (Effective from the Session: 2022-23)



DEFINITIONS AND NOMEN CLATURE:

- (i) "**Programme**" means Post Graduate Degree Programme like Master of Computer Application (MCA). Hence further MCA and MCA (AI & ML) will call MCA in this document. AI means Artificial Intelligence and ML means Machine Learning.
- (ii) Academic Year: Two consecutive (one odd + one even) semesters constitute one academic year.
- (iii) Semester: Each semester will consist of 15-18 weeks of academic work equivalent to 90 actual teaching days. The odd semester may be scheduled from July to December and even semester from January to June.
- (iv) **Program:** An educational program leading to award of a degree.
- (v) "VC, Vice-Chancellor of IIMT-University" means the Head of the University.
- (vi) Course: Usually referred to, as 'papers' is a component of a program. All courses need not carry the same weightage. The courses should define learning objectives and learning outcomes. A course may be designed to comprise lectures/tutorials/laboratory work/ field work / outreach activities / project work / vocational training / viva / seminars / term papers / assignments / presentations / self-study etc. or a combination of some of these.
- (vii) Branch: Master of Computer Applications (MCA).
- (viii) Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters A, B, C, D, E and F.
- (ix) Grade Point: It is a numerical weightage allotted to each letter grade on a 10-pointscale.
- (x) **Credit:** A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/field work per week.
- (xi) Credit Point: It is the product of grade point and number of credits for a course.
- (xii) Semester Grade Point Average (SGPA): It is a measure of academic performance of student/s in a semester. It is the ratio of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to two decimal places.
- (xiii) Cumulative Grade Point Average (CGPA): It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points earned by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.
- (xiv) First Attempt: If a student has completed all formalities and become eligible to attend the examinations and has attended at least one subject of passing, such attempt (first sitting) shall be considered as first attempt.
- (xv) Transcript or Grade Card or Certificate: Based on the grades earned, a grade sheet/certificate shall be issued to all the registered students at the end of every academic year. The grade sheet/certificate will display the course details (code, title, number of credits, grade secured) along with SGPA of both semesters and CGPA earned till that academic year.
- (xvi) UGC: University Grants Commission.
- (xvii) AIU: Association of Indian universities The CBCS provides choice for students to select from the prescribed courses. Sequencing Plan for the MCA Post Graduate Degree Curriculum



Semesters

Course Coverage

- I–II Foundation Course for Computer Applications and Programming Techniques, Mathematical Foundations, Numerical & Statistical Techniques and Course on Computer Organizations and Entrepreneurial Skills etc.
- III-IV Core Courses including Design & Development of Applications, Design& Analysis of Algorithms, Operating Systems, Applications of Information Systems, Web Application Development, Artificial Intelligence, Elective Courses, Mini Project Work etc.

1. **PREAMBLE**

As the technological enhancement and availability of technology to every person of world a huge demand of computer skilled professional is ample. In this world of opportunities, impact of higher education is so inevitable for getting desired guidance to secure, right kind of employment. It is compulsory to pursue higher related- education in the best institutes. The syllabus development is a step to ensure development of the undergraduates for both, academia and employability. Latest technical trends, industry standards, market needs, and interests of students, future expectations the need has been taken into consideration while developing the syllabus.

This is an effort to develop a student centric framework where they are expected to have a concrete understanding of fundamentals of computer science along with the latest trends and techniques like Artificial Intelligence, Internet of Things (IoT), Machine Learning (ML) with advanced skill sets that include Mobile Application environment, Object Oriented Programming (OOPs) among many courses. Each course aims to present learning targets and objectives, and thus provide learning and teaching strategies, assessment and resources. The students shall be equipped with the latest trends in computer science, after completion of the programme.

With this an education temple of nation should ensure an environment, which should be bias free, irrespective of cast, religion, races, sex difference and easily available to youths of the nation. The human value, ethics and environmental teaching is also introduced with this.

2. VISION AND MISSION OF THE SCHOOL

VISION

To achieve heights in computer education domain by creating appropriate environment for students, faculties and staff with availability of latest technological infrastructure.

MISSION

- 1. To dissipate appropriate all types of practical and theoretical computer science knowledge to our young students.
- 2. Inculcate professional efficiency in the students for brighter career opportunity as per industry latest requirement.
- 3. To provide learning environment for students with our reputed academics partner in the field of computer science.
- 4. To prepare our student as an IT professional with full of ethics and human values.



3. PROGRAM EDUCATIONAL OBJECTIVES (PEO)

- **PEO1:** The Postgraduates Programs are designated to produce skilled Postgraduates who will be proficient professionals in private sector, semi government and government institutions.
- **PEO2:** The pass out Postgraduates will be able to handle the overall world requirements and will become effective employees or employers.
- **PEO3:** The pass out Postgraduates will be a good team leader and will be able to lead the team to find inexpensive and optimal solutions and, achieve expertise in their fields or become entrepreneurs and play the proficiently managing roles in all types of institutions, establishment, and industry ventures.

4. **PROGRAM OUTCOMES (PO'S)**

- **PO1:** Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **PO2: Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO3:** Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **PO4:** Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **PO5:** Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools prediction and modeling to complex engineering activities with an understanding of the limitations.
- **PO6:** The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional engineering practice.
- **PO7:** Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and the need for sustainable development.
- **PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **PO9:** Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **PO10: Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and receive clear instructions.
- **PO11: Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in team, to manage projects and in multidisciplinary environments.
- **PO12: Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



5. **PROGRAM SPECIFIC OUTCOMES (PSO'S)**

- **PSO1:** The Postgraduates are capable in basic principles and methods of Computer era with sufficient Mathematical and Scientific grounds and can:
 - Apply fundamental concepts of integration, Artificial intelligence with deep learning, differentiation, vector calculus, probability & statistics, and discrete mathematics.
 - Design, create & evaluate programming algorithms appropriate to all types of current real frequent changing difficulties.
- **PSO2:** The Postgraduates have deep sense acknowledgement for:
 - Present capability for computers, computer network and server environments and their troubleshooting.
 - Capacity to handle ever changing cloud computing environments and related solutions.
 - Well defined knowledge for solving problems of security and threats in knowledge and financial domain.

6. ADMISSION

- 6.1 Admission to MCA first year in Ist Semester.
- **6.2** Admission on migration of a candidate from any other University to the University is not permitted.

7. ELIGIBILITY FORADMISSIONS

7.1 Admission to MCA First Year:

For admission to first year of MCA in IIMT University, Meerut, a candidate must have passed Bachelor degree course of 03 Years minimum duration from any recognized Indian University; or its equivalent, recognized by **A.I.U.** securing minimum 50% (45% for SC/ST) marks in aggregate. Candidate must have passed Mathematics at 10+2 level or Graduation level.

7.2 The Academic Council shall have power to amend or repeal the eligibility criteria laid down at clause 7.1 as per the guidelines of AICTE.

8. ATTENDANCE

- **8.1** Every student is required to attend all the Lectures, Tutorials, Practical Classes and other prescribed curricular and co-curricular activities. The attendance can be condoned up to 25% on medical grounds or for other genuine reasons beyond the control of students.
- **8.2** A further relaxation of attendance up to 15% for a student can be given by Head of School/College provided that he/she has been absent with prior permission of the Head of the School/college for the reasons acceptable to him.
- **8.3** No student will be allowed to appear in the end semester examination if he / she do not satisfy the overall average attendance requirements of Clause Nos. 8.1, and 8.2. Such candidate(s) shall be treated as having failed and will be further governed by clause no. 9.2 &9.3.
- **8.4** The attendance shall be counted from the date of admission in the college or start of academic session whichever is later.



9. DURATION OFCOURSE

- **9.1** Total duration of the MCA Course shall be 2 years, each year comprising two semesters. Each semester shall normally have teaching for the 90 working days or as prescribed by A.I.C.T.E. from time to time.
- **9.2** The student admitted to 1st year MCA Course shall complete the course within a period of five (05 Years) Academic Years from the date of first admission, failing which he/she has to discontinue the course.
- **9.3** A Student, who has failed twice in first year due to any reason (either due to his/her non-appearance or he/she being not permitted to appear in semester examinations) shall not be allowed to continue his/her studies further. Provided further that if a student wishes to continue third time in first year, he/she may be allowed on the terms and conditions laid down by the University for such permission but the maximum time allowed for completing the course will remain the same as described in clause 4.2.
- **9.4** The minimum percentage requirement for MCA Degree is 40%.

10. % CURRICULUM

- **10.1** The 2 Year curriculum has been divided into 4Semesters and shall include Lectures, Tutorials, Practical Labs, Seminars and Projects etc. in addition to industrial training as defined in the scheme and executive instructions issued by the University from time to time.
- **10.2** The curriculum will also include other curricular, co-curricular and extracurricular activities as may be prescribed by the University from time to time.
- **10.3** The subjects listed in semester I or II for MCA will be as per Course Structure of MCA Program and shall not be offered exactly in the same sequence.

11. EXAMINATION

- 11.1 The performance of a student in a semester shall be evaluated through continuous class assessment and end semester examination. The continuous assessment shall be based on class tests, assignments/tutorials, quizzes/viva-voce and attendance. The marks for continuous assessment (Sessional marks) shall be awarded at the end of the semester. The end semester examination shall be comprised of written papers, Practical and Viva-voce, Record of Lab Work, Project Work, Design Reports or by means of any combination of these methods.
- **11.2** The distribution of marks for sessional, end semester theory papers, practical and other examinations, seminar, project and industrial training shall be as prescribed by the University in prescribed Course Structure. The practical, viva-voce, projects and reports shall be examined/evaluated through internal and external examiners as and when required, as per university guidelines.



11.3 The marks obtained in a subject shall consist of marks allotted in end semester theory paper and sessional work.

12. ELIGIBILITY OFPASSING

- **12.1** A student who obtained Grades A⁺to E shall be considered as passed. If a student secured "F" grade, he /she has to reappear for the examination. It is mandatory for a student to earn the required credits as mentioned in each semester.
 - (a) For a pass in a Theory Subject, a student shall secure minimum of 30% of the maximum marks prescribed in the University Examination and 40% of marks in the aggregate marks in the subject including sessional marks. i.e., Minimum Passing Grade is "E".
 - (b) For a pass in a Practical/Project/Viva-voce examination, a student shall secure a minimum of 50% of the maximum marks prescribed for the University Examination in the relevant Practical/Project/Viva-voce and 40% of marks in the aggregate marks in the Practical/Project/Viva-voce including sessional marks i.e., Minimum Passing Grade in a course is "E".
- **12.2** The students who do not satisfy the condition 12.1 or the student who remains absent shall be deemed to have failed in that subject and may reappear for the University examination in the subsequent examinations. However, the Sessional marks awarded to the student/s at previous attempt in the concerned subject will be carried forward.
- **12.3** A student may, at his/her desire, opt to abandon his/her performance of a semester in following manner.
 - (a) A student may opt to abandon his/her performance only in University Examination of the Semester.
 - (b) A student may opt to abandon his/her Total Performance of the Semester which includes performance in University Examination and Sessional Marks.
 - (c) A student may opt to abandon his/her performance in University Examination of any or both semesters of the same academic year only.
 - (d) A student shall be allowed to abandon the performance maximum twice during the entire course of study.
 - (e) Performance of a semester, once abandoned, cannot be claimed again.
- **12.4** The student, who opts to abandon the performance of a semester as per clause 12.3, shall abandon performance in all the courses of that semester, irrespective of the fact whether the student has passed or failed in any subject of that semester.
- **12.5** A student, who opts to abandon the total performance of the semester including sessional marks, has to take readmission for the relevant semester. Readmission to the First semester in such cases shall not be considered as fresh admission i.e., the student will continue to have the same University Roll Number, which was allotted earlier.
- **12.6** The student, who opted to abandon his / her performance only in the University examination of



a semester and does not desire readmission, shall be permitted to re-appear for examinations of all the subjects of the semester in the subsequent examinations as an Ex- Student. However, the sessional marks obtained by the student in the abandoned semester shall be retained.

- **12.7** Such students who opted to abandon the performance at final year are eligible for the award of Class and Distinction at the MCA degree level, but are not eligible for the award of ranks.
- **12.8** The student who passes a course of a semester as per 12.1 shall not be allowed to appear for the same again, unless he/she opts for *abandoning of results* as per12.3-12.7.
- **12.9** A student shall be declared to have completed the program of MCA degree, provided the student has undergone the stipulated course work as per the regulations and has overall 40 percent marks.

13. ELIGIBILITYFORPROMOTION

- **13.1** There shall not be any restriction for promotion from an odd semester to the next even semester.
- **13.2** For promotion from even semester to the next odd semester (i.e., of the next academic year) the student has cleared in at least seven subjects in the immediately preceding two semesters including theory and practical exam.
- **13.3** The result of the semester shall be declared pass only on securing E or above grades in all subjects and minimum Semester Grade Point Average (SGPA) is 5.0.
- **13.4** Student himself can decide to abandon the performance of any or both the semesters of same academic year as per clause 8.3 and reappear in abandoned semester examination as per clauses 7.4, 7.5 &7.6.

13.5 Grace Marks:

13.5.1 A candidate may be awarded grace marks a maximum of total 10 marks distributed in maximum four subjects, not more than 5 marks in an individual subject, including theory papers, practical, seminar, project and/or aggregate marks in each academic year provided he/she can be declared to have passed the academic year by the award of these marks.

13.5.2 The grace marks shall not be added to the aggregate marks.

14. CARRYOVERSYSTEM

- **14.1** Following rules shall be followed for carry over papers:
 - (a) A candidate who satisfies the requirements of clause 12.2 (a) will be required to appear in those theory papers / practical's during respective end semester exams in which he/she failed.
 - (b) A candidate satisfying clause 12.2 (b) shall be required to exercise his/her choice of theory papers in which he/she desires to appear in the examination to fulfill the



requirements of clause12.1(a).

- (c) A candidate shall be required to exercise his/her choice of minimum theory papers in which he/she desires to appear in the examination for improvement to fulfill the requirements of clause13.3.
- (d) Candidate appearing for carry over paper in any semester shall be examined with the examination paper of that subject running in that semester.
- 14.2 All carryover examinations shall be held only with end semester examination.

15. RE-ADMISSION IN THE SCHOOL/ COLLEGE

A candidate may be allowed for re-admission provided he/she satisfies one of the following conditions:

- (a) A candidate is declared fail.
- (b) A candidate did not appear in a semester examination / or he/she was not granted permission to appear in the examination.
- (c) A candidate has been detained by the institute and subsequently has been permitted to takere-admission.
- (d) A candidate has own desire to abandon the performance of semester(s).

16. COMPUTATION OF SGPA ANDCGPA

16.1 The IIMT University Meerut adopts absolute grading system wherein the marks are converted to grades, and every semester results will be declared with semester grade point average (SGPA) and Cumulative Grade Point Average (CGPA). The CGPA will be calculated every semester, except the first semester. The grading system is with the following letter grades and grade points scale as given below:

Level	Out	Excellent	Very	Good	Above	Average	Poor	Fail
	standing		Good		Average			
Letter Grade	A+	Α	B+	B	С	D	Ε	F
Grade	10	9	8	7	6	5	4	00
Points								
Score (Marks)	≥ 90	<90	<80,	<70,	<60	<50,	<45,	< 40
Range			≥70	≥60	≥50	≥45	≥40	
(%)	(90-100)	(80-89)	(70-79)	(60-69)	(50-59)	(45-49)	(40-	(0-39)
							4 4)	

- **16.2** A student obtaining Grade "F" shall be considered failed and will be required to reappear in the examination. Such students after passing the failed subject in subsequent examination/s will be awarded with "E" grade irrespective of marks he/she scores in the subsequent examination/s. Number of attempts taken to clear a subject/s shall be shown in the transcripts.
- **16.3** The University has right to scale/moderate the theory exam/practical exam/sessional marks of any subject whenever required for converting of marks in to letter grades on the basis of the result statistics of university as in usual practice.



- The modality for moderation of marks before the declaration of result shall be decided (a) by a committee of Pro-Vice Chancellor, Dean UG, Assoc. Dean UG and Controller of Examination.
- **(b)** The modality for moderation of marks if needed after the declaration of result shall be decided by a committee of Pro-Vice Chancellor, Dean UG, Assoc. Dean UG, Controller of Examination and an external member not below the rank of Professor nominated by the Vice Chancellor.
- If the candidate(s) appeared in the examination but theory marks are not available due (c) to missing of copy by any reason, the average marks may be awarded as decided by the committee mentioned in 16.3(a). In case of missing/unavailable of sessional marks, Controller of Examination can take decision as per the provision laid down by the Examination Committee.
- The Committee defined in16.3 (a) shall also fix up the responsibility and recommend **(d)** the punishment for occurrence of such case(s) in 16.3 (c).
- All the matters defined under 15.3(a) to 15.3 (d) shall be executed subject to the **(e)** approval of Academic Council of the IIMTU.

Computation of SGPA and CGPA 16.4

The following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

The SGPA is the ratio of sum of the product of the number of credits with the grade (a) points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

SGPA
$$(S_i) = \Sigma(C_i \times G_i) / \Sigma C_i$$

Where C_i is the number of credits of the **i**th course and Gi is the grade point scored by the student in the i^{th} course.

The CGPA is also calculated in the same manner taking into account all the courses **(b)** undergone by a student over all the semesters of a programme, i.e. С

$$\Sigma \mathbf{GPA} = \Sigma \left(\mathbf{C}_{i} \times \mathbf{S}_{i} \right) / \Sigma \mathbf{C}_{i}$$

where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester.

(c) The SGPA and CGPA shall be rounded off to 2 decimal places and reported in the transcripts.

Illustration for Computation of SGPA and CGPA Computation of SGPA Illustration No.1

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 1	4	B ⁺	8	4x8 = 32
Course 2	4	С	6	4x6 = 24
Course 3	4	В	7	4x7 = 28
Course 4	3	A+	10	3x10=30
Course 5	3	D	4	3x4 = 12
Course 6	2	С	6	2x6 = 12
Course 7	2	Α	9	2x9 = 18
Course 8	2	С	6	2x6 = 12
Total	24			168



Thus, SGPA= 168/24=7.00

Illustration No.2

Course	Credit	Grade letter	Grade point	Credit Point
				(Credit x Grade)
Course 1	4	B+	8	4x8 = 32
Course 2	4	С	6	4x6 = 24
Course 3	4	B	7	4x7 = 28
Course 4	3	A+	10	3x10=30
Course 5	3	F	0	3x0=00
Course 6	2	С	6	2x6 = 12
Course 7	2	Α	9	2x9 = 18
Course 8	2	С	6	2x6 = 12
Total	24			156

Thus, **SGPA= 156/24=6.50 Illustration No.2** (a)

Course	Credit	Grade letter	Grade point	CreditPoint(Credit x Grade)
Course 1	3	Ε	4	3x4 = 12

 C_i (First Attempt) 156+ C_i (subsequent attempt)12= 168 Thus, SGPA= 168/24=7.00 Illustration No.3

Course	Credit	Grade letter	Grade point	CreditPoint
				(Credit x Grade)
Course 1	4	B+	8	4x8 = 32
Course 2	4	С	6	4x6 = 24
Course 3	4	В	7	4x7 = 28
Course 4	3	A+	10	3x10=30
Course 5	3	Α	9	3x9 = 27
Course 6	2	С	6	2x6 = 12
Course 7	2	Α	9	2x9 = 18
Course 8	2	С	6	2x6 = 12
Total	24			183

Thus, SGPA= 183/24=7.63 CGPA= 24x7.00+24x7.63/48=7.3125 CGPA after Final Semester

Sem 1	Sem 2	Sem 3	Sem. – 4
Credit: 24	Credit: 24	Credit: 27	Credit: 27
SGPA:7	SGPA:8.5	SGPA:9.2	SGPA:6.86

Thus, **CGPA=**24*x*7 + 24*x*8.5 + 27*x*9.2 + 27*x*6.86 + 24*x*8.18 + 24*x*7.73 **=7.92**



16.5 Transcript (Format): Based on the above recommendations on Lettergrades, grade points, SGPA and CCPA, the transcript for eachsemester and a consolidated transcript indicating the performance inall semesters may be ssued.

17. CONVERSION OF GRADES INTOPERCENTAGE

Conversion formula for the conversion of CGPA into Percentage is

CGPA Earned x 10= Percentage of marks scored. Illustration: CGPA Earned 7.92 x 10 = 79.2%

18. AWARD OF DIVISION, RANKANDMEDALS

- **18.1** Division shall be awarded only after the final semester examination based on integrated performance of the candidate for all the six semesters (four semesters for lateral entry) as per following details.
 - (a) A candidate who qualifies for the award of the degree securing E or above grades in all subjects pertaining to all semesters in his/her first attempt within six consecutive semesters (three academic years)/ four consecutive semesters (two academic years) as applicable, and in addition secures a CGPA of 7.5 and above for the semesters I to VI and in case of lateral entry (III to VI) shall be declared to have passed the examination in FIRST DIVISION WITHHONOURS.
 - (b) A candidate who qualifies for the award of the degree by securing E or above grades in all subjects of all the semesters within a maximum period of six semesters/four semesters as applicable, after his/her commencement of study in the 1st/3rd semester and secures CGPA not less than 6.5 shall be declared to have passed the examination in **FIRST DIVISION**.
 - (c) All other candidates who qualify for the award of degree by securing E or above grades in all subjects of all semesters within a maximum period of six / four semesters as applicable, after his/her commencement of study in the 1st/3rdsemester an addition secures CGPA not less than 5.0 shall be declared to have passed the examination in **SECOND DIVISION**.
- **18.2** For award of ranks a minimum of 10 students should have appeared in the 4th semester examination. The total number of ranks awarded shall be 10% of total number of students appeared in 6th semester or 10 students, whichever is less.

Illustration:

- 1. If 100 students appeared for the 4th semester in MCA, the number of ranks to be awarded for MCA will be 10.
- 2. If 90 students appeared for the 4th semester in MCA, the number of ranks to be awarded for MCA will be 09.

For award of rank in MCA, the CGPA secured by the student from

(a) 1stto 6th semester for the students admitted to MCA. Program from 1st year, And A



student shall be eligible for a rank at the time of award of degree in MCA, provided the student

- (a) Has passed 1st to 4th (students joining from 1st semester) semester in all the subjects in first attempt only
- (b) Has not repeated/rejected any of the lower semesters.

If two students get the same *CGPA*, the tie should be resolved by considering the number of times a student has obtained higher *SGPA*; but, if it is not resolved even at this stage, the number of times a student has obtained higher grades like A^+ , A, B^+ , B etc. shall be taken into account in rank ordering of the students in a program.

18.3 The Gold, Silver and any other Medals as decided by the university shall be awarded to students falls in the top ranks of various courses as per university rules.

19. SCRUTINY ANDREVALUATION

- **19.1** Scrutiny shall be allowed in only theory papers.
- **19.2** Revaluation of theory/practical papers is permitted only with certain conditions as laid down by university.

20. UNFAIRMEANS

Cases of unfair means shall be dealt as per the rules and regulations of the University.

21. AWARD OF SESSIONALMARKS

Sessional marks for theory subjects, practical and project shall be awarded as prescribed and at present the break-up of sessional marks shall be as follows:

(a) Theory Subjects:

- (i) Class test which will comprise 20 % of total theory marks with two mid-term tests of equal weightage.
- (ii) Teacher Assessment Tutorial/Assignment/ Quizzes/ Attendance comprises 10% of total theorymarks.

(b) **Practical**:

- (iii) Two mid-term viva-voce/tests of equal weightage 30% of total Practical marks.
- (iv) Teacher Assessment: Lab, Record/ Attendance 20% of total Practical marks.
- (c) Make-up test may be held only for those students who could not appear in any one of midterm class tests due to genuine reasons for which the prior permission from the Head of Institution/College was taken. Make up test shall ordinarily be held about two weeks before the semester examination. The syllabus for the make-up test shall be the whole syllabus covered by the subject teacher up to that time.

22. AWARD OF SEMINAR INDUSTRIAL TRAINING, EDUCATIONAL TOUR MARKS AT INSTITUTION/COLLEGELEVEL

- **22.1** The marks of Seminar, Industrial Training, Educational tour marks shall be awarded on the following basis:
 - (a) Write-up / Report 50%



- (b) Presentation 50%
- **22.2** The marks in Seminar, Industrial Training and Educational Tour shall be awarded by a committee consisting of following members:
 - (a) Head of the Department or his/her nominee.
 - (**b**) Concerned Officer In-charge.
 - (c) Senior Faculty Member of the department nominated by the Head of Department.

23. CANCELLATION OF ADMISSION

The admission of a student at any stage of study shall be cancelled if:

- (i) He / She is not found qualified as per AICTE / State Government norms and guidelines or the eligibility criteria prescribed by the University. or
- (ii) He / She is found unable to complete the course within the stipulated time as prescribed in clause 4.2or
- (iii) He / She are found involved in creating indiscipline in the Institution / College or in the University.

24. STUDENT DESCIPILINE

Every student is required to observe utmost discipline and decorum both inside and outside the campus and not to indulge in any activity which may affect adversely the prestige reputation of the University and School.

25. RAGGING

Ragging in any form is a criminal and non-bail able offence in our country. The current State andCentrallegislationsprovidestringentpunishmentsincludingimprisonment.Oncetheinvolvemen tofastudent(s) is established in ragging, offending fellow students/staff, harassment of any nature to the fellow students/staff etc. the student(s) will be liable to be dismissed from the University, as per the laid down procedures of the UGC / Govt. /Institute. Every senior student at the University, along with their parent, shall give an undertaking every year in this regard and the same should be submitted at the time of Registration.

26. POWER TO MODIFY

Not withstanding all that has been stated above, the Academic Council is vested with powers to modify any or all the above regulations from time to time, if required, subject to the approval by the Board of Studies and final approval by Vice-Chancellor.



IIMTUNIVERSITY

Year – I /Semester – I

Progra	mme:Degree	Year: I	
Class:N	ACA	Semester: I	
Credits	Subject: Fundamen	tal of Computers & Emerging Technologies	
Theory	:4Cr		
Course	Code: Title : Fundamental	l of Computers & Emerging Technologies	
MCA -	111		
Course	Objectives:		
CO1 D	emonstrate the knowledge of the	he basic structure, components, features and gen	erations of
	omputers.		
		r languages, language translators and construct alg	gorithms to
	olve problems using programming		
		ioning&typesofoperatingsystemandcomputernetwor	`ks
		ng&servicesoftheInternetandbasicsofmultimedia.	
		nnologiesinthefieldofInformationTechnology.	
	of Paper: CORE COURSE		
	um Passing Marks/Credits:40%	o Marks	
L:3			
T:1	Lange (Weals)		
	Hours/Week)		
	-1 Hr. $= 1$ Credit	Cradita	
Unit	al- 2 Hrs.=1Credit(4Hrs./Week=4	Contents	No. of
Umt		Contents	Lectures
			Allotted
			moticu
Ι	Introduction to Computer:	Definition, Computer Hardware & Computer	8
1	Software	Definition, computer fluidware & computer	0
		luction, Input devices, Output devices, Central	
	-	ary and Secondary. Software-Introduction, Types–	
	System and Application.	,,,	
		duction, Concept of Compiler, Interpreter &	
	Assembler.		
	Problem solving conce	ept: Algorithms–Introduction, Definition,	
	Characteristics, Limitations, Con	ditions in pseudo-code, Loops in pseudo code.	
II	Operating system: Definition	, Functions, Types, Classification, Elements of	8
11		an anotin a aristana	
11	command based and GUI based	operating system.	
		ew, Types (LAN, WAN and MAN), Data	
	Computer Network: Overviscommunication, topologies.	ew, Types (LAN, WAN and MAN), Data	
III	Computer Network: Overviscommunication, topologies.		8
	Computer Network: Overviscommunication, topologies.	ew, Types (LAN, WAN and MAN), Data re, Functioning, Basic services like WWW, FTP,	8
	Computer Network: Overview communication, topologies. Internet: Overview, Architectu Telnet, Gopher etc., Search engi	ew, Types (LAN, WAN and MAN), Data re, Functioning, Basic services like WWW, FTP,	8
	Computer Network: Overview communication, topologies. Internet: Overview, Architectu Telnet, Gopher etc., Search engi	ew, Types (LAN, WAN and MAN), Data re, Functioning, Basic services like WWW, FTP, nes,E-mail,WebBrowsers. finition, Sensors, their types and features, Smart	8



	fundamentals of Block Chain.		
	Crypto currencies: Introduction, Applications and use cases.		
	Cloud Computing: It nature and benefits, AWS, Google, M	diarageft & IDM	
	Services		
V		limitations and	8
v	Emerging Technologies: Introduction, over view, features application areas of Augmented Reality, Virtual Reality,		8
	Greencomputing, Big data analytics, Quantum Computing and	1 0,	
	Interface.	i Brani Computer	
Text B			
	ajaramanV., "FundamentalsofComputers", Prentice-HallofIndia.		
	ortonP., "IntroductiontoComputers", McGrawHillEducation.		
	olden, "ComputerFundamentals", Pearson.		
Refer			
	alagurusamy E., "Fundamentals of Computers", McGraw Hill.		
	hareja R., "Fundamentals of Computers", Oxford University Press		
2. 1	Evaluation/Assessment Methodology	•	
		Max	Marks100
1) Clas	ss tasks/ Sessional Examination	20	
,	sentations /Seminar	20	
/	ignments		
,	earch Project Report	10	
,	ninar On Research Project Report	-	
5) ESE		70	
,	Total:	100	
Prereq	uisites for the course: NIL		
Cours	e Learning Outcomes:		
CO1: I	Demonstrate the use of mathematical software and solve simple ma	athematical problem	IS.
CO2: E	Explain the needs of hardware and software required for a computa	tion task.	
CO3: \$	State typical provisions of cyber law that govern the proper usa	ge of Internet and	computing
r	esources.		
CO4: I	Explain the working of important application software and their u	se to perform any e	ngineering
а	octivity		

activity. CO5: Demonstrate the use of Operating system commands and shell script.



IIMT UNIVERSITY Year – I /Semester – I

0	me: Degr	ee		Year: I	
Class: M	CA			Semester: I	
Credits		Subject: PR	OBLEM S	OLVING USING C	
Theory:4	Cr				
Course (Code:	Title: PROB	LEM SOL	LVING USING C	
MCA - 1	12				
Course (Objectives	:			
CO1: De	scribe the	functional co	omponents	and fundamental concepts of a digital comp	outer system
		nber systems.			
				hms for solving basic problems.	
CO3: W1	rite simple	programs us	ing the bas	sic elements like control statements, functions	, arrays and
	ings.				
CO4: Wr	ite advanc	ed programs u	using the co	oncepts of pointers, structures, unions and enur	nerated data
	es.				
-			ctives and	basic file handling and graphics operations	in advanced
-	ogramming				
		CORE COUR			
	n Passing	Marks/Cred	its:40% M	larks	
L:3					
T:1					
	ours/Week				
Theory -	1 Hr. = 1	Credit			
Theory - Practical-	1 Hr. = 1 2 Hrs.=1	Credit Credit(4Hrs./V	Veek=4Cre	edits)	
Theory -	1 Hr. = 1	Credit Credit(4Hrs./V	Veek=4Cre	edits)	No. of
Theory - Practical-	1 Hr. = 1 2 Hrs.=1	Credit Credit(4Hrs./V	Veek=4Cre	edits)	Lectures
Theory - <u>Practical</u> - Unit	1 Hr. = 1 2 Hrs.=10 Content	Credit Credit(4Hrs./V			Lectures Allotted
Theory - Practical-	1 Hr. = 1 (2 Hrs.=1) Content Basics o	Credit Credit(4Hrs./V s f programmi	ng: Appro	baches to problem solving, Use of high-level	Lectures
Theory - Practical- Unit	1 Hr. = 1 (2 Hrs.=1) Content Basics o program	Credit Credit(4Hrs./V S f programmi ning language	ng: Appro e for system	aches to problem solving, Use of high-level matic development of programs, Concept of	Lectures Allotted
Theory - Practical- Unit	1 Hr. = 1 (2 Hrs.=1) Content Basics o programmalgorithm	Credit Credit(4Hrs./V 5 f programmi ning language n and flow cha	ng: Appro e for system art, Concep	aches to problem solving, Use of high-level matic development of programs, Concept of t and role of structured programming.	Lectures Allotted
Theory - Practical- Unit	1 Hr. = 1 (2 Hrs.=1) Content Basics o programmalgorithm Basics o	Credit Credit(4Hrs./V 5 f programmi ning language n and flow cha f C : History	ng: Appro e for system art, Concep of C, Sali	aches to problem solving, Use of high-level matic development of programs, Concept of t and role of structured programming. ient features of C, Structure of C Program,	Lectures Allotted
Theory - <u>Practical</u> - Unit	1 Hr. = 1 (2 Hrs.=1) Content Basics o programmalgorithm Basics o Compilin	Credit Credit(4Hrs./V 5 f programmi ning language and flow cha f C: History ag C Program,	ng: Appro e for syster art, Concep of C, Sali Link and F	aches to problem solving, Use of high-level matic development of programs, Concept of t and role of structured programming. ient features of C, Structure of C Program, Run C Program, Character set, Tokens,	Lectures Allotted
Theory - <u>Practical</u> - Unit	1 Hr. = 1 (2 Hrs.=1) Content Basics o programmalgorithm Basics o Compilin Keyword	Credit Credit(4Hrs./V 5 f programmi ning language n and flow cha f C : History ng C Program, s, Identifiers,	ng: Appro e for system art, Concep of C, Sali Link and H Constants,	Paches to problem solving, Use of high-level matic development of programs, Concept of t and role of structured programming. The features of C, Structure of C Program, Run C Program, Character set, Tokens, Variables, Instructions, Data types, Standard	Lectures Allotted
Theory - Practical- Unit	1 Hr. = 1 (2 Hrs.=1) Content Basics o program algorithm Basics o Compilin Keyword Input / O	Credit Credit(4Hrs./V 5 f programmi ning language and flow cha f C : History ng C Program, s, Identifiers, utput, Operato	ng: Appro e for systen ort, Concep of C, Sali Link and F Constants, ors and exp	paches to problem solving, Use of high-level matic development of programs, Concept of t and role of structured programming. ient features of C, Structure of C Program, Run C Program, Character set, Tokens, Variables, Instructions, Data types, Standard pressions.	Lectures Allotted 8
Theory - <u>Practical</u> - Unit	1 Hr. = 1 (2 Hrs.=1) Content Basics o program algorithm Basics o Compilin Keyword Input / O Conditio	Credit Credit(4Hrs./V 5 f programmi ning language and flow cha f C: History og C Program, s, Identifiers, utput, Operato onal Program	ng: Appro e for system of C, Sali Link and H Constants, ors and exp h Execution	aches to problem solving, Use of high-level matic development of programs, Concept of t and role of structured programming. ent features of C, Structure of C Program, Run C Program, Character set, Tokens, Variables, Instructions, Data types, Standard pressions. on: if, if-else, and nestedif-else statements,	Lectures Allotted
Theory - Practical- Unit	1 Hr. = 1 (2 Hrs.=1) Content Basics o programmalgorithm Basics o Compilin Keyword Input / O Condition Switch s	Credit Credit(4Hrs./V 5 f programmi ning language n and flow cha f C : History ng C Program, s, Identifiers, utput, Operate onal Program tatements, Re	ng: Appro e for system of C, Sali Link and H Constants, ors and exp h Executions	aches to problem solving, Use of high-level matic development of programs, Concept of t and role of structured programming. ient features of C, Structure of C Program, Run C Program, Character set, Tokens, Variables, Instructions, Data types, Standard pressions. on: if, if-else, and nestedif-else statements, on switch values, Use of break and default	Lectures Allotted 8
Theory - Practical- Unit	1 Hr. = 1 (2 Hrs.=1) Content Basics o program algorithm Basics o Compilin Keyword Input / O Conditio Switch s withs with	Credit Credit(4Hrs./V S f programmi ning language and flow cha f C: History g C Program, s, Identifiers, utput, Operato nal Program tatements, Re ch, Compariso	ng: Appro e for system of C, Sali Link and F Constants, ors and exp D Executions con of switc	paches to problem solving, Use of high-level matic development of programs, Concept of t and role of structured programming. ient features of C, Structure of C Program, Run C Program, Character set, Tokens, Variables, Instructions, Data types, Standard pressions. on: if, if-else, and nestedif-else statements, on switch values, Use of break and default th and if-else.	Lectures Allotted 8
Theory - Practical- Unit	1 Hr. = 1 (2 Hrs.=10 Content Basics o programmal algorithm Basics o Compilin Keyword Input / O Condition Switch s withs with	Credit Credit(4Hrs./V 5 f programmi ning language and flow cha f C : History og C Program, s, Identifiers, utput, Operator tatements, Re ch, Comparise nd Iteration :	ng: Appro e for system of C, Sali Link and H Constants, ors and exp h Executions con of switch for, while	aches to problem solving, Use of high-level matic development of programs, Concept of t and role of structured programming. The features of C, Structure of C Program, Run C Program, Character set, Tokens, Variables, Instructions, Data types, Standard pressions. Dn: if, if-else, and nestedif-else statements, on switch values, Use of break and default th and if-else. and do-while loops, Multi ple loop variables,	Lectures Allotted 8
Theory - Practical- Unit	1 Hr. = 1 (2 Hrs.=10 Content Basics o programmalgorithm Basics o Compilin Keyword Input / O Conditio Switch s withs wit Loops an Nested lo	Credit Credit(4Hrs./V 5 f programmi ning language n and flow cha f C : History ng C Program, s, Identifiers, <u>utput, Operato</u> nal Program tatements, Reich, Comparise nd Iteration : pops, Assignm	ng: Appro e for system of C, Sali Link and H Constants, ors and exp h Executions con of switch for, while ent operato	aches to problem solving, Use of high-level matic development of programs, Concept of t and role of structured programming. ient features of C, Structure of C Program, Run C Program, Character set, Tokens, Variables, Instructions, Data types, Standard ressions. on: if, if-else, and nestedif-else statements, on switch values, Use of break and default th and if-else. and do-while loops, Multi ple loop variables, prs, break and continue statement.	Lectures Allotted 8
Theory - Practical- Unit	1 Hr. = 1 (2 Hrs.=10 Content Basics o program algorithm Basics o Compilin Keyword Input / O Conditio Switch s withs with Loops an Nested lo	Credit Credit(4Hrs./V Credit(4Hrs./V F f programmi ning language and flow cha f C: History g C Program, s, Identifiers, utput, Operato nal Program tatements, Reich, Comparise nd Iteration: pops, Assignments: Introduction	ng: Appro e for system of C, Sali Link and F Constants, ors and exp D Executions con of switch for, while ent operato on, Types,	paches to problem solving, Use of high-level matic development of programs, Concept of t and role of structured programming. Thent features of C, Structure of C Program, Run C Program, Character set, Tokens, Variables, Instructions, Data types, Standard pressions. Dr: if, if-else, and nestedif-else statements, on switch values, Use of break and default th and if-else. and do-while loops, Multi ple loop variables, prs, break and continue statement. Declaration of a Function, Function calls,	Lectures Allotted 8
Theory - Practical- Unit	1 Hr. = 1 (2 Hrs.=10 Content Basics o programmal algorithm Basics o Compilin Keyword Input / O Condition Switch s withs with Loops an Nested lo Function defining	Credit Credit(4Hrs./V 5 f programmi ning language and flow cha f C : History og C Program, s, Identifiers, utput, Operato nal Program tatements, Re ch, Comparise nd Iteration: oops, Assignm s: Introductio functions, Fu	ng: Appro e for system of C, Sali Link and H Constants, ors and exp n Executions on of switch for, while ent operato on, Types, inction Pro	aches to problem solving, Use of high-level matic development of programs, Concept of t and role of structured programming. ent features of C, Structure of C Program, Run C Program, Character set, Tokens, Variables, Instructions, Data types, Standard ressions. on: if, if-else, and nestedif-else statements, on switch values, Use of break and default th and if-else. and do-while loops, Multi ple loop variables, ors, break and continue statement. Declaration of a Function, Function calls, pto types, Passing arguments to a Function	Lectures Allotted 8
Theory - Practical- Unit	1 Hr. = 1 (2 Hrs.=10 Content Basics o programmal algorithm Basics o Compilin Keyword Input / O Conditio Switch s withs wit Loops an Nested lo Function defining Return	Credit Credit(4Hrs./V 5 f programmi ning language n and flow cha f C : History ng C Program, s, Identifiers, <u>utput, Operato</u> nal Program tatements, Rei ch, Comparise nd Iteration: pops, Assignments is: Introduction functions, Fut values and t	ng: Appro e for system of C, Sali Link and F Constants, ors and exp D Execution estrictions of on of switch for, while ent operato on, Types, inction Pro-	aches to problem solving, Use of high-level matic development of programs, Concept of t and role of structured programming. ient features of C, Structure of C Program, Run C Program, Character set, Tokens, Variables, Instructions, Data types, Standard pressions. on: if, if-else, and nestedif-else statements, on switch values, Use of break and default th and if-else. and do-while loops, Multi ple loop variables, prs, break and continue statement. Declaration of a Function, Function calls, pto types, Passing arguments to a Function , writing multi-function program, Calling	Lectures Allotted 8
Theory - Practical- Unit	1 Hr. = 1 (2 Hrs.=10 Content Basics o programmal algorithm Basics o Compilin Keyword Input / O Conditio Switch s withs wit Loops an Nested lo Function defining Return	Credit Credit(4Hrs./V 5 f programmi ning language and flow cha f C : History og C Program, s, Identifiers, utput, Operato nal Program tatements, Re ch, Comparise nd Iteration: oops, Assignm s: Introductio functions, Fu	ng: Appro e for system of C, Sali Link and F Constants, ors and exp D Execution estrictions of on of switch for, while ent operato on, Types, inction Pro-	aches to problem solving, Use of high-level matic development of programs, Concept of t and role of structured programming. ient features of C, Structure of C Program, Run C Program, Character set, Tokens, Variables, Instructions, Data types, Standard pressions. on: if, if-else, and nestedif-else statements, on switch values, Use of break and default th and if-else. and do-while loops, Multi ple loop variables, prs, break and continue statement. Declaration of a Function, Function calls, pto types, Passing arguments to a Function , writing multi-function program, Calling	Lectures Allotted 8
Theory - Practical- Unit	1 Hr. = 1 (2 Hrs.=10 Content Basics o program algorithm Basics o Compilin Keyword Input / O Conditio Switch s withs with Loops a Nested lo Function defining Return function	Credit Credit(4Hrs./V Credit(4Hrs./V F f programmi ning language and flow cha f C: History g C Program, s, Identifiers, utput, Operato onal Program tatements, Re ch, Compariso ongs, Assignm is: Introductio functions, Fu values and t by value, Rec	ng: Appro e for system of C, Sali Link and F Constants, ors and exp n Executions con of switc for, while ent operato on, Types, unction Pro- heir types ursive func	aches to problem solving, Use of high-level matic development of programs, Concept of t and role of structured programming. ient features of C, Structure of C Program, Run C Program, Character set, Tokens, Variables, Instructions, Data types, Standard pressions. on: if, if-else, and nestedif-else statements, on switch values, Use of break and default th and if-else. and do-while loops, Multi ple loop variables, prs, break and continue statement. Declaration of a Function, Function calls, pto types, Passing arguments to a Function , writing multi-function program, Calling	Lectures Allotted 8
Theory - Practical- Unit I	1 Hr. = 1 (2 Hrs.=10 Content Basics o programmal algorithm Basics o Compilin Keyword Input / O Condition Switch s withs with Loops an Nested lo Function defining Return function Arrays:	Credit Credit Credit(4Hrs./V 5 f programmi ning language and flow cha f C : History ng C Program, s, Identifiers, utput, Operato nal Program tatements, Re ch, Comparise nd Iteration: oops, Assignm s: Introduction functions, Fu values and t by value, Reco	ng: Appro e for system of C, Sali Link and F Constants, ors and exp n Executions on of switch for, while ent operato on, Types, inction Pro- heir types ursive func-	paches to problem solving, Use of high-level matic development of programs, Concept of t and role of structured programming. Tent features of C, Structure of C Program, Run C Program, Character set, Tokens, Variables, Instructions, Data types, Standard pressions. on: if, if-else, and nestedif-else statements, on switch values, Use of break and default th and if-else. and do-while loops, Multi ple loop variables, prs, break and continue statement. Declaration of a Function, Function calls, pto types, Passing arguments to a Function , writing multi-function program, Calling etions.	Lectures Allotted 8



00.000		
dimensional arrays.		
Pointers: Introduction, Characteristics, * and & o		
declaration and assignment, Pointer arithmetic, Call	by reference, Passing	
pointers to functions, array of pointers, Pointers to	functions, Pointer to	
pointer, Array of pointers.		
Strings: Introduction, Initializing strings, Accessing strings	ring elements, Array of	
strings, Passing strings to functions, String functions.		
IV Structure: Introduction, Initializing, defining and	l declaring structure,	8
Accessing members, Operations on individual me	mbers, Operations on	
structures, Structure within structure, Array of structure		
Union: Introduction, Declaring union, Usage of union	s, Operations on union.	
Enumerated data types		
Storage classes: Introduction, Types- automatic, register	er, static and external.	
V Dynamic Memory Allocation : Introduction, Library fu		8
realloc and free.		
File Handling: Basics, File types, File operations, Fil	e pointer, File opening	
modes, File handling functions, File handling th		
argument, Record I/O in files.	C	
Graphics: Introduction, Constant, Data types and gl	obal variables used in	
graphics, Library functions used in drawing, Drawing a		
interaction within the program.	6 . 6	
Text Books:		
1. Kanetkar Y., "Let UsC", BPB Publications.		
2. Hanly J. R. and Koffman E. B., "Problem Solving and Program	n Design in C", Pearson I	Education.
3. Schildt H., "C- The Complete Reference", Mc Graw-Hill.	8 ,	
Reference		
1. Goyal K.K. and Pandey H.M., Trouble FreeC", University Scie	ence Press.	
2. Gottfried B., "Schaum's Outlines-Programmingin C", McGraw		
Evaluation/Assessment Methodo		
		. Marks100
1) Class tasks/ Sessional Examination	20	
2) Presentations /Seminar		
3)Assignments		
4)Research Project Report	10	
Seminar On Research Project Report		
5) ESE	70	
Total:	100	
Prerequisites for the course: NIL	I	
Course Learning Outcomes:		
CO1: Students will be able to develop programs based on fundame	ental concepts of program	nming in C
CO2: Students will be able to solve problems based on Conditiona	1 1 0	•
CO3: Students will be able to learn Complete Programming Co		
familiar with modular programming Concepts of C using Function		
Programming concepts of c using f unetion		

CO4: Students will be able to learn conceptual programming with String, Structure and its differentiation with Union.

CO5: Students will be able to perform File handling programs with read and write concepts.



IIMT UNIVERSITY Year – I /Semester – I

Programme: Degree Year: I Class: MCA Semester: I Credits Subject: Principles of Management & Communication Theory:4Cr Title: Principles of Management & Communication Course Code: Title: Principles of Management & Communication MCA - 113 Course Objectives: CO1: Describe primary features, processes and principles of management. CO2: Explain functions of management in terms of planning, decision making and organizing.	s and
Credits Theory:4CrSubject: Principles of Management & CommunicationCourse Code: MCA - 113Title: Principles of Management & CommunicationCourse Objectives: CO1: Describe primary features, processes and principles of management. CO2: Explain functions of management in terms of planning, decision making and organizing.	s and
Theory:4CrTitle: Principles of Management & CommunicationMCA - 113Title: Principles of Management & CommunicationCourse Objectives: CO1: Describe primary features, processes and principles of management. CO2: Explain functions of management in terms of planning, decision making and organizing.	s and
Course Code: MCA - 113Title: Principles of Management & CommunicationCourse Objectives: CO1: Describe primary features, processes and principles of management. CO2: Explain functions of management in terms of planning, decision making and organizing.	s and
MCA - 113Course Objectives:CO1: Describe primary features, processes and principles of management.CO2: Explain functions of management in terms of planning, decision making and organizing.	s and
Course Objectives: CO1: Describe primary features, processes and principles of management. CO2: Explain functions of management in terms of planning, decision making and organizing.	s and
CO1: Describe primary features, processes and principles of management. CO2: Explain functions of management in terms of planning, decision making and organizing.	s and
CO2: Explain functions of management in terms of planning, decision making and organizing.	s and
	s and
CO3: Illustrate key factors of leadership skill in directing and controlling business resources	
processes.	
CO4: Exhibited quat ever bal and non-verbal communication skills.	
CO5: Demonstrate effective discussion, presentation and writing skills.	
Nature of Paper: DSE	
Minimum Passing Marks/Credits:40% Marks	
L:4	
T:0	
P:0(In Hours/Week)	
Theory - 1 Hr. = 1 Credit	
Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)	
UnitContentsNo.	of
Lectu	ıres
Allot	tted
I Management: Need, Scope, Meaning and Definition. The process of 8	
Management, Development of Management thought F.W. Taylor and Henry	
Fayol, Horothorne Studies, Qualities of an Efficient Management.	
IIPlanning & Organising: Need, Scope and Importance of Planning, Steps in8	
planning, Decision making model. Organising need and Importance,	
Organisational Design, Organisational structure, centralization and	
Decentralisation, Deligation.	
IIIDirecting & Controlling: Motivation—Meaning, Importance, need.8	
Theories of Motivation, Leadership-meaning, need and importance,	
leadership style, Qualities of effective leader, principles of directing, Basic	
control process, Different control Techniques.	
IVIntroduction to Communication: What is Communication, Levels of8	
communication, Barriers to communication, Process of Communication,	
Non-verbal Communication, The flow of Communication: Downward,	
Upward, Lateralor Horizontal (Peer group) Communication, Technology	
Enabled communication, Impact of Technology, Selection of appropriate	
communication Technology, Importance of Technical communication.	
V Business letters: Sales & Credit letters; Claim and Adjustment Letters; Job 8	
application and Resumes.	
Reports: Types; Structure, Style & Writing of Reports.	
Technical Proposal: Parts; Types; Writing of Proposal; Significance.	
Nuances of Delivery; Body Language; Dimensions of Speech: Syllable;	BOS



Accent; Pitch; Rhythm; Intonation; Paralinguistic features	of	voice;
Communication skills, Presentation strategies, Group Discussion	; Int	terview
skills; Workshop; Conference; Seminars.		

Text Books:

- 1. P.C. Tripathi, P.N. Reddy, "Principles of Management", Mc Graw Hill Education 6thEdition.
- 2. C.B. Gupta, "Management Principles and Practice", Sultan Chand & Sons 3rd edition.
- 3. T.N. Chhabra, "Business Communication", Sun India Publication.

Reference

- 1. V.N. Aroraand Laxmi Chandra, "Improve Your Writing", Oxford Univ. Press, 2001, New Delhi.
- 2. Madhu Rani and Seema Verma, "Technical Communication: A Practical Approach", Acme Learning, New Delhi-2011.

Evaluation/Assessment Methodology	
	Max. Marks :100
1) Class tasks/ Sessional Examination	20
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	70
Total:	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO1: Identify different concept of management.	
CO2: Able to understand the importance of planning and orgaising.	
CO3: Able to explore communication beyond language.	
CO4: Able to manage oneself while communicating.	
CO5: Able to acquire good communication skills and develop confidence.	



IIMT UNIVERSITY Year – I /Semester – I

Program	ne: Degree Ye	ear: I	
Class: MO	CA Set	mester: I	
Credits	Subject: Discrete Mathemati	ics	
Theory:4C			
Course Co	Dde: Title: Discrete Mathematics		
MCA - 11	4		
Course O	bjectives:		
CO1: Use	mathematical and logical notation	to define and formally reason about	basic discrete
stru	ctures such as Sets, Relations and Fun	ctions.	
11		cal connectives and quantifiers to check	the validity o
an a	rgument through truth tables and pro J	positional and predicate logic.	
		Structures like Groups, Rings and Fields	5.
	nulate and solve recurrences and recur		
	onstrate effective discussion, presenta	ation and writing skills.	
	Paper: DSE		
	Passing Marks/Credits:40% Marks	<u>s</u>	
L:4			
T:0			
P:0(In Hou	,		
•	Hr. = 1 Credit		
	2 Hrs.=1Credit(4Hrs./Week=4Credits)		
Unit	Co	ntents	No. of
			Lectures Allotted
Ι	Set Theory: Introduction, Size of Combination of sets, Multi sets, order	sets and Cardinals, Venn diagrams, ered pairs and Set Identities	8
		on relations, Composite relations,	
	Properties of relations, Equality of re	· · ·	
		ation of functions, Operation son	
	functions, recursively defined function	-	
II		ces: Introduction, Partial ordered sets,	8
		ets, Hasse diagram, Introduction of	č
		unded, Complemented, Modular and	
	Complete lattice.		
	Complete lattice.		
	Boolean Algebra: Introduction	n, Axioms and Theorems of	
	Boolean Algebra: Introduction	n, Axioms and Theorems of Simplification of Boolean functions,	
	Boolean Algebra: Introduction		
III	Boolean Algebra: Introduction Booleanalgebra, Boolean functions. Karnaughmaps, Logic gates.		8
III	BooleanAlgebra:IntroductionBooleanalgebra,Boolean functions.Karnaughmaps,Logic gates.Propositional:Propositions,Trut	. Simplification of Boolean functions, th tables, Tautology, Contradiction,	8
III	BooleanAlgebra:IntroductionBooleanalgebra, Boolean functions.Karnaughmaps, Logic gates.Propositional:Propositions, TrutAlgebra of Propositions, Theory of I	. Simplification of Boolean functions, th tables, Tautology, Contradiction,	8
III	BooleanAlgebra:IntroductionBooleanalgebra, Boolean functions.Karnaughmaps, Logic gates.Propositional:Propositions, TrutAlgebra of Propositions, Theory of I	. Simplification of Boolean functions, the tables, Tautology, Contradiction, Inference and Natural Detection. cates, First order predicate, Predicate	8
III	BooleanAlgebra:IntroductionBooleanalgebra, Boolean functions.Karnaughmaps, Logic gates.Propositional:Propositions, TrutAlgebra of Propositions, Theory of IPredicate Logic:Theory of Predicformulas, Quantifiers, Inference theory	. Simplification of Boolean functions, th tables, Tautology, Contradiction, Inference and Natural Detection. cates, First order predicate, Predicate ory of predicate logic.	8
	 Boolean Algebra: Introduction Booleanalgebra, Boolean functions. Karnaughmaps, Logic gates. Propositional: Propositions, Trut Algebra of Propositions, Theory of I Predicate Logic: Theory of Predic formulas, Quantifiers, Inference theory Algebraic Structures: Introduction 	. Simplification of Boolean functions, the tables, Tautology, Contradiction, Inference and Natural Detection. cates, First order predicate, Predicate	
	 Boolean Algebra: Introduction Booleanalgebra, Boolean functions. Karnaughmaps, Logic gates. Propositional: Propositions, Trut Algebra of Propositions, Theory of I Predicate Logic: Theory of Predic formulas, Quantifiers, Inference theor Algebraic Structures: Introduction Types of algebraic structures: Semi 	Simplification of Boolean functions, the tables, Tautology, Contradiction, Inference and Natural Detection. cates, First order predicate, Predicate ory of predicate logic. to algebraic Structures and properties. group, Monoid, Group, Abelian group	
	 Boolean Algebra: Introduction Booleanalgebra, Boolean functions. Karnaughmaps, Logic gates. Propositional: Propositions, Trut Algebra of Propositions, Theory of I Predicate Logic: Theory of Predic formulas, Quantifiers, Inference theor Algebraic Structures: Introduction Types of algebraic structures: Semi 	. Simplification of Boolean functions, th tables, Tautology, Contradiction, Inference and Natural Detection. cates, First order predicate, Predicate ory of predicate logic. to algebraic Structures and properties. group, Monoid, Group, Abelian group p, Cyclic group, Cosets, Permutation	



	of Rings and	
Fields.	8	
V Natural Numbers: Introduction, Piano's axioms,	Mathematical	8
Induction, Strong Induction and Induction with Non zero Bas	se cases.	
Recurrence Relation & Generating functions: Intro		
properties of Generating Functions. Simple Recurrence	relation with	
constant coefficients and Line arrecurrencerelation with	nout constant	
coefficients. Methods of solving recurrences.		
Combinatorics: Introduction, Counting techniques and	Pigeon hole	
principle, Polya's Counting the orem.	_	
Text Books:		
1. Kenneth H. Rosen, "Discrete Mathematics and Its Applications", Mc C	Graw Hill, 2006.	
2. B. Kolman, R.C Bus by and S.C Ross,"Discrete Mathematics Stru	ctures", Prentice	e Hall,
2004.		
Reference		
1. Krishnamurthy, "Combinatorics Theory & Application", East-West P	Press Pvt. Ltd., N	ew Delhi.
2. Liptschutz, Seymour, "Discrete Mathematics", McGraw Hill Appro	ach", Acme Lea	rning, New
Delhi-2011		
Evaluation/Assessment Methodology		
Evaluation/Assessment Methodology	Max	. Marks :100
Evaluation/Assessment Methodology 1) Class tasks/ Sessional Examination	Max 20	
1) Class tasks/ Sessional Examination		
 Class tasks/ Sessional Examination Presentations /Seminar)
 Class tasks/ Sessional Examination Presentations /Seminar Assignments 	20)
 Class tasks/ Sessional Examination Presentations /Seminar Assignments Research Project Report 	20)
 Class tasks/ Sessional Examination Presentations /Seminar Assignments Research Project Report Seminar On Research Project Report 	20))
 Class tasks/ Sessional Examination Presentations /Seminar Assignments Research Project Report Seminar On Research Project Report ESE 	20 10 70))
1) Class tasks/ Sessional Examination 2) Presentations /Seminar 3)Assignments 4)Research Project Report Seminar On Research Project Report 5) ESE Total: Prerequisites for the course: NIL Course Learning Outcomes:	20 10 70))
 1) Class tasks/ Sessional Examination 2) Presentations /Seminar 3) Assignments 4) Research Project Report Seminar On Research Project Report 5) ESE Total: Prerequisites for the course: NIL Course Learning Outcomes: CO1: Able to identify the properties of functions and relations.	20 10 70))
 1) Class tasks/ Sessional Examination 2) Presentations /Seminar 3) Assignments 4) Research Project Report Seminar On Research Project Report 5) ESE Total: Prerequisites for the course: NIL Course Learning Outcomes: CO1: Able to identify the properties of functions and relations. CO1: Able to understand the concepts of sets and perform operations.	20 10 70))
 1) Class tasks/ Sessional Examination 2) Presentations /Seminar 3) Assignments 4) Research Project Report Seminar On Research Project Report 5) ESE Total: Prerequisites for the course: NIL Course Learning Outcomes: CO1: Able to identify the properties of functions and relations. CO1: Able to understand the concepts of sets and perform operations. CO3: Able to verify the correctness of an argument using truth tables.	20 10 70 10))
 1) Class tasks/ Sessional Examination 2) Presentations /Seminar 3) Assignments 4) Research Project Report Seminar On Research Project Report 5) ESE Total: Prerequisites for the course: NIL Course Learning Outcomes: CO1: Able to identify the properties of functions and relations. CO1: Able to understand the concepts of sets and perform operations.	20 10 70 10))



IIMT UNIVERSITY Year – I /Semester – I

Progra	mme: Degree	Year: I			
Class:	ИСА	Semester: I			
Credit	Subject: Computer Or	ganization & Architecture			
Theory	:4Cr				
Course	Code: Title: Computer Organ	Title: Computer Organization & Architecture			
MCA -	115				
Course	Objectives:				
		ystem and explain how arithmetic and logical o	perations a		
	eaper formed by computers.				
		t and write sequence of instructions for carrying	out simple		
	peration u sing various addressing m				
	Design various types of memory and i				
		IO devices communicate with CPU and memory			
		of parallel computer and describe various an	rchitectural		
	chemes.				
	of Paper: CORE COURSE				
	um Passing Marks/Credits:40% N	larks			
L:3					
T:1					
	Hours/Week)				
	- 1 Hr. = 1 Credit	1			
	al-2 Hrs.=1Credit(4Hrs./Week=4Cre	edits)			
Unit	Contents		No. of		
			Lectures Allotted		
Ι	Introduction • Functional units or	f digital system and their inter connections,	8		
1		buses and bus arbitration. Register, bus and	0		
	memory transfer.	buses and bus arbitration. Register, bus and			
	•	registers organization, stack organization and			
	addressing modes.	registers organization, stack organization and			
II		a head carries adders. Multiplication: Signed	8		
		algorithm and array multiplier. Division and	0		
	logic operations.				
	0 1	on, Arithmetic & logic unit design. IEEE			
	Standard for Floating Point Numbe	• •			
III		ormats, instruction cycles and sub cycles (fetch	8		
	21 /	, execution of a complete instruction. Program			
		Computer, Pipelining. Hard wire and micro			
		ram sequencing, concept of horizontal and			
	vertical micro programming.				
IV		archy, semi conductor RAM memories, 2D &	8		
		M memories. Cache memories: concept and			
		ddress mapping and replacement Auxiliary			
	•	tic tape and optical disks Virtual memory:			
	concept implementation.				
	* *		BOS		



V Input / Output: Peripheral devices, I/O interface, I	/O ports, Interrupts: interrupt	8
hardware, types of interrupts and exceptions.	Modes of Data Transfer:	
Programmed I/O, interrupt initiated I/O and Direct M	Memory Access, I/O channels	
and processors.		
Serial Communication: Synchronous & asynchrono	ous communication, standard	
communication interfaces.		
Text Books:		
1. John P.Hayes ,"Computer Architecture and Organization"		
2. William Stallings, "Computer Organization and Architecture"	itecture-Designing for Perform	nance",
Pearson Education.		
3. M. Morris Mano, "Computer System Architecture", PHI.		
Reference		
1. David A. Patterson and John L. Hennessy, Compu	ter Architecture- A Quantita	ıtive
Approach", Elsevier Pub.		
2. Tannen baum, "Structured Computer Organization", PHI.		
Evaluation/Assessment Methodology		
Max. Marks100		
1) Class tasks/ Sessional Examination	20	
2) Presentations /Seminar		
3)Assignments		
4)Research Project Report	10	
Seminar On Research Project Report		
5) ESE	70	
Total:	100	
Prerequisites for the course: NIL		
Course Learning Outcomes:		
CO1: For a microprocessor system, student should be able t	to deal with the internal archite	ecture of 8
bits and 16-bit microprocessor to analyze the wo	rking operation and to know	v the pir
configuration for the respective microprocessor. A stud	dent should be good enough to	deal with
interrupts internally or externally.		
CO2: He/she should be able to understand the basic concept	pts of Assembly language prog	gramming

- CO2: He/she should be able to understand the basic concepts of Assembly language programming. For a particular data instruction set, student should be having a clear idea of solving machine language programs using kit. He/she shall be having an idea to tackle with counter delays and subroutines.
- CO3: He/she should be able to know the concept of pipelining and parallelism in uniprocessor system for hazard detection. Understand the basic concept of Parallel computing.
- CO4: A student should have a basic idea of job levels that are governed by an organization on priority basis. He/she should know the Pipeline scheduling theory.
- CO5: For good networking, a student should be able to draw SIMD interconnections and FFT or a butterfly method system for collision prevention and vector dispatching. He/she should be able to make Cube Interconnection Network, Shuffle-Exchange and Omega Network



IIMT UNIVERSITY

Year-I/ Semester –I

Program:	Degree Year: I	
Class: MO	CA Semester: I	
Credits	Subject: Computer Organization & Architecture Lab	
Theory: 0		
Practical:	2	
Course Co	ode: Title: Computer Organization & Architecture Lab	
MCA -11'	7P	
Course O	bjectives:	
CO1: Des	ign and verify combinational circuits (adder, code converter, decoder, multi	plexer) using
basi	c gates.	
CO2: Des	ign and verify various flip-flops.	
CO3: Des	ign I/O system and ALU.	
CO4: Den	nonstrate combinational circuit using simulator.	
	Paper: Core	
Minimum	Passing Marks/Credits: 50% Marks	
L:0		
T:0		
P:4(In Hou		
-	Hr. = 1 Credit	
	2 Hrs.=1Credit(4Hrs./Week=4Credits)	No. of
Unit	Contents	
		Lectures
		Allotted
Ι	Implementing HALF ADDER, FULL ADDER using basic logic gates	02
II	Implementing Binary -to -Gray, Gray -to -Binary code conversions.	02
III	Implementing 3–8-line DECODER. Implementing 4x1 and 8x1 MULTI PLEXERS.	02
IV	Verify the excitation tables of various FLIP-FLOPS	02
V	Design of an 8-bit Input / Output system with four 8-bit Internal Registers.	02
VI	Design of an 8-bit ARITHMETIC LOGIC UNIT.	02
VII	Design the data path of a computer from its register transfer language	02
V 11	description.	
VIII	Design the control unit of a computer using either hardwiring or micro	02
VIII	programming based on its register transfer language description.	
Reference	/ Text Books:	
★ T 1	nn P. Hayes, "Computer Architecture and Organization", McGraw Hill.	
🐝 Joi	in reiniges, computer ricentecture and organization, incortant rinn.	
	lliam Stallings, "Computer Organization and Architecture-Designing for F	erformance",



Evaluation/Assessment Methodology	
	Max. Marks:50
1) Class tasks/ Sessional Examination	10
2) Presentations /Seminar	10
3) Assignments	
4) Research Project Report	
Seminar On Research Project Report	
5) ESE	30
Total:	50
Program Learning Outcomes:	
CO1: Students will be able to develop flip-flops.	
CO2: Students will be able to solve problems based on circuit design.	
CO3: Students will be able to learn working of ALU.	
CO4: Students will be able to Implement Binary-to -Gray, Gray -to -Bin	ary code conversions
CO5: Students will be able to work with logic gates.	



IIMT UNIVERSITY

Year- I / Semester –I

Class: MCA Semester: I Credits Theory: 0 Practical: 2 Subject: Problem-Solving using C Lab Course Code: MCA -116P Title: Problem-Solving using C Lab Course Objectives: CO1: Students will be able to learn the basics of programming language and Fundamental conc of C Language. CO2: Students will be able to learn and understand Concepts of basic programming with Condition and Iterative Control statements. CO3: Students will be familiar with the concept of Arrays, Pointers, Functions, categories function, and recursion. CO4: Students will be able to develop a Program with Structure; learn Union and Complete St Operations. CO5: Students will be familiar with File handling programs to perform read-write operations. Nature of Paper: Core Minimum Passing Marks/Credits:50% Marks L:0 T:0 P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits) Unit Contents No. of Lecture I Write a program to display "hello world" in C. 02 Write a program to find the largest and smallest among three entered unumbers and also display whether the identified largest/smallest number	onal
Theory: 0 Practical: 2 Course Code: MCA -116P Title: Problem-Solving using C Lab Course Objectives: Course Objectives: CO1: Students will be able to learn the basics of programming language and Fundamental conc of C Language. CO2: Students will be able to learn and understand Concepts of basic programming with Conditionand Iterative Control statements. CO3: Students will be familiar with the concept of Arrays, Pointers, Functions, categories function, and recursion. CO4: Students will be familiar with the concept of Arrays, Pointers, Functions, categories functions, and recursion. CO4: Students will be familiar with File handling programs to perform read-write operations. Nature of Paper: Core Minimum Passing Marks/Credits:50% Marks L:0 T:0 P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits) Unit Contents No. of Lecture Allotted I Write a program to display "hello world" in C. 02 Write a program to find the largest and smallest among three entered 02 II Write a program to find the largest and smallest among three entered 02	onal
Practical: 2 Title: Problem-Solving using C Lab MCA -116P Title: Problem-Solving using C Lab Course Objectives: Course Objectives: CO1: Students will be able to learn the basics of programming language and Fundamental conc of C Language. CO2: Students will be able to learn and understand Concepts of basic programming with Condition and Iterative Control statements. CO3: Students will be familiar with the concept of Arrays, Pointers, Functions, categories function, and recursion. CO4: Students will be familiar with the concept of Arrays, Pointers, Functions, categories function, and recursion. CO4: Students will be to develop a Program with Structure; learn Union and Complete St Operations. CO5: Students will be familiar with File handling programs to perform read-write operations. Nature of Paper: Core Minimum Passing Marks/Credits:50% Marks L:0 T:0 P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits) No. of Lecture Allottee I Write a program to display "hello world" in C. 02 Minimus and also display whether the identified largest/smallest number 02	onal
Course Code: MCA -116P Title: Problem-Solving using C Lab Course Objectives: CO1: Students will be able to learn the basics of programming language and Fundamental conc of C Language. CO2: Students will be able to learn and understand Concepts of basic programming with Condition and Iterative Control statements. CO3: Students will be familiar with the concept of Arrays, Pointers, Functions, categories function, and recursion. CO4: Students will be able to develop a Program with Structure; learn Union and Complete St Operations. CO5: Students will be familiar with File handling programs to perform read-write operations. Nature of Paper: Core Minimum Passing Marks/Credits:50% Marks L:0 T:0 P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits) Unit Contents I Write a program to display "hello world" in C. 02 Write a program to find the largest and smallest among three entered numbers and also display whether the identified largest/smallest number 02	onal
MCA -116P Course Objectives: CO1: Students will be able to learn the basics of programming language and Fundamental concoft C Language. CO2: Students will be able to learn and understand Concepts of basic programming with Conditionand Iterative Control statements. CO3: Students will be familiar with the concept of Arrays, Pointers, Functions, categories function, and recursion. CO4: Students will be familiar with the concept of Arrays, Pointers, Functions, categories function, and recursion. CO4: Students will be familiar with File handling programs to perform read-write operations. CO5: Students will be familiar with File handling programs to perform read-write operations. CO5: Students will be familiar with File handling programs to perform read-write operations. Nature of Paper: Core Minimum Passing Marks/Credits:50% Marks L:0 T:0 P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits) Unit Contents No. of Lecture Allottee I Write a program to display "hello world" in C. 02 II Write a program to find the largest and smallest among three entered number 02	onal
Course Objectives: CO1: Students will be able to learn the basics of programming language and Fundamental conc of C Language. CO2: Students will be able to learn and understand Concepts of basic programming with Condition and Iterative Control statements. CO3: Students will be familiar with the concept of Arrays, Pointers, Functions, categories function, and recursion. CO4: Students will be able to develop a Program with Structure; learn Union and Complete St Operations. CO5: Students will be familiar with File handling programs to perform read-write operations. Nature of Paper: Core Minimum Passing Marks/Credits:50% Marks L:0 T:0 P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits) Unit Contents Write a program to display "hello world" in C. 02 Write a program to find the largest and smallest among three entered numbers and also display whether the identified largest/smallest number	onal
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function, and recursion. CO4: Students will be able to develop a Program with Structure; learn Union and Complete St Operations. CO5: Students will be familiar with File handling programs to perform read-write operations. Nature of Paper: Core Minimum Passing Marks/Credits:50% Marks L:0 T:0 P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits) Unit Contents No. of Lecture Allottee I Write a program to display "hello world" in C. Write a program to find the largest and smallest among three entered numbers and also display whether the identified largest/smallest number	of
CO4: Students will be able to develop a Program with Structure; learn Union and Complete St Operations. CO5: Students will be familiar with File handling programs to perform read-write operations. Nature of Paper: Core Minimum Passing Marks/Credits:50% Marks L:0 T:0 P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits) Unit Contents No. of Lecture Allotted I Write a program to display "hello world" in C. U 02 Write a program to find the largest and smallest among three entered numbers and also display whether the identified largest/smallest number	
Operations. CO5: Students will be familiar with File handling programs to perform read-write operations. Nature of Paper: Core Minimum Passing Marks/Credits:50% Marks L:0 Image: Core interval of the image: Core interval of	
CO5: Students will be familiar with File handling programs to perform read-write operations. Nature of Paper: Core Minimum Passing Marks/Credits:50% Marks L:0 T:0 P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits) Unit Contents No. of Lecture Allottee I Write a program to display "hello world" in C. 02 Write a program to find the largest and smallest among three entered numbers and also display whether the identified largest/smallest number 02	ring
Nature of Paper: Core Minimum Passing Marks/Credits:50% Marks L:0 T:0 P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits) Unit Contents No. of Lecture Allotted I Write a program to display "hello world" in C. 02 II Write a program to find the largest and smallest among three entered numbers and also display whether the identified largest/smallest number 02	
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Theory - 1 Hr. = 1 Credit Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits) Unit Contents No. of Lecture Allotted I Write a program to display "hello world" in C. 02 Write a program to find the largest and smallest among three entered 02 II Write a program to find the largest and smallest among three entered 02	
Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits) Unit Contents No. of Lecture Allotted I Write a program to display "hello world" in C. 02 Write a program to find the largest and smallest among three entered numbers and also display whether the identified largest/smallest number 02	
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IWrite a program to display "hello world" in C.02Write a program to find the largest and smallest among three entered numbers and also display whether the identified largest/smallest number02	S
Write a program to find the largest and smallest among three entered 02 numbers and also display whether the identified largest/smallest number	1
numbers and also display whether the identified largest/smallest number	
is even or odd.	
III Write a program to check whether the entered year is a leap year or not 02	
(a year is a leap if it is divisible by 4 and divisible by 100 or 400.)	
Write a program to read a string and check for palindrome without 02	
IV using string-related functions (a string is a palindrome if its half is	
mirror by itself.	
V Write a program to find the biggest among three numbers using a 02	
pointer.	
Create a structure named company which has a name, address, phone, 02	
VI and as member variables. Read the name of the company, its address,	
phone, and no Of Employee. Finally display these members' values.	
VIIThe BCT class and display the details from the function.02	
Write a program to show programming examples with unions and 02	
VIII vince a program to show programming examples with amons and structures.	



Reference / Text Books:

- * The C Programming Language" by Brian W. Kernighan and Dennis M. Ritchie.
- C Programming: A Modern Approach" by K. N. King.

Evaluation/Assessment Methodology				
	Max. Marks:50			
1) Class tasks/ Sessional Examination	10			
2) Presentations /Seminar	10			
3) Assignments				
4) Research Project Report				
Seminar On Research Project Report				
5) ESE	30			
Total:	50			
Program Learning Outcomes:				
CO1: Students will be able to develop programs based on fundamenta	l concepts of programming in			

CO1: Students will be able to develop programs based on fundamental concepts of programming in C.

- CO2: Students will be able to solve problems based on Conditional and Iterative Control Statements.
- CO3: Students will be able to learn Complete Programming Concepts of Arrays, Pointers and get familiar with modular programming Concepts of C using Functions.

CO4: Students will be able to learn conceptual programming with String, Structure, and its differentiation with Union.

CO5: Students will be able to perform File handling programs with read and write concepts



IIMT UNIVERSITY Year – I /Semester – II

Program	mme: Degree Year: I			
Class: N	MCA Semester: II			
Credits Subject: Theory of automata and formal languages				
Theory:	Theory:4Cr			
Course				
MCA -				
Course	Objectives:			
CO1: D	Define various types of automata for different classes off or mallanguages and	explain their		
W	orking.	-		
CO2: St	tate and provekey properties of formal languages and automata.			
CO3: C	construct appropriate formal notations (such as grammars, acceptors, transducer	s and regular		
ех	xpressions) for given formal languages.			
	onvert among equivalent notations for formal languages.			
CO5: E	xplain the significance of the Universal Turing machine, Church-Turingthesis ar	nd concept of		
	ndesirability.			
	of Paper: DSE			
	Im Passing Marks/Credits:40% Marks			
L:4				
T:0				
	Hours/Week)			
•	- 1 Hr. = 1 Credit			
	1- 2 Hrs.=1Credit(4Hrs./Week=4Credits)			
Unit	Contents	No. of		
		Lectures		
Ι	Pagia Concents and Automata Theorem. Introduction to Theorem of	Allotted 8		
1	Basic Concepts and Automata Theory: Introduction to Theory of Computation Automate Computability and Complexity Alphabet Symbol	0		
	Computation-Automata, Computability and Complexity, Alphabet, Symbol, String, Formal Languages, Deterministic Finite Automaton (DFA)-Definition			
	,Representation, Acceptability of a String and Language, Non Deterministic			
	Finite Automaton (NFA), Equivalence of DFA and NFA, NFA with ε -			
	Transition, Equivalence of NFA's with and without ε -Transition, Finite			
	Automata with output-Moore machine, Mealy Machine, Equivalence of			
	Moore and Mealy Machine, Minimization of Finite Automata, Myhill-Nerode			
	Theorem, Simulation of DFA and NFA.			
II	Regular Expressions and Languages: Regular Expressions, Transition	8		
	Graph, Kleen's Theorem, Finite Automata and Regular Expression-Arden's	č		
	theorem, Algebraic Method Using Arden's Theorem. Regular and Non-			
	theorem, Algebraic Method Using Arden's Theorem, Regular and Non- Regular Languages-Closure properties of Regular Languages, Pigeonhole			
	Regular Languages-Closure properties of Regular Languages, Pigeonhole			
	Regular Languages-Closure properties of Regular Languages, Pigeonhole Principle, Pumping Lemma, Application of Pumping Lemma, Decidability- Decision properties, Finite Automata and Regular Languages, Regular			
	Regular Languages-Closure properties of Regular Languages, Pigeonhole Principle, Pumping Lemma, Application of Pumping Lemma, Decidability-			
III	Regular Languages-Closure properties of Regular Languages, Pigeonhole Principle, Pumping Lemma, Application of Pumping Lemma, Decidability- Decision properties, Finite Automata and Regular Languages, Regular Languages and Computers, Simulation of Transition Graph and Regular language.	8		
III	Regular Languages-Closure properties of Regular Languages, Pigeonhole Principle, Pumping Lemma, Application of Pumping Lemma, Decidability- Decision properties, Finite Automata and Regular Languages, Regular Languages and Computers, Simulation of Transition Graph and Regular	8		



CFG and Regular grammar into FA, Simplification of CFG,		
Chomsky Normal Form(CNF), Greibach Normal Form (G	•	
Hierarchy, Programming problems based on the properties of C		
IV Push Down Automata and Properties of Context Free		8
Nondeterministic Push down Automata (NPDA)-Definition	on, Moves, A	
Language Accepted by NPDA, Deterministic Push down Au	tomata (DPDA)	
and Deterministic Context free Languages (DCFL), Push dow	n Automata for	
Context Free Languages, Context Free grammars for Pushd	own Automata,	
Two stack Pushdown Automata, Pumping Lemma for	CFL, Closure	
properties of CFL, Decision Problems of CFL, Programming	problems based	
on the properties of CFLs.		
V Turing Machines and Recursive Function Theory: Basic	Furing Machine	8
Model, Representation of Turing Machines, Language A	-	
Turing Machines, Techniques for Turing Machine	1 V	
Modifications of Turing Machine, Turing Machine as Comp		
Functions, Universal Turing machine, Linear Bounded Auto		
Thesis, Recursive and Recursively Enumerable language, H		
Post Correspondence Problem, Introduction to Recursive Func		
Text Books:		
1. J.E. Hopcraft, R. Motwani, and Ullman, "Introduction to Auto	mata theory. La	inguages and
Computation", Pearson Education Asia, 2 nd Edition.	, , , , , , , , , , , , , , , , , , ,	8
2. J. Martin, "Introduction to languages and the theory of computation"	. McGraw Hill.3	rdEdition
Reference	, ,-	
1. K.L.P. Mishra and N. Chandrasekaran, "Theory of Computer Scie	ence Automata L	anguages and
Computation", PHI.		00
2. Y.N. Singh, "Mathematical Foundation of Computer Science", New	v Age Internation	al.
Evaluation/Assessment Methodology	U	
	Ma	x. Marks100
1) Class tasks/ Sessional Examination	20	
2) Presentations /Seminar		
3) Assignments		
4) Research Project Report	10)
Seminar On Research Project Report		
5) ESE	70)
Total:	10	
Prerequisites for the course: NIL	10	
Course Learning Outcomes:		
CO1: Understand various types of automata and their working.		
CO2: Understand key properties of formal languages and automata.		
CO3: Able to construct automata for given formal languages		
CO4: Able to Convert among equivalent annotations for formal languages.	es	
CO5: Understand the concept of Universal Turing machine, Church		nd concept of
Undesirability.	i uning uncoro al	ia concept of
Undestraumty.		



IIMT UNIVERSITY Year – I /Semester – II

Program	nme: Degr	00	Year: I	
Class: M	0		Semester: II	
Credits		Subject: Object orio		
Theory:4Cr				
Course		Title: Object orient	ed programming	
MCA - 1			- F. O	
	Objectives	•		
			gramming techniques.	
			ing techniques using Java.	
CO3: So	olve the real	-world problems usin	ng of Packages, Interfaces, and apply Exceptions	handling and
Th	reading con	ncepts in Java.		
CO4: De	evelop I/O a	and GUI applications	in java.	
CO5: De	esign Datab	ase applications and	swing programming in Java.	
	of Paper: C			
	m Passing	Marks/Credits:40%	b Marks	
L:3				
T:1				
•	ours/Week			
•	1 Hr. = 1 C			
		Credit(4Hrs./Week=4	Credits)	
Unit	Unit Contents		No. of	
				Lectures
Ι	Introduct	ione Object Oriente	d Drogramming, chiests classes Abstraction	Allotted 8
1		õ	d Programming: objects, classes, Abstraction, lymorphism, OOP in Java, Characteristics of	0
			Java Source File Structure, and Compilation.	
			tructures in Java: Defining classes in Java,	
			specifies, tatic members, Comments, Data	
		riables, Operators, C	-	
II			Packages: Inheritance: Super classes, sub	8
			instructors in sub classes, Object class, abstract	C
	,	,	: defining an interface, implementing interface,	
			nd interfaces and extending interfaces, Object	
			es: Defining Package, CLASS PATH Setting	
	for Packa	ges, Making JAR F	iles for Library Packages, Import and Static	
	Import Na	ming Convention For	r Packages, Networking java. net package.	
III	Exception	Handling, I/O : E	xceptions: exception hierarchy, throwing and	8
	catching e	xceptions, built-in ex	ceptions, creating own exceptions, Stack Trace	
Elements. Input /Output Basics: Byte streams and Character streams, Reading				
		ng, Console Reading		
IV		-	Programming: Differences between multi-	8
	0	0	aread lifecycle, creating threads, synchronizing	
			cation, daemon threads, thread groups. Generic	
	-	-	generic methods, Bounded Types: Restrictions	
	and Limita	ations.		BOS



V	Event Driven Programming: Graphics programming: Frame	e Components	8			
•	working with 2D shapes, Using colors, fonts, and images. I	-	0			
handling: even thandlers, adapter classes, actions, mouse events, AWT event						
hierarchy. Introduction to Swing: layout management, Swing Components:						
I	Text Fields, Text Areas, Buttons, Check Boxes, Radio Buttons					
I	Scrollbars, Windows Menus and Dialog Boxes.	, Lists, choices,				
Text Bo	· · · · · · · · · · · · · · · · · · ·					
		anaa? MaCaara	1211			
	ick Naughton and Herbertz Schildt, "Java-2 The Complete Refer	ence, McGraw	HIII.			
	Horton, "Beginning Java-2", Wiley Publishing.					
	guru swamy, "Programming with Java: A Primer", Tata McGra	W Hill Education	l			
Referen		E la setta a				
I. Hore	etmann Cay and Cornell Gary, "Core Java Volume – I", Pearson	Education.				
	Evaluation/Assessment Methodology					
			x. Marks100			
	tasks/ Sessional Examination	20				
/	ntations /Seminar					
3) Assig						
	arch Project Report	10				
Semir	nar On Research Project Report					
5) ESE		70				
	Total:	100)			
Prerequi	isites for the course: NIL					
Course	Learning Outcomes:					
	ble to understand the use of OOPs concepts.					
CO2: A	ble to solve real world problems using OOP techniques.					
	ble to understand the use of Packages, Interfaces, abstractio	n, Exceptions a	nd threading			
	oncepts in Java	· 1	U			
	ble to understand the use of I/O and GUI programming in java.					



IIMT UNIVERSITY Year – I /Semester – II

D			X7	
Programme: Degree			Year: I	
Class: MCA			Semester: II	
•		Subject: Ope	erating system	
	Theory:4Cr Course Code: Title :Operating system			
		Title :Operation	ing system	
MCA -				
	Objectives:		to the second strengthere of One section Constants	
	-	-	ces, types and structure of Operating Systems.	-1:
		0	techniques to handle the various concurrency contra	of issues.
			scheduling algorithms for process execution.	
	•		and describe ways to handle it.	
	* ** *		ry, I/O and disk management techniques.	
	of Paper: COR		07 Manha	
	um Passing Mar	ks/Creans:40	% Marks	
L:3 T:1				
	Jours (Weals)			
	Hours/Week) - 1 Hr. = 1 Credit	t		
•	- 1 Hr. = 1 Credit il- 2 Hrs.=1Credit		4Credits)	
Unit	Contents	u(41115./ WEEK-	4Credits)	No. of
Omt	Contents			Lectures
				Allotted
Ι	Introduction:	Operating S	System Structure-Layered structure, System	8
			m functions, Classification of Operating systems-	0
			ing, Real-Time System, Multiprocessor Systems,	
Multiuser Systems, Multi process Systems, Multithreaded				
	-	-	rnels, Monolithic and Microkernel Systems.	
II			ess Concept, Principle of Concurrency, Producer /	8
			Exclusion, Critical Section Problem, Dekker's	
			Semaphores, Test and Set operation, Classical	
	,		ng Philosopher Problem, Sleeping Barber Problem,	
		•	models and Schemes, Process generation.	
III			g Concepts, Performance Criteria, Process States,	8
		0 0	Schedulers, Process Control Block (PCB), Process	
	address space,	, Process id	lentification information, Threads and their	
management, So		cheduling Alg	orithms, Multiprocessor Scheduling. Dead lock:	
	System model,	Deadlock chara	acterization, Prevention, Avoidance and detection,	
	Recovery from	dead lock.		
IV	Memory Man	agement: Ba	asic bare machine, Resident monitor, Multi	8
			tions, Multi programming with variable partitions,	
	Protection scher	nes, Paging, Se	egmentation, Paged segmentation, Virtual memory	
	-		erformance of demand paging, Page replacement	
			memory organization, Locality of reference.	
V			Scheduling: I/O devices, and I/O sub systems, I/O	8
	buffering, Disk	storage and di	isk scheduling, RAID. File System: File concept,	



File organization and access mechanism, File directories, and File sharing, File	
system implementation issues, File system protection and security.	

Text Books:

- 1. Silberschatz, Galvinand Gagne, "Operating Systems Concepts", Wiley Publication.
- 2. Sibsankar Halder and Alex A Arvind, "Operating Systems", Pearson Education

Reference

- 1. Harvey M Dietel, "An Introduction to Operating System", Pearson Education.
- 2. William Stallings, "Operating Systems: Internals and Design Principles", 6th Edition, Pearson Education.

) Class tasks/ Sessional Examination22) Presentations /Seminar23) Assignments34) Research Project Report2	
2) Presentations /Seminar 3)Assignments 4)Research Project Report	ax. Marks100
B)Assignments B)Research Project Report	0
Research Project Report	
5 1	
	0
Seminar On Research Project Report	
5) ESE	0
Total: 1	00

Prerequisites for the course: NIL

Course Learning Outcomes:

CO1: Describe the important computer system resources and the role of operating system in their management policies and algorithms.

CO2: Understand the process management policies and scheduling of processes by CPU.

CO3: Evaluate the requirement for process synchronization and coordination handled by operating system.

CO4: Describe and analyze the memory management and its allocation policies.

CO5: Identify use and evaluate the storage management policies with respect to different storage management technologies.



Due que rue re	Very L	
Programme: DegreeYear: IClass: MCASemester: II		
Credits Subject:DATA BASE MANAGEMENT SYSTEM		
Theory:4Cr	e: Title:DATA BASE MANAGEMENT SYSTEM	
Course Cod	e: Inte:DATA BASE MANAGEMENT SYSTEM	
MCA- 124		
Course Obj		
	plain the concept of features of a database system and its application and compa	tre various
v 1	es of data models. scribe the E-R Models and Relational Database.	
		niomoin be
	plain the concept of SQL Commands, relational algebra, tuple calculus an culus.	na aomain
		ma al famma
	plain the need of normalization and normalize a given relation to the desired nor	
	alyze the different approaches of transaction processing and concurrency contro)1.
	aper: CORE	
	Passing Marks/Credits:40% Marks	
L:3		
T:1	- // 1 - 1 -)	
P:0(In Hours		
	Ir. = 1 Credit	
Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)		
Unit	Contents	No. of
		Lectures
т		Allotted
Ι	Introduction: Overview, Database System vs File System, Data base	8
	System Concept and Architecture, Data Model Schema and Instances, Data	
	Independence and Data base Language and Interfaces, Data Definitions	
	Language, DML, Overall Data base Structure. Data Modeling Using the	
	Entity Relationship Model: ER Model Concepts, Notation for ER Diagram,	
	Mapping Constraints, Keys, Concepts of Super Key, Candidate Key,	
	Primary Key, Generalization, Aggregation, Reduction of an ER Diagrams to	
TT	Tables, Extended ER Model, Relationship of Higher Degree.	0
II	Relational data Model and Language: Relational Data Model Concepts,	8
	Integrity Constraints, Entity Integrity, Referential Integrity, Keys	
	Constraints, Domain Constraints, Relational Algebra, Relational Calculus,	
	Tuple and Domain Calculus. Introduction to SQL: Characteristics of SQL,	
	Advantage of SQL. SQL Data Type and Literals. Types of SQL Commands.	
	SQL Operators and their Procedure. Tables, Views and Indexes. Queries and	
	Sub Queries. Aggregate Functions. Insert, Update and Delete Operations,	
Joins, Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL		
	SQL	
III	Data Base Design & Normalization: Functional dependencies, normal	8
	forms, first, second, third normal forms, BCNF, inclusion dependence, loss	
	less joined compositions, normalization using FD, MVD, and JDs,	



		alternative approaches to data base design		
	IV	Transaction Processing Concept: Transaction System	n, Testing of	8
		Serializability, Serializability of Schedules, Conflict & Vie	ew Serializable	
		Schedule, Recoverability, Recovery from Transaction Failur		
		Recovery, Checkpoints, Dead lock Handling. Distribute	ed Data base:	
		Distributed Data Storage, Concurrency Control,		
		Directory System.		
	V	Concurrency Control Techniques: Concurrency Cor		8
		Techniques for Concurrency Control, Time Stamping		
		Concurrency Control, Validation Based Protocol, Multip	•	
		Multi Version Schemes, Recovery with Concurrent Transacti	on, Case Study	
		of Oracle.		
Te	xt Books			
1.		ilbertz, Sudarshan," Database Concepts", McGraw Hill.		
		, "An Introduction to Database Systems", Addision Wesley.		
		Navathe, "Fundamentals of Database Systems", Addision Wes	ley.	
-		"Databases", Elsevier Pub		
	ference			
1.		ishnan, "Database Management Systems", McGraw Hill.		
2.		Leon, "Database Management Systems", Vikas Publishing Hou		
3.	-	. Desai, "An Introduction to Database Systems", Gagotia Public		
4.	Majumo	lar& Bhattacharya, "Database Management System", McGraw l	Hill.	
		Evaluation/Assessment Methodology		
	~1		Max. Marl	ks100
1)		sks/ Sessional Examination	20	
2)		tions /Seminar		
3)	Assignn			
4)		h Project Report	10	
-		On Research Project Report		
5)	ESE		75	
		Total:	100	
		s for the course: SQL		
		arning Outcomes:		
C		escribe the features of a database system and its application an	d compare variou	s types of
		ata models.		1 . 1
C		onstruct an ER Model for a given problem and transform thema.	it into a relation	database
C	O3: F	ormulate solution to a query problem using SQL Command	s, relational alge	bra, tuple
		llculus and domain calculus.	U	. 1
	CC CC			
		xplain the need of normalization and normalize a given relation	to the desired nor	mal form.



Progra	mme:]	Degree	Year: I	
Class: MCA		8	Semester: II	
		Subject:Data structure	e and analysis of algorithms	
Theory:4Cr				
Course		Title:Data structure ar	nd analysis of algorithms	
Code:			, ,	
MCA-	125			
Course	Objec	tives:		
CO 1:			lata structure, abstract data types, algorithms, a	inalysis of
	-	-	ganization schemes such as arrays and linked lists.	•
CO 2:	-		f stacks and queues and implement various operati	
		ng arrays and linked lis		
CO 3:		e .	graphs and trees and implement various operatio	ns such as
		hing and traversal on th		
CO 4:	Com	pare incremental and o	divide-and-conquer approaches of design in gal go	orithms for
		lems such assorting and		
CO 5:	Appl	y and analyze various	design approaches such as Divide-and-Conquer, g	greedy and
	dyna	mic for problem solvin	g.	
Nature	of Pap	er: DSE		
Minim	um Pas	ssing Marks/Credits:4	0% Marks	
L:4		~		
T:0				
P:0(In H	Hours/W	Week)		
Theory	- 1 Hr.	= 1 Credit		
Practica	al- 2 Hr	s.=1Credit(4Hrs./Week	x=4Credits)	
Unit	Conte	ents		No. of
				Lectures
				Allotted
Ι	Intro	duction to data str	ucture: Data, Entity, Information, Difference	8
	betwe	en Data and Informati	ion, Data type, Build in data type, Abstract data	
	type,]	Definition of data struc	ctures, Types of Data Structures: Linear and Non-	
	Linear	r Data Structure, Intro	duction to Algorithms: Definition of Algorithms,	
			thm and programs, properties of algorithm,	
	Algor	ithm Design Technique	es, Performance Analysis of Algorithms, Complex	
	it y of	various code structure	s, Order of Growth, Asymptotic Notations.	
	Array	vs: Definition, Single	and Multidimensional Arrays, Representation of	
	Array	s: Row Major Order,	and Column Major Order, Derivation of Index	
	Formu	ulae for 1-D,2-D Array	Application of arrays, Sparse Matrices and their	
	repres	entations.		
	Linked lists: Array Implementation and Pointer Implementation of Singly			
Linked Lists, Doubly Link			ed List, Circularly Linked List, Operations on a	
	Linke	d List. Insertion, Dele	etion, Traversal, Polynomial Representation and	
		ion Subtraction & Multi	iplications of Single variable.	
II	Stack	ion Subtraction &Multi s: Abstract Data Type	iplications of Single variable. , Primitive Stack operations: Push & Pop, Array of Stack in C, Application of stack: Prefix and	8



		T			
	Postfix Expressions, Evaluation of post fix expression,				
	Recursion-Principles of recursion, Tail recursion, Removal of recursion Problem solving using iteration and recursion with examples such as binary				
	search, Fibonacci numbers, and Hanoi towers.				
	Queues: Operations on Queue: Create, Add, Delete, Full and Empty, Circular				
	queues, Array and linked implementation of queues in C, Deque	ue and Priority			
	Queue.				
	Searching: Concept of Searching, Sequential search, Index Sequentia				
	Search. Concept of Hashing & Collisionre solution Techniques used in		0		
III	Sorting: Insertion Sort, Selection Sort, Bubble Sort, Heap Sort,	1	8		
	Sorting Algorithms, Sorting in Linear Time: Counting Sort and I				
	Graphs: Terminology used with Graph, Data Structur	-			
	Representations: Adjacency Matrices, Adjacency List, Adja Traversal: Depth First Search and Breadth First Search, Connected				
IV	Trees: Basic terminology used with Tree, Binary Trees,	-	8		
1 V	Representation: Array Representation and Pointer (•	0		
	Representation, Binary Search Tree, Complete Binary Tree				
	Binary Trees, Tree Traversal algorithms: In order, Preorder a				
	Constructing Binary Tree from given Tree Traversal, Operation				
	Deletion, Searching & Modification of data in Binary Search				
	Binary trees, Huffman coding using Binary Tree, AVL Tree and				
V	Divide and Conquer with Examples Such as Merge Sort, Quic		8		
	Multiplication: Strassen's Algorithm Dynamic Programm		_		
	Algorithm, Bell man Ford Algorithm, All-pair Shortest				
	Algorithm, Longest Common Sub-sequence Greedy Programn				
	Kruskal algorithm.	-			
Text B	ooks:				
	rmen T.H., Leiserson C.E., Rivest R.L., and Stein C., "Introductio				
2. Ho	rowitz Ellis, Sahni Sartaj and Rajasekharan S., "Fundamentals of	Computer Algor	ithms", 2 nd		
	tion, Universities Press.				
Refere					
	schutz, Data Structures With C-SIE-SOS, McGraw Hill.				
2. Sar	nanta D., "Classic Data Structures", 2 nd Edition Prentice Hall India	à.			
	Evaluation/Assessment Methodology		1 100		
1) (1)		Max. Mar	KSIUU		
	ss tasks/ Sessional Examination	20			
ŕ	sentations /Seminar				
· ·	signments search Project Report	10			
· ·	5 I	10			
Seminar On Research Project Report5) ESE70					
5) LSI	Total:	100			
Prereou	usites for the course: NIL	100			
	e Learning Outcomes:				
CO1:	Understand the concept of data structure and various algorithm	s.			
CO2:	Able to analyze the performance of algorithms.				
CO3:	Understand which algorithm or data structure to use in differen	t scenarios.			
CO4:	Use various data structures effectively in application programs				
CO5:	Understand various types of sorting and their algorithms				
	- · · · · · · · · · · · · · · · · · · ·		DO		



IIMT UNIVERSITY

Year- I / Semester –II

Program	nme: Degr	ee	Year: I		
Class: N	0		Semester: II		
Credits		Subject: OOPS US			
Practical					
Course		Title: OOPS USIN	G JAVA LAB		
MCA-1					
Course	Objectives	•			
CO1: To	write GUI	programs using swir	ng in java.		
CO2: To	write prog	grams implementing (OOPS concepts.		
CO3: To	write prog	grams based on real w	orld problems using java collection fra	me work.	
Nature	of Paper: (Core			
Minimu	m Passing	Marks/Credits: 509	% Marks		
L:0					
T:0					
`	ours/Week	/			
-	1 Hr. = 1 (
-		Credit(4Hrs./Week=4	Credits)		
Unit	Contents				No. of
					Lectures
т	XX 7 */			1	Allotted
Ι	-	-	number from user and print the odd	numbers	2
TT		to that number.			
II			eter of square if area is entered by user.		2
III			ay indexOutOfBounds exception.		2
IV			an array by iterating the array.		2
V			e a divide by zero program exception.	G	2
VI			e character at the given index within the	e String.	2
VII	±	0	n of each row of a matrix.	atar	2 2
VIII			f rectangle using parameterized constru	ctor.	2
	ce / Text B		dt "Java 2 The Complete Deference"	Ma Crow	11:11
	-		dt, "Java-2 The Complete Reference",		ПШ.
Z. Dala	guruswanny		n Java: A Primer", Tata McGraw Hill E ion/Assessment Methodology		
		Evaluat	ion/Assessment Methodology	Ma	x. Marks:50
1) Clas	s tasks/ See	sional Examination		20	IA. IVIAI KS.SU
,	entations /S			20	
/	gnments	, enninai			
,	-	ct Report/Seminar On	Research Project Report		
5) ESE	uren riejet		in tese and in the speet help one	30	
Total:					
-	Learning (Outcomes: Student w	vill be able to:	-	
	0		ld problems using java collection frame	work	
		ograms using swing i			
	-	OPS concepts.			
	•	1			



Program	mme: Degr	200	Year: I	
Class: N	0	u	Semester: II	
Credits		Subject: Data Base	e Management System Lab	
Practica		Subject. Data Das	Management System Lab	
Course		Title: Data Base M	anagement System Lab	
MCA-1			unagement System Lus	
	Objectives	•		
	•	t should be made to:		
			se concepts, technology and practice to groom	students into
		base application deve		
		ed with a query langu		
		on experience on DDI		
		1	L Commands and DCL commands	
CO5: Fa	amiliarize a	dvanced SQL queries	and exposed to different applications	
	of Paper: (A	
Minimu	ım Passing	Marks/Credits: 50	% Marks	
L:0	0			
T:0				
P:4 (In 1	Hours/Weel	K)		
Theory	- 1 Hr. = 1 (Credit		
Practica	<u>l- 2 Hrs.=1</u>	Credit(4Hrs./Week=4	Credits)	
Unit	Contents			No. of
				Lectures
				Allotted
Ι			iting SQL queries to retrieve information from	2
	the databa			
II		-	n, Modifying, Altering, Updating and Viewing	2
		ased on conditions.		2
III		he following:		2
		-	eating a Database, Viewing all Tables in a	
		e e	bles (With and Without Constraints),	
		ng/Updating/Deleting		
IV		he following:	(Commit) and Undoing (rollback).	2
1 V		e	g/Truncating/Renaming Tables, backing up /	Z
		ng a Database.	ig/Truncating/Renaming Tables, backing up /	
V			emes, create tables and perform the following	2
v			ries with Aggregate functions, Queries with	2
	Aggregate		ines with regiogate functions, Queries with	
			g clause), Queries involving- Date Functions,	
			ons Join Queries- Inner Join, Outer Join	
	-	es- With IN clause, V	-	
VI			es perform the following	2
, <u>,</u>	-		d without check option), Dropping views,	_
í	a. Crouti		a maiout check option, Dropping views,	



	Selecting from view.	2		
VII	VII Write a Pl/SQL program using FOR loop to insert ten rows into a database			
	table.			
VIII	VIII Given the table EMPLOYEE (EmpNo, Name, Salary, Designation, Dept ID			
	write a cursor to select the five highest paid employees from the table.			
Referen	ce / Text Books:			
1. Fund	amentals of Database System ByElmasari& Navathe, 7th Edition, 2018, Pearso	on Education.		
	base System Concepts by Silberschatz, Korth & Sudarshan, 6th Edition, 2019			
	ation.			
	Evaluation/Assessment Methodology			
	Max. Marks:50			
1) Class	s tasks/ Sessional Examination	20		
2) Prese	entations /Seminar			
3) Assig	gnments			
4) Rese	arch Project Report			
Semi	nar On Research Project Report			
5) ESE		30		
	Total:	50		
Course	Learning Outcomes:			
Student v	will be able to:			
CO1: De	sign and implement a database schema for a given problem-domain			
CO2: Po	pulate and query a database			
CO3: Cr	eate and maintain tables using PL/SQL.			



Progra	mme: De	gree	Year: II	
Class: N		0	Semester: III	
Credits		Subject: Artificial Int		
Theory:			<u>O</u>	
Course	Code:	Title: Artificial Intell	igence	
MCA-2				
Course	Objectiv	ves:		
CO1:	Define th	e meaning of intelliger	nce and study various intelligent agents.	
CO2	Understa	nd, analyze and apply A	AI searching algorithms in different problem doma	ins.
			els for knowledge representation.	
			of machine learning to analyze and implement	widely used
		nethods and algorithm		
			pattern recognition and evaluate various classi	fication and
		techniques		
		: Core Course		
	um Passi	ng Marks/Credits:40	% Marks (ISE+ESE)	
L:3				
T:1	Lange (NV a	a1x)		
	Hours/We			
	-1Hr.=1C		Cr odita)	
Unit	$11-2\Pi 15.=$	Credit(4Hrs./Week=4	Contents	No. of
Unit			Contents	Lectures
				Allotted
Ι	Artific	ial Intelligence: Intr	roduction to artificial intelligence, Historical	08
-		-	n areas of artificial intelligence, Tasks and	00
	-		intelligence. Introduction, types and structure of	
			Vision, Natural language processing.	
II	U U		ntroduction, Problem solving by searching,	08
			ormed searching techniques, Informed searching	
			gorithms, Adversarial search methods, Search	
	techniq	ues used in games, Alp	pha-Beta pruning.	
III			and Reasoning: Propositional logic, Predicate	08
	-	-	ence in first order logic, Clause form conversion,	
		-	ept, forward chaining and backward chaining,	
		•	tic reasoning, Hidden Markov model, Bayesian	
	networ			
IV			tion, types and application areas, Decision trees,	08
		e 1	Learning with complete data - concept and	
			g with hidden data- concept and EM algorithm,	
X 7		cement learning.		0.0
V		8	luction and design principles, Statistical pattern	08
			ation methods - Principle component analysis and	
1	Linear	discrimination analysi	is, Classification techniques - Nearest neighbor	



rule and Bayes classifier, K-means clustering, Support vector machine.

Text Book:

- 1. Russell S. and Norvig P., "Artificial Intelligence A Modern Approach", Pearson Education.
- 2. Rich E. and Knight K., "Artificial Intelligence", McGraw Hill Publications.
- 3. Charnik E. and McDermott D., "Introduction to Artificial Intelligence", Pearson Education.
- 4. Patterson D. W., "Artificial Intelligence and Expert Systems", Prentice Hall of India Publications.

Reference Book:

- 1. Khemani D., "A First Course in Artificial Intelligence", McGraw Hill.
- 2. Winston P. H., "Artificial Intelligence", Pearson Education.
- Thornton C. and Boulay B.," Artificial Intelligence- Strategies, Applications and Models through Search", New Age International Publishers.

Evaluation/Assessment M	lethodology	
		Max. Marks 100
1. Classtasks/Sessional Examination		15
2. Presentations /Seminar		
3. Assignments		
4. Research Project Report		10
5. Seminar On Research Project Report		
6. ESE		75
	Total:	100

Prerequisites for the course: NIL

Course Learning Outcomes:

- CO1: Demonstrate fundamental understanding of the history of artificial intelligence.
- CO2: Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
- CO3: Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
- CO4: Demonstrate proficiency developing applications in an 'AI language', expert system shell, or data mining tool.

CO5: Demonstrate proficiency in applying scientific method to models of machine learning.



Progra	mme:Degree	Year: II	
Class:MCA		Semester:III	
Credit	s Subject:Software E	ngineering	
Theory	0		
	e Code: Title:Software Engi	neering	
MCA-2	e	6	
Course	Objectives:		
	0	acteristics and analyze different softwareDevelopme	nt Models.
	-	a SRS and apply basic software quality assurance	
		nt meet or exceed applicable standards.	F
CO3:	Compare and contrast various		
	Formulate testing strategy for software systems, employ techniques such as unit		testing. Test
	driven development and functi		, 1000
CO5:	1	at process independently as well as in teams and	make use of
		toolsfordevelopment, maintenance and analysis.	
Nature	of Paper: Core Course	1	
	um Passing Marks/Credits:4	0% Marks (ISE+ESE)	
L:3	8		
T:1			
P:0(In]	Hours/Week)		
	-1Hr.=1Credit		
-	al-2Hrs.=1Credit(4Hrs./Week=	4Credits)	
Unit		Contents	No. of
			Lectures
			Allotted
Ι	Introduction: Introduction	to Software Engineering, Software Components,	08
	Software Characteristics, S	oftware Crisis, Software Engineering Processes,	
		es from Conventional Engineering Processes,	
		es. Software Development Life Cycle (SDLC)	
		l, Prototype Model, Spiral Model, Evolutionary	
	Development Models, Iterat		
II		pecifications (SRS): Requirement Engineering	08
		sis, Documentation, Review and Management of	
		dy, Information Modelling, Data Flow Diagrams,	
	-	ams, Decision Tables, SRS Document, IEEE	
		are Quality Assurance (SQA): Verification and	
		ware Quality Frameworks, ISO 9000 Models, SEI-	
	Validation, SOA Plans. Soft		
III	CMM Model.		08
III	CMM Model. Software Design: Basic Co	oncept of Software Design, Architectural Design,	08
III	CMM Model. Software Design: Basic Co Low Level Design: Modula	oncept of Software Design, Architectural Design, arization, Design Structure Charts, Pseudo Codes,	08
III	CMM Model.Software Design: Basic ControlLow Level Design: ModulaFlow Charts, Coupling and	oncept of Software Design, Architectural Design, arization, Design Structure Charts, Pseudo Codes, Cohesion Measures, Design Strategies: Function	08
III	CMM Model.Software Design: Basic CoLow Level Design: ModulaFlow Charts, Coupling andOriented Design, Object Ori	oncept of Software Design, Architectural Design, arization, Design Structure Charts, Pseudo Codes, Cohesion Measures, Design Strategies: Function ented Design, Top- Down and Bottom-Up Design.	08
III	CMM Model.Software Design: Basic ControlLow Level Design: ModulaFlow Charts, Coupling andOriented Design, Object OriSoftware Measurement and	oncept of Software Design, Architectural Design, arization, Design Structure Charts, Pseudo Codes, Cohesion Measures, Design Strategies: Function ented Design, Top- Down and Bottom-Up Design. and Metrics: Various Size Oriented Measures:	08
III	CMM Model.Software Design: Basic CoLow Level Design: ModulaFlow Charts, Coupling andOriented Design, Object OriSoftware Measurement arHalestead's Software Sci	oncept of Software Design, Architectural Design, arization, Design Structure Charts, Pseudo Codes, Cohesion Measures, Design Strategies: Function ented Design, Top- Down and Bottom-Up Design.	08



	<u> </u>	
IV Software Testing: Testing Objectives, Unit Testing, Integrat	ion Testing	, 08
Acceptance Testing, Regression Testing, Testing for Functionality	and Testing	<u>y</u>
for Performance, Top Down and Bottom- Up Testing Strategies:	•	~
and Test Stubs, Structural Testing (White Box Testing), Function		
(Black Box Testing), Test Data Suit Preparation, Alpha and Be	0	
Products. Static Testing Strategies: Formal Technical Reviews (Pe		
Walk Through, Code Inspection, Compliance with Design	and Coding	5
Standards.		
V Software Maintenance and Software Project Management: So	oftware as an	n 08
Evolutionary Entity, Need for Maintenance, Categories of I		
Preventive, Corrective and Perfective Maintenance, Cost of		
Software Re-Engineering, Reverse Engineering. Software C	-	
Management Activities, Change Control Process, Software Ver		
An Overview of CASE Tools. Estimation of Various Parameter	rs such as	5
Cost, Efforts, Schedule/Duration, Constructive Cost Models	(COCOMO)	,
Resource Allocation Models, Software Risk Analysis and Manage	ment.	
Text Book:		
1. R S Pressman, "Software Engineering: A Practitioners Approach", McC	raw Hill	
2. Pankaj Jalote, "Software Engineering", Wiley		
3. Rajib Mall, "Fundamentals of Software Engineering", PHI Publication.		1 1 1 1
4. KK Aggarwal and Yogesh Singh, "Software Engineering", New Age Int	ernational Pu	iblishers.
Reference Book:		
1. Ghezzi, M. Jarayeri, D. Manodrioli, "Fundamentals of Software Engine	ring", PHI I	Publication.
2. I an Sommerville, "Software Engineering", Addison Wesley.		
3. Kassem Saleh, "Software Engineering", Cengage Learning		
4. Pfleeger, "Software Engineering", Macmillan Publication		
Evaluation/Assessment Methodology		
	May	x. Marks 100
1. Classtasks/SessionalExamination	11142	
		15
2. Presentations /Seminar		
3. Assignments		
4. Research Project Report		10
5. Seminar On Research Project Report		
6. ESE		75
Тс	tal:	100
Prerequisites for the course: NIL		100
Course Learning Outcomes:		
8	the energific	ation design
CO1: Plan a software engineering process life cycle, including	-	-
implementation, and testing of software systems that meet s	pecification,	performance,
maintenance and quality requirements		
CO2: Able to elicit, analyze and specify software requirements through	igh a produ	ctive working
relationship with various take holders of the project		_
CO3: Analyze and translate a specification into a design, and then real	ize that desi	gn practically
using an appropriate software engineering methodology.	4001	6 - r
CO4: Know how to develop the code from the design and effectively ap	nly relevent	standarda and
CO+. Know now to develop the code from the design and effectively ap	pry relevant	stanuarus and

perform testing, and quality management and practiceCO5: Able to use modern engineering tools necessary for software project management, time management and software reuse.



Progra	amme:Degree	Year: II	
Class:	MCA	Semester:III	
Credit	ts Subject:Comput	ter Networks	
Theory	y:4Cr		
Course	e Code: Title:Computer	Networks	
MCA-	233		
Course	e Objectives:		
CO1:	Describe communication	models TCP/IP, ISO-OSI model, network topologies	along with
	communicating devices an	d connecting media.	
CO2:	Apply knowledge of error	detection, correction and learn concepts of flow control	ol along with
	error control.		
CO3:	Classify various IP address	sing techniques, subnetting along with network routing p	protocols and
	algorithms.		
CO4:		port layer protocols and their design considerations	along with
	congestion control to main		
CO5:	11	yer protocols and elementary standards of cryptography	and network
	security.		
	e of Paper: Core Course		
	num Passing Marks/Credit	ts:40% Marks (ISE+ESE)	
L:4			
T:4			
	Hours/Week)		
-	y-1Hr.=1Credit		
	cal-2Hrs.=1Credit(4Hrs./We	,	
Unit		Contents	No. of
			Τ
Ι			Lectures
1 1	Data Communicatio	ng Introduction Data communication	Allotted
· ·	Data Communicatio		
	Components and charact	eristics, Data representation and Dataflow.	Allotted
	Components and charact Networks: LAN, WAN,	eristics, Data representation and Dataflow. MAN, Topologies.	Allotted
	Components and charact Networks: LAN, WAN, Protocols and Standa	reristics, Data representation and Dataflow. MAN, Topologies. rds: ISO-OSI model and TCP-IP Model. Network	Allotted
	Components and charact Networks: LAN, WAN, Protocols and Standa Connecting Devices: H	reristics, Data representation and Dataflow. MAN, Topologies. rds: ISO-OSI model and TCP-IP Model. Network UB, Bridge, Switch, Router and Gateways.	Allotted
	Components and charact Networks: LAN, WAN, Protocols and Standa Connecting Devices: HI Transmission Media: C	reristics, Data representation and Dataflow. MAN, Topologies. rds: ISO-OSI model and TCP-IP Model. Network UB, Bridge, Switch, Router and Gateways. Guided and unguided Media	Allotted
	Components and charact Networks: LAN, WAN, Protocols and Standa Connecting Devices: HI Transmission Media: C Classification and Arra	reristics, Data representation and Dataflow. MAN, Topologies. rds: ISO-OSI model and TCP-IP Model. Network UB, Bridge, Switch, Router and Gateways.	Allotted 08
I	Components and charact Networks: LAN, WAN, Protocols and Standa Connecting Devices: H Transmission Media: C Classification and Arra Data Link Layer:	eristics, Data representation and Dataflow. MAN, Topologies. rds: ISO-OSI model and TCP-IP Model. Network UB, Bridge, Switch, Router and Gateways. Guided and unguided Media Ingement: Wired LANs and Wireless LANs	Allotted
	Components and charact Networks: LAN, WAN, Protocols and Standa Connecting Devices: Hi Transmission Media: C Classification and Arra Data Link Layer: Error Detection and	eristics, Data representation and Dataflow. MAN, Topologies. rds: ISO-OSI model and TCP-IP Model. Network UB, Bridge, Switch, Router and Gateways. Guided and unguided Media Ingement: Wired LANs and Wireless LANs Error Correction: Types of errors, LRC, VRC,	Allotted 08
	Components and charact Networks: LAN, WAN, Protocols and Standa Connecting Devices: Hy Transmission Media: C Classification and Arra Data Link Layer: Error Detection and Checksum, CRC, and Ha	 beristics, Data representation and Dataflow. MAN, Topologies. rds: ISO-OSI model and TCP-IP Model. Network UB, Bridge, Switch, Router and Gateways. Guided and unguided Media Ingement: Wired LANs and Wireless LANs Error Correction: Types of errors, LRC, VRC, amming Code. 	Allotted 08
	Components and charact Networks: LAN, WAN, Protocols and Standa Connecting Devices: Hi Transmission Media: C Classification and Arra Data Link Layer: Error Detection and Checksum, CRC, and Ha Flow Control and Error	 beristics, Data representation and Dataflow. MAN, Topologies. rds: ISO-OSI model and TCP-IP Model. Network UB, Bridge, Switch, Router and Gateways. Guided and unguided Media angement: Wired LANs and Wireless LANs Error Correction: Types of errors, LRC, VRC, amming Code. or Control: Stop and Wait Protocol, Sliding Window, 	Allotted 08
	Components and charact Networks: LAN, WAN, Protocols and Standa Connecting Devices: Hi Transmission Media: C Classification and Arra Data Link Layer: Error Detection and Checksum, CRC, and Ha Flow Control and Error	 beristics, Data representation and Dataflow. MAN, Topologies. rds: ISO-OSI model and TCP-IP Model. Network UB, Bridge, Switch, Router and Gateways. Guided and unguided Media Ingement: Wired LANs and Wireless LANs Error Correction: Types of errors, LRC, VRC, amming Code. 	Allotted 08
	Components and charact Networks: LAN, WAN, Protocols and Standa Connecting Devices: HU Transmission Media: C Classification and Arra Data Link Layer: Error Detection and Checksum, CRC, and Ha Flow Control and Error Go-back-N-ARQ Protoc Channel Allocation	 beristics, Data representation and Dataflow. MAN, Topologies. rds: ISO-OSI model and TCP-IP Model. Network UB, Bridge, Switch, Router and Gateways. Guided and unguided Media Ingement: Wired LANs and Wireless LANs Error Correction: Types of errors, LRC, VRC, amming Code. or Control: Stop and Wait Protocol, Sliding Window, ol and Selective-Repeat ARQ Protocol. 	Allotted 08
	Components and charact Networks: LAN, WAN, Protocols and Standa Connecting Devices: HU Transmission Media: C Classification and Arra Data Link Layer: Error Detection and Checksum, CRC, and Ha Flow Control and Error Go-back-N-ARQ Protoc Channel Allocation	 beristics, Data representation and Dataflow. MAN, Topologies. rds: ISO-OSI model and TCP-IP Model. Network UB, Bridge, Switch, Router and Gateways. Guided and unguided Media angement: Wired LANs and Wireless LANs Error Correction: Types of errors, LRC, VRC, amming Code. or Control: Stop and Wait Protocol, Sliding Window, ol and Selective-Repeat ARQ Protocol. Protocols: Random Access, Controlled and es such as ALOHA, CSMA, CSMA/CD, CDMA/CA,	Allotted 08
	Components and charact Networks: LAN, WAN, Protocols and Standa Connecting Devices: Hi Transmission Media: C Classification and Arra Data Link Layer: Error Detection and Checksum, CRC, and Ha Flow Control and Error Go-back-N-ARQ Protoc Channel Allocation Channelization techniqu	 beristics, Data representation and Dataflow. MAN, Topologies. rds: ISO-OSI model and TCP-IP Model. Network UB, Bridge, Switch, Router and Gateways. Guided and unguided Media angement: Wired LANs and Wireless LANs Error Correction: Types of errors, LRC, VRC, amming Code. or Control: Stop and Wait Protocol, Sliding Window, ol and Selective-Repeat ARQ Protocol. Protocols: Random Access, Controlled and es such as ALOHA, CSMA, CSMA/CD, CDMA/CA,	Allotted 08
Π	Components and charact Networks: LAN, WAN, Protocols and Standa Connecting Devices: Hi Transmission Media: C Classification and Arra Data Link Layer: Error Detection and Checksum, CRC, and Ha Flow Control and Error Go-back-N-ARQ Protoc Channel Allocation Channelization techniqu TDMA, FDMA, Token I	 beristics, Data representation and Dataflow. MAN, Topologies. rds: ISO-OSI model and TCP-IP Model. Network UB, Bridge, Switch, Router and Gateways. Guided and unguided Media angement: Wired LANs and Wireless LANs Error Correction: Types of errors, LRC, VRC, amming Code. or Control: Stop and Wait Protocol, Sliding Window, ol and Selective-Repeat ARQ Protocol. Protocols: Random Access, Controlled and es such as ALOHA, CSMA, CSMA/CD, CDMA/CA,	Allotted 08 08



Logicaladdressing: IPv4 and IPv6 Address schemes, Classe	s and
subnetting	
Network Layer Protocols: ARP, RARP, BOOTP and DHCP	
Routing Techniques: Interdomain and Intradomain routing with examp	
IV Transport Layer:	08
Introduction to Transport Layer: Process-to-	
ProcessDelivery:Reliable and unreliable Connection, Port and	Socket
Addressing	
Transport Layer Protocols with packet formats: User Datagram	
(UDP), Transmission Control Protocol (TCP), Stream Control Trans	smission
Protocol (SCTP).	
Congestion Control: Techniques for handling the Congestion Control.	
Quality of Service (QoS): Flow Characteristics and techniques to	Improve
QoS.	
V Application Layer:	08
Basic Concept of Application Layer: Domain Name System, World	
Web, Hyper Text Transfer Protocol, Electronic mail, File Transfer Protocol, El	rotocol,
Remote login.	
Introduction to Cryptography: Definition, Goal, Applications, A	Attacks,
Encryption, decryption, public-key and private key cryptography.	
Sext Book:	
. Behrouz Forouzan, "Data Communication and Networking", McGraw Hill	
. Andrew Tanenbaum "Computer Networks", Prentice Hall.	
. William Stallings, "Data and Computer Communication", Pearson. Reference Book:	
 Kurose and Ross, "Computer Networking- A Top-Down Approach", Pearson Peterson and Davie, "Computer Networks: A Systems Approach", Morgan Katalan 	
. W. A. Shay, "Understanding Communications and Networks", Congage Learn	
. D. Comer, "Computer Networks and Internets", Pearson.	iiiig.
5. Behrou zForouzan, "TCP/IP Protocol Suite", McGraw Hill.	
Evaluation/Assessment Methodology	
87	Max. Marks 100
1) Classtasks/Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
5) Seminar On Research Project Report	
6) ESE	75
Total:	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO1: Understand Basics of Computer Networks and different Transmission Me	
CO2: Differentiate Protocols which play a major role in providing internet effe	ctively.
CO3: Understand various protocol layers and inner operations.	
CO3: Understand various protocol layers and inner operations.CO4: Understand architectures of network protocols.CO5: Understand security issues in network protocols.	



D			V II	
0	mme: De	gree	Year: II	
Class:M			Semester: III	
Credits		Subject: Cryptograph	ny & Network Security	
Theory:				
Course		Title:Cryptography &	z Network Security	
MCA-0				
	Objectiv			
			acks and their protection mechanism.	
		d analyze various encr		1.00
			ithms to authenticate messages and study and apply	different
	<u> </u>	nature techniques.	1	
		lifferent types of key of		
			and system security mechanism.	
	of Paper		0/ Marka (ISE : ESE)	
	in Passi	ng Marks/Credits:40	% Marks (ISE+ESE)	
L:4				
T:0	r /\\7	1 \		
	Iours/We	· · · · · · · · · · · · · · · · · · ·		
	1Hr.= 1 Ci		Creatite)	
	$1-2\pi rs.=1$	Credit(4Hrs./Week=4		No. of
Unit			Contents	
				Lectures Allotted
Ι	Introdu	ation to socurity attack	za Sarviaas and machanism Classical anaryption	<u>Anotted</u> 08
1			ks, Services and mechanism, Classical encryption ners and transposition ciphers, Cryptanalysis,	Vð
	-	ography, Stream and b		
	-		Block ciphers principles, Shannon's theory of	
			tel structure, Data encryption standard(DES),	
			fferential cryptanalysis, Block cipher modes of	
	-	ons, Triple DES	interential cryptanarysis, block cipiter modes of	
II	-	_	inite field of the form GF(p), Modular arithmetic,	08
		U 1	nbers, Extended Euclidean Algorithm, Advanced	00
		tion Standard (AES).	action Extended Edendean Augorithm, Advanced	
	• 1	· · · · · · · · · · · · · · · · · · ·	n, Primality testing, Chinese Remainder theorem,	
			n, Principals of public key crypto systems, RSA	
		im, Security of RSA		
III			des: Authentication requirements, Authentication	08
	-		cation code, Hash functions, Birthday attacks,	
			cure hash algorithm (SHA).	
			ignatures, Elgamal Digital Signature Techniques,	
	0	0 0	DSS), Proof of digital signature algorithm.	
IV			tribution: Symmetric key distribution, Diffie-	08
			blic key distribution, X.509 Certificates, Public	
		rastructure.		
L	IIII			



Authentication Applications: Kerberos Electronic mail security: pret	ty good
privacy (PGP), S/MIME.	ity good
V IP Security: Architecture, Authentication header, Encapsulating securi	ity 08
payloads, Combining security associations, Key management.	5
Introduction to Secure Socket Layer, Secure electronic transaction (SE	Г).
System Security: Introductory idea of Intrusion, Intrusion detection, V	iruses
and related threats, firewalls.	
Text Book:	·
1. Stallings W., "Cryptography and Network Security: Principals and Practice",	Pearson Education.
2. Frouzan B. A., "Cryptography and Network Security", McGraw Hill.	
Reference Book:	
1. Kahate A., "Cryptography and Network Security", Tata McGraw Hill.	
Evaluation/Assessment Methodology	
	Max. Marks 100
1) Classtasks/Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
5) Seminar On Research ProjectReport	
6) ESE	75
Total:	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO1: Provide security of the data over the network.	
CO2: Do research in the emerging areas of cryptography and network security	
CO3: Implement various networking protocols.	
CO4: Protect any network from the threats in the world	
CO5: Understand various protocols for network security to protect against the	threatsin the
networks.	



Program	nme:Degree	Year: II	
Class:M	U	Semester:III	
Credits		a Warehousing & Data Mining	
Theory:	•		
Course		Varehousing & Data Mining	
MCA-0			
	Objectives:		
	0	e of Data Warehouse and its components.	
		Warehouse Planning and Implementation.	
	-	various supervised and Non supervised learning algorithms	on data.
		cess of Data Mining and decide best according to type of dat	
	1 1	wledge discovery in database (KDD). Design Data	
	Mining model.		
	of Paper: DSE		
-		edits:40% Marks (ISE+ESE)	
L:4			
T:0			
P:0(In H	lours/Week)		
Theory-	1Hr.=1Credit		
Practical	l-2Hrs.=1Credit(4Hrs.	Week=4Credits)	
Unit		Contents	No. of
			Lectures
			Allotted
Ι	-	Overview, Definition, Data Warehousing Components,	08
		Varehouse, Warehouse Database, Mapping the Data	
		ltiprocessor Architecture, Difference between Database	
	•	arehouse, Multi Dimensional Data Model, Data Cubes,	
		Fact Constellations, Concept.	
II		Process and Technology: Warehousing Strategy,	08
		ent and Support Processes, Warehouse Planning and	
		dware and Operating Systems for Data Warehousing,	
		ting Model & Data Warehousing. Parallel Processors &	
	•	tributed DBMS implementations, Warehousing Software,	
111	Warehouse Schema	e	00
III		rview, Motivation, Definition & Functionalities, Data	08
		Data Pre-processing, Data Cleaning: Missing Values,	
	-	ing, Clustering, Regression, Computer and Human	
		stent Data, Data Integration and Transformation. Data	
		ube Aggregation, Dimensionality reduction, Data	
	-	rosity Reduction, Discretization and Concept hierarchy	
13.7	generation, Decision		00
IV		nition, Data Generalization, Analytical Characterization,	08
	-	te relevance, Mining Class comparisons, Statistical Databases, Statistical-Based Algorithms, Distance-Based	



Algorithms, Decision Tree-Based Algorithms.	
Clustering: Introduction, Similarity and Distance Measures, Hierarchi	
Partitional Algorithms. Hierarchical Clustering- CURE and Char	
Density Based Methods DBSCAN, OPTICS. Grid Based Methods-	
CLIQUE. Model Based Method - Statistical Approach, Association	
Introduction, Large Item sets, Basic Algorithms, Parallel and Dist	tributed
Algorithms, Neural Network approach.	
V Data Visualization and Overall Perspective: Aggregation, H	
information, Query Facility, OLAP function and Tools. OLAP	-
ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Back	
Recovery, Tuning Data Warehouse, Testing Data Warehouse. Ware	
applications and Recent Trends: Types of Warehousing Application	ns, Web
Mining, Spatial Mining and Temporal Mining.	
Text Book:	
1. Alex Berson, Stephen J. Smith "Data Warehousing, Data-Mining & OLAP", '	
2. Mark Humphries, Michael W. Hawkins, Michelle C. Dy, "Data Warehousin	ng: Architecture and
Implementation",Pearson.	
3. I. Singh, "Data Mining and Warehousing", Khanna Publishing House.	
Reference Book:	
1. Margaret H. Dunham, S. Sridhar,"Data Mining: Introductory and Advance	ed Topics" Pearson
Education 5. Arun K. Pujari, "Data Mining Techniques" Universities Press.	
2. Pieter Adriaans, DolfZantinge, "Data-Mining", Pearson Education	
Evaluation/Assessment Methodology	
	Max. Marks 100
1. Classtasks/Sessional Examination	15
2. Presentations /Seminar	
3. Assignments	10
4. Research Project Report	10
5. Seminar On Research Project Report	75
6. ESE	75
Total:	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO1: Understand warehousing architectures and tools for systematically orga	mizing large database
and use their data to make strategic decisions.	
CO2: Understand KDD process for finding interesting pattern from warehouse	
CO3: Remove redundancy and incomplete data from the dataset using data pre CO4: Characterize the kinds of patterns that can be discovered by association r	

- CO4: Characterize the kinds of patterns that can be discovered by association rule mining.
- CO5: Develop a data mining application for data analysis using various tools.



Program	nme: De	gree	Year: II		
Class: MCA		~	Semester: III		
Credits		Subject: Software Pr	oject Management		
Theory:4	4Cr	-	-		
Course	Course Code: Title: Software Project Management				
MCA-01	MCA-013				
Course (Objectiv	es:			
CO1: I	dentify p	roject planning object	ives, along with various cost/effort estimation mod	els.	
CO2 (D2 Organize & schedule project activities to compute critical path for risk analysis				
		and control project acti			
			d test plan to ensure good software quality under SI	EI-CMM	
			risks using project management tools.		
	of Paper				
-	m Passi	ng Marks/Credits:40	% Marks (ISE+ESE)		
L:4					
T:0					
	lours/We				
	1Hr.=1C				
	I-2Hrs.=]	Credit(4Hrs./Week=4		NT A	
Unit			Contents	No. of	
				Lectures	
т	Droise	Evoluction and D.	pinet Dianning Importance of Coffering During	Allotted	
Ι	•		Dject Planning: Importance of Software Project	08	
	U		Methodologies – Categorization of Software		
			 Management Principles – Management Control ent – Cost-benefit evaluation technology – Risk 		
		1 0	Management – Stepwise Project Planning.		
II			fort Estimation: Software process and Process	08	
			nodels – Rapid Application development – Agile	VO	
			Development Method – Extreme Programming–		
			ses – Basics of Software estimation – Effort		
			iques-COSMICFullfunctionpoints-COCOMOII-		
		etricProductivity Mod			
III		~	Management: Objectives of Activity planning –	08	
_			ies – Sequencing and scheduling – Network		
	5		ng Network Model – Forward Pass & Backward		
		e	path (CRM) method - Risk identification -		
		-	-Risk Management – – PERT technique – Monte		
	Carlo s	imulation – Resource	e Allocation- Creation of Critical paths - Cost		
	schedul				
IV	Project	Management and	Control: Framework for Management and	08	
			ualizingprogress-Costmonitoring-		
			oritizing Monitoring – Project tracking –		
	Change	control SoftwareCo	onfiguration Management – Managing contracts –		



	Contract Management.				
V	Staffing in Software Projects: Managing people – Organizational beh	navior –	08		
	Best methods of staff selection – Motivation – The Oldham – Hackman job				
	characteristic model – Stress – Health and Safety – Ethical and Professional				
	concerns – Working in teams – Decision making – Organizational structures –				
	DispersedandVirtualteams-Communicationsgenres-Communicationpla				
	Leadership.				
Text	Book:				
	ob Hughes, Mike Cotterell and Rajib Mall: "Software Project Managem	ent" – F	ifth Editior		
	IcGraw Hill,New Delhi,2012.				
	obert K. Wysocki — "Effective Software Project Management" – Wiley Pul	blication	.2011.		
	Valker Royce: — "Software Project Management" - Addison-Wesley, 1998.		,		
	opalaswamy Ramesh, — "Managing Global Software Projects" – McC	Graw Hi	II Education		
	ndia), FourteenthReprint2013.				
	rence Book:				
		McGraw	Hill		
	hEdition2008.				
	obbins and Coulter, "Management", Prentice Hall of India, 9thedition.				
	mes A. F., Stoner, "Management", Pearson Education Delhi.				
	D. Chaturvedi, "Business Communication", Pearson Education.				
	Evaluation/Assessment Methodology				
		Max.	Marks 100		
1. (Classtasks/SessionalExamination		15		
2. F	Presentations /Seminar				
3. A	Assignments				
	Research Project Report		10		
	Seminar On Research Project Report				
	ESE		75		
	Total:		100		
Prer	equisites for the course: NIL	1			
	se Learning Outcomes:				
	1: Identify the different project contexts and suggest an appropriate manage	ment stra	ategy.		
	2: Practice the role of professional ethics in successful software development				
	3: Identify and describe the key phases of project management.				
	1. Determine on environminte preisest menagement environh				

CO4: Determine an appropriate project management approach.

CO5: Evaluation of the business context and scope of the project.



Progra	mme: Degree	Year: II			
Class: MCA		Semester: III			
Credits Subject: Cloud Cor		nputing			
Theory	Theory:4Cr				
Course Code: Title: Cloud Computing					
MCA-0	014				
Course	Objectives:				
CO1:	Understand the concepts of Cloud Computing, key technologies, strengths and limitations o				
	cloud computing.				
CO2	Develop the ability to understa	and and use the architecture to compute and storage c	loud, service		
	and models.				
	Understand the application in	1 0			
		chnologies that help in the development of cloud.			
	-	id computing such as resource management and secu	ırity.		
	of Paper: DSE				
-	um Passing Marks/Credits:4	0% Marks (ISE+ESE)			
L:4					
T:0					
	Hours/Week)				
	-1Hr.=1Credit				
	al-2Hrs.=1Credit(4Hrs./Week=				
Unit		Contents	No. of		
			Lectures		
			Allotted		
Ι	-	buting – Definition of Cloud – Evolution of Cloud	08		
	1 0 0	Principles of Parallel and Distributed, History of			
		Architecture - Types of Clouds - Business models			
		Players in Cloud Computing-issues in Clouds -			
II	Eucalyptus - Nimbus - Oper		08		
		Cloud services: Software as a Service- Platform as a Service-Database as a Service - Monitoring as a	Võ		
		s services. Service providers- Google, Amazon,			
	Microsoft Azure, IBM, Sale	1 0			
III		Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solut	08		
	<u> </u>	oject Management-Event Management - Task	00		
	6	Schedules - Word Processing – Presentation –			
	-	Desktop - Social Networks and Groupware.			
IV		: Need for Virtualization – Pros and cons of	08		
_ <u> </u>		Virtualization – System VM, Process VM, Virtual			
	• •	1 machine properties - Interpretation and binary			
		pervisors – Xen, KVM, V Mware, Virtual Box,			
	Hyper-V.				
1		Applications: Security in Clouds: Cloud security			



challenges – Software as a Service Security, Common Standards: The Open
Cloud Consortium – The Distributed management Task Force – Standards for
application Developers – Standards for Messaging – Standards for Security,
End user access to cloud computing, Mobile Internet devices and the cloud.
Hadoop – Map Reduce – Virtual Box — Google App Engine – Programming
Environment for Google App Engine

Text Book:

- 1. David E.Y. Sarna, "Implementing and Developing Cloud Application", CRC press2011.
- Lee Badger, Tim Grance, Robert Patt-Corner, Jeff Voas, NIST, Draft cloud computing synopsis and recommendation, May2011.
- Anthony T Velte, Toby J Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach", Tata McGraw-Hill2010.

Reference Book:

1. Haley Beard, "Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs", Emereo Pty Limited, July2008. Evaluation/Assessment Methodology

Evaluation/Assessment Methodology			
	Max. Marks 100		
1. Class tasks/Sessional Examination	15		
2. Presentations /Seminar			
3. Assignments			
4. Research Project Report	10		
Seminar On Research Project Report			
5. ESE	75		
Total:	100		
Prerequisites for the course: NIL			

Course Learning Outcomes:

- CO1: Understand the fundamental principles of distributed computing.
- CO2: Understand how the distributed computing environments known as Grids can be built from lower level services.
- CO3: Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing.
- CO4: Analyze the performance of Cloud Computing.
- CO5: Understand the concept of Cloud Security.



Progra	amme: De	egree	Year: II	
Class: MCA			Semester: III	
Credit	ts	Subject: Compiler D	esign	
Theory	y:4Cr			
Cours	Course Code: Title: Compiler Design			
MCA-015				
Cours	e Objecti	ves:		
CO1: CO2	compiler compiler	tools like LEX, YAC tools to meet the requi	phases and passes of the compiler and also able to CC, etc. Students will also be able to design different irements of the realistic constraints of compilers. Top-Down and Bottom-up parsers and co	rent types of
		, CLR, and LALR pars		
CO3:	Impleme	· · · · ·	syntax-directed translation method and get knowled	lge about the
CO4:	-	knowledge about run t es used in that.	time data structure like symbol table organization	and different
CO5:		nd the target machine'	's run time environment, its instruction set for cod	le generation
Natur	e of Pape	r: DSE		
Minim	num Passi	ng Marks/Credits:40	% Marks (ISE+ESE)	
L:4				
T:0				
P:0(In	Hours/We	eek)		
Theory	y-1Hr.=1C	fredit		
Practic	al-2Hrs.=	1Credit(4Hrs./Week=4	Credits)	
Unit	,		Contents	No. of
				Lectures Allotted
Ι	machin Optim analyz their a syntac	nes and regular expressization of DFA-Based ers, lexical-analyzer g pplication to syntax a	Phases and passes, Bootstrapping, Finite state ssions and their applications to lexical analysis, d Pattern Matchers implementation of lexical generator, LEX compiler, Formal grammars and analysis, BNF notation, ambiguity, YACC. The rogramming languages: Context free grammars, pabilities of CFG.	08
II	parsing efficien constru Constr	g, top down parsing, nt Parsers: LR parse acting SLR parsing ta ucting LALR parsing	Parsers, Shift reduce parsing, operator precedence predictive parsers Automatic Construction of ers, the canonical Collection of LR(0) items, bles, constructing Canonical LR parsing tables, tables, using ambiguous grammars, an automatic tion of LR parsingtables.	08
III	Syntax Impler	x-directed Translation of Syntax-d		08



alter the flow of control, postfix translation, translation with a top down	parser.
More about translation: Array references in arithmetic expressions, pro	
call, declarations and case statements.	
IV Symbol Tables: Data structure for symbols tables, representing	
information. Run- Time Administration: Implementation of simple	
allocation scheme, storage allocation in block structured language Detection & Recovery: Lexical Phase errors, syntactic	. Enor
phase errors semantic errors.	
V Code Generation: Design Issues, the Target Language. Addresses	in the 08
Target Code, Basic Blocks and Flow Graphs, Optimization of Basic	
Code Generator. Code optimization: Machine-Independent Optimi	
Loop optimization, DAG representation of basic blocks, value numb	
algebraic laws, Global Data-Flow analysis.	
Text Book:	
1. K. Muneeswaran, Compiler Design, First Edition, Oxford University Press.	
2. J.P. Bennet, "Introduction to Compiler Techniques", Second Edition, Tata Mo	
3. Henk Alblas and Albert Nymeyer, "Practice and Principles of Compiler Bu	ilding with C",
PHI, 2001.	
Reference Book:	
1. Aho, Sethi & Ullman, "Compilers: Principles, Techniques and Tools", Pearson V. Pashwan, "Dringinlag of Compiler Design", TMU	on Education
 V Raghvan, "Principles of Compiler Design", TMH Kenneth Louden," Compiler Construction", Cengage Learning. 	
 Kenneth Louden, Complet Construction, Cengage Learning. Charles Fischer and Ricard LeBlanc," Crafting a Compiler. 	
Evaluation/Assessment Methodology	
	Max. Marks 100
1. Classtasks/Sessional Examination	15
2. Presentations /Seminar	10
3. Assignments	
4. Research Project Report	10
5. Seminar On Research Project Report	
6. ESE	75
Total:	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO1: Explain the concepts and different phases of compilation with compile ti	-
Represent language tokens using regular expressions, context free	grammar and finite
CO2: automata and design lexical analyzer for a language.	
Compare top down with bottom up parsers, and develop appropriate pa	irser to produce parse
CO3: tree representation of the input.	
Generate intermediate code for statements in high level language.	
CO4: Design syntax directed translation schemes for a given context free gran	mmar. generation and
CO5: techniques used for code optimization.	



Programme:Degree Year: II		Year: II			
Class:MCA		Semester:III			
Credits Subject: Web Technology					
	Theory:4Cr				
	Course Code: Title:Web Technology				
MCA-021					
Course O	jectives:				
CO1:	Apply the knowledge of HTML and CSS to develop web application and analyze the insi				
	internet programming to implement complete application over the web.				
CO2	Understand, analyze and apply the role of JavaScript in the workings of the web and w				
	applications.				
		ynamic web applications using servlet and JSP.			
		applications using Java configuration, XML	configuration,		
	e ,	beans and their scopes, and properties.			
		pring Boot and REST Ful Web Services			
	Paper: DSE				
	Passing Marks/Credits:40% N	Marks (ISE+ESE)			
L:3					
T:1 D:0(In He)	ma (Waala)				
P:0(In Hou					
Theory-1H	Hrs.=1Credit(4Hrs./Week=4Cre	dita			
Unit		Contents	No. of		
Unit		Contents	Lectures		
			Allotted		
Ι	Web Page Designing: Introdu	action and Web Development Strategies, History	08		
-	8 8 8	ls Governing Web, HTML-Introduction, HTML	00		
		ng Div& Span, HTML-Lists, HTML-Images,			
		able, HTML-I frame, HTML-Form, Introduction			
	• •	al Style Sheet using < link >, Multiple Style			
	•	Percentages, CSS-Selectors, CSS-Box Model,			
	Floats, Clear, Introduction to E				
II		JavaScript, Creating Variables in JavaScript,	08		
		ipt, UI Events, Returning Data from Functions,			
	Working with Conditions, lo	poping in JavaScript, Block Scope Variables,			
		ing Object using Object Literals, Manipulating			
	DOM Elements with JavaScrip				
III		nt using JSP & Servlets: Servlet Overview and	08		
		and the Servlet Life Cycle, Handling HTTP get			
		bost Requests, Redirecting Requests to Other			
		Cookies, Session Tracking with Http Session.			
		oduction, Java Server Pages Overview, A First			
		Implicit Objects, Scripting, Standard Actions,			
	Directives ,Custom				
	Tag Libraries.				



	Spring: Spring Core Basics-Spring Dependency Injection con Introduction to Design patterns, Factory Design Pattern, Strategy I pattern, Spring Inversion of Control, AOP, Bean Scopes- Singleton, Prov Request, Session, Application, Web Socket, Auto wiring, Annotations Cycle Call backs, Bean Configuration styles	Design totype,	
V	Spring Boot: Spring Boot- Spring Boot Configuration, Spring Annotations, Spring Boot Actuator, Spring Boot Build Systems, Spring Code Structure, Spring Boot Runners, Logger, BUILDING RESTFUL SERVICES, Rest Controller, Request Mapping, Request Body, Path Va Request Parameter, GET, POST, PUT, DELETE APIs, Build Applications	g Boot WEB ariable,	
Text Boo	k:		
1. Burdı	nan, Jessica, "Collaborative Web Development" Addison Wesley		
2. Xavie	r, C, "Web Technology and Design", New Age International		
3. Ivan I	Bayross," HTML, DHTML, Java Script, Perl & CGI", BPB Publication		
Referenc	e Book:		
1. Bhave	e, "Programming with Java", Pearson Education		
2. Hans	Bergsten, "Java Server Pages", SPD O'Reilly		
3. Naug	nton, Schildt, "The Complete Reference JAVA2", TMH		
	Evaluation/Assessment Methodology		
		Max. Marks	100
1. Clas	s tasks/ Sessional Examination	15	
2. Pres	entations /Seminar		
3. Assi	gnments		
	anah Draisat Danant		
4. Rese	arch Project Report	10	
	inar On Research Project Report	10	
		10 75	
5. Sem			
5. Sem 6. ESE	inar On Research Project Report Total:	75	
5. Sem 6. ESE Prerequi	inar On Research Project Report Total: sites for the course: NIL	75	
5. Sem 6. ESE Prerequi	inar On Research Project Report Total: sites for the course: NIL Learning Outcomes:	75 100	
5. Sem 6. ESE Prerequi Course	inar On Research Project Report Total: Sites for the course: NIL Learning Outcomes: Students are able to develop a dynamic webpage by the use of java script a	75 100 and DHTML.	
5. Sem 6. ESE Prerequi Course I CO1:	inar On Research Project Report Total: Sites for the course: NIL Learning Outcomes: Students are able to develop a dynamic webpage by the use of java script a Students will be able to write a well formed / valid XML document.	75 100 and DHTML.	delete
5. Sem 6. ESE Prerequi Course I CO1: CO2:	inar On Research Project Report Total: Sites for the course: NIL Learning Outcomes: Students are able to develop a dynamic webpage by the use of java script a	75 100 and DHTML.	delete
5. Sem 6. ESE Prerequi Course I CO1: CO2:	inar On Research Project Report Total: <u>sites for the course: NIL</u> Learning Outcomes: Students are able to develop a dynamic webpage by the use of java script a Students will be able to write a well formed / valid XML document. Students will be able to connect a java program to a DBMS and perform is operations on DBMS table.	75 100 and DHTML. nsert, update and	
5. Sem 6. ESE Prerequi Course I CO1: CO2: CO3:	inar On Research Project Report Total: Sites for the course: NIL Learning Outcomes: Students are able to develop a dynamic webpage by the use of java script a Students will be able to write a well formed / valid XML document. Students will be able to connect a java program to a DBMS and perform is operations on DBMS table. Students will be able to write a server side java application called Servlet	75 100 and DHTML. nsert, update and	
5. Sem 6. ESE Prerequi Course I CO1: CO2: CO3:	inar On Research Project Report Total: <u>sites for the course: NIL</u> Learning Outcomes: Students are able to develop a dynamic webpage by the use of java script a Students will be able to write a well formed / valid XML document. Students will be able to connect a java program to a DBMS and perform is operations on DBMS table.	75 100 and DHTML. nsert, update and to catch form da	ta sent



Drogram	nmaiDac	7800	Year: II	
Programme:Degree Class:MCA		giee	Semester:III	
Credits	ICA	Subject: Dia Date	Semester:m	
Theory:4	1Cr	Subject:Big Data		
Course		Title:Big Data		
MCA-02		The.Dig Data		
	Objectiv	70C+		
	0		Data Analytics concepts and its applications in bus	inoss
		6 6	nponents of Map Reduce Framework and HDFS.	5111055.
		queries in NoSQL env		
	-	1 -	Map Reduce based distributed processing application	ns
			applications using HBASE, Hive, Pig etc.	<u>, , , , , , , , , , , , , , , , , , , </u>
-	of Paper			
			0% Marks (ISE+ESE)	
L:3	111 I a 5511			
T:1				
P:0(In H	ours/We	ek)		
	1Hr.=1Ci	-		
		Credit(4Hrs./Week=4	4Credits)	
Unit			Contents	No. of
				Lectures
				Allotted
Ι	Introdu	uction to Big Data	: Types of digital data, history of Big Data	08
			Big Data platform, drivers for Big Data, Big Data	
			stics, 5 Vs of Big Data, Big Data technology	
	compor	nents, Big Data imp	portance and applications, Big Data features –	
	security	y, compliance, auditin	g and protection, Big Data privacy and ethics, Big	
	Data A	nalytics, Challenges	of conventional systems, intelligent data analysis,	
	nature of	of data, analytic proce	essesand tools, analysis vs reporting, modern data	
	analytic	e tools.		
II	Hadoo	p: History of Hadoo	p, Apache Hadoop, the Hadoop Distributed File	08
	2	· 1	doop, data format, analyzing data with Hadoop,	
	-	-	ng, Hadoop pipes, Hadoop Echo System.	
	-	1	framework and basics, how Map Reduce works,	
			pplication, unit tests with MR unit, test data and	
		•	p Reduce job run, failures, job scheduling, shuffle	
			ap Reduce types, input formats, output formats,	
		educefeatures, Real-w		
III			I File System): Design of HDFS, HDFS concepts,	08
		0	sizes, block sizes and block abstraction in HDFS,	
	1		DFS store, read, and write files, Java interfaces to	
			ace, Hadoop file system interfaces, data flow, data	
	-		op, Hadoop archives, Hadoop I/O: Compression,	
			e-based data structures. Hadoop Environment: uster, cluster specification, cluster setup and	



	installation, Hadoop configuration, security in Hadoop, administering H	Hadoop,
	HDFS monitoring & maintenance, Hadoop benchmarks, Hadoop in the	cloud
IV	 Hadoop Eco System and YARN: Hadoop ecosystem comp schedulers, fair and capacity, Hadoop 2.0 New Features – Name Nov availability, HDFS federation, MRv2, YARN, Running MRv1 in YARN NoSQL Databases: Introduction to NoSQL Mongo DB: Introduction types, creating, updating and deleing documents, querying, introduct indexing, capped collections Spark: Installing spark, spark applications, jobs, stages and tasks, R Distributed Databases, anatomy of a Spark job run, Spark on YARN SCALA: Introduction, classes and objects, basic types and operators, 	oonents, 08 de high N. on, data ction to esilient
X 7	control structures, functions and closures, inheritance.	
V Text F	 Hadoop Eco System Frameworks: Applications on Big Data using P and H Base. Pig : Introduction to PIG, Execution Modes of Pig, Comparison of P Databases, Grunt, Pig Latin, User Defined Functions, Data Pro operators, Hive - Apache Hive architecture and installation, Hive shell services, Hive metastore, comparison with traditional databases, H tables, querying data and user defined functions, sorting and aggregatin Reduce scripts, joins & subqueries. HBase– Hbase concepts, clients, example, Hbasevs RDBMS, advanced schema design, advance indexing, Zookeeper – how it helps in monit cluster, how to build applications with Zookeeper. IBM Big Data s introduction to Infosphere, Big Insights and Big Sheets, introduction SQL. Book: 	ig with cessing II, Hive liveQL, Ig, Map I usage, coring a trategy,
	ichael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big A	Analytics: Emerging
	siness Intelligence and Analytic Trends for Today's Businesses", Wiley.	, , , , ,
	g-Data Black Book, DT Editorial Services, Wiley.	
	rk de Roos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch,	
	ta Analytics for Enterprise Class Hadoop and Streaming Data", McGraw H	111.
	e nce Book: Iomas Erl, Wajid Khattak, Paul Buhler, "Big Data Fundamentals: Con	ncants Drivers and
	connais Ell, Wajid Khattak, Faul Buller, Big Data Fundamentals. Con conniques", PrenticeHall.	neepis, Drivers and
	art Baesens "Analytics in a Big Data World: The Essential Guide to D	Data Science and its
	oplications (WILEY Big Data Series)", John Wiley & Sons	
	shdeep Bahga, Vijay Madisetti, "Big Data Science & Analytics: A Hands C	On Approach ",VPT
	Evaluation/Assessment Methodology	
		Max. Marks 100
	lasstasks/Sessional Examination	15
	resentations /Seminar	
	ssignments	10
	esearch Project Report	10
	eminar On Research Project Report	75
6. E	SE Totali	75 100
	Total:	100



Prerequisites for the course: NIL

Course Learning Outcomes:

- CO1: Identify Big Data and its Business Implications.
- CO2: List the components of Hadoop and Hadoop Eco-System
- CO3: Access and Process Data on Distributed File System
- CO4: Manage Job Execution in Hadoop Environment
- CO5: Develop Big Data Solutions using Hadoop Eco System



Programme:Degree		ree	Year: II		
Class:MCA			Semester:III		
Credits	Subject:Simulation and Modelling				
Theory:4	łCr				
Course C	Code: Title: Simulation and Modelling				
MCA-023					
CourseObjectives:					
CO1: Study the concept of system, its components and types.					
CO2 U	CO2 Understand and analyze nature and techniques of major simulation models.				
CO3: St	Study and simulation. Analyze the idea of continuous and discrete system.				
CO4: U	Understand the notion of system dynamics and system dynamicsdiagrams.				
CO5: Fi	O5: Finding critical path computation and understanding PERT networks				
Nature of Paper: DSE					
Minimum Passing Marks/Credits:40% Marks (ISE+ESE)					
L:3					
T:1					
P:0(In Hours/Week)					
Theory-1Hr.=1Credit					
•		Credit(4Hrs./Week=4	Credits)		
Unit				No. of	
				Lectures	
				Allotted	
Ι	System definition and components, stochastic activities, continuous a			08	
			odeling, Types of models, static and dynamic		
	physical models, static and dynamic mathematical models, full corporate				
		types of system study.			
II	System simulation, Need of simulation, Basic nature of simulation, techniques			08	
	-		of simulation and analytical methods, types of		
	system	Simulation, real tim	e simulation, hybrid simulation, simulation of		
	pursuit	problem, single-serve	er queuing system and an inventory problem,		
			ributed Lag model, Cobweb model.		
III	Simulat	ion of continuous Sys	stems, analog vs digital simulation, simulation of	08	
			lation of a servo system, simulation of an auto-		
	pilot. D	viscrete system simula	ation, fixed time step vs. event-to-event model,		
			rs, test of randomness, Monte-Carlo computation		
		hastic simulation.			
IV	System	dynamics, exponent	ial growth models, exponential decay models,	08	
	-		nics diagrams, world model.		
V	Simulat	ion of PERT netwo	rks, critical path computation, uncertainties in	08	
			location and consideration, Simulation languages,		
	-	riented simulation			
Text Book:					
1. Geoffrey Gordon, "System Simulation", PHI					
2. Narsingh Deo, "System Simulation with digital computer", PHI.					



Reference Book:	
1. Averill M. Law and W. David Kelton, "Simulation Modelling and Analysis",	TMH.
Evaluation/Assessment Methodology	
	Max. Marks 100
1. Classtasks/SessionalExamination	15
2. Presentations /Seminar	
3. Assignments	
4. ResearchProjectReport	10
5. SeminarOnResearchProjectReport	
6. ESE	75
Total:	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO1: Describe the role of important elements of discrete event simulation and	modeling paradigm.
CO2: Conceptualize real world situations related to systems development of	lecisions, originating
from source requirements and goals.	
CO3: Interpret the model and apply the results to resolve critical issues in a real	l world environment.
CO4: Apply random number variates to develop simulation models	

CO5: Analyze output data produced by a model and test validity of the model



Progra	mme:De	gree	Year: II	
Class:N		5	Semester:III	
Credits		Subject: Software Te	sting & Quality Assurance	
Theory:		5		
Course		Title: Software Testin	ng & Quality Assurance	
MCA-0	024			
Course	Objectiv	ves:		
CO1:	Test the s	oftware by applying te	esting techniques to deliver a product free from bug	5 8.
CO2	Investiga	nvestigate the scenario and select the proper testing technique.		
CO3:	Explore the test automation concepts and tools and estimation of cost, schedule based			
	standard			
			ify, prevent and remove defects.	
			urance models and develop quality. Ability to co	nduct formal
	-		results of inspections.	
	of Paper			
	um Passi	ng Marks/Credits: 40	9% Marks (ISE+ESE)	
L:3				
T:1		1 \		
	Hours/We			
2	-1Hr.=1C			
	al-2Hrs.=	Credit(4Hrs./Week=4		
Unit			Contents	No. of
				Lectures
Ι	Softwa	no Tosting Dogiog. To	acting as an anginaging activity. Data of magaza	Allotted
1			esting as an engineering activity, Role of process	08
			as a process, Basic definitions, Software testing a software development organization, Origins of	
			he defect repository and test design, Defect	
			support for developing a defect repository.	
II			vels of Testing: Using White Box Approach to	08
11			Vs. Structural Testing, Code Functional Testing,	00
			Graphs, Using Black Box Approaches to Test	
			ng, Requirements based testing, Decision tables,	
			effect graphing, Error guessing, Compatibility	
			Unit Testing, Integration Testing, Defect Bash	
			ng - Usability and Accessibility Testing,	
		uration Testing, Comp	• • • •	
III	-	re Test Automatio		08
			r Automation, Scope of Automation, Design and	
			, Requirements for a Test Tool, Challenges in	
	Autom	ation Tracking the Bug	, Debugging. Testing Software System Security -	
	Six-Sig	ma, TQM - Complex	xity Metrics and Models, Quality Management	
		-	, Defect Removal Effectiveness, FMEA, Quality	
			hi Quality Loss Function, Cost of Quality.	



		00
IV Fundamentals of Software Quality Assurance: SQA basics, Component of Software Quality Assurance subjects in husing and the Software Quality in husing and the software subjects of the software s		08
the Software Quality Assurance System, software quality in business of		
planning for software quality assurance, product quality and process	quanty,	
software process models, 7 QC Tools and Modern Tools.	0.0000	00
V Software Assurance Models: Models for Quality Assurance, IS		08
series, CMM, CMMI, Test Maturity Models, SPICE, Malcolm E Model- P- CMM.	saldrige	
	SD OO	
Software Quality Assurance Trends: Software Process- PSP and T Methodology, Clean room software engineering, Defect Injection		
prevention, Internal Auditing and Assessments, Inspections & Walkthro		
Case Tools and their affect on Software Quality.	Jugiis,	
Text Book:		
1. Aditya P. Mathur, "Foundations of Software Testing", Pearson.		
 Paul Ammann, Jeff Offutt, "Introduction to Software Testing", Cambridge United Software Software Testing", Cambridge United Software S	niversity	Press
3. Paul C. Jorgensen, "Software Testing: A Craftsman's Approach", Auerbach P		
4. William Perry, "Effective Methods of Software Testing", Wiley Publishing, 7		
Reference Book:		
1. RenuRajani, Pradeep Oak, "Software Testing – Effective Methods, Tools	and Tech	niques".
Tata McGrawHill.		,
2. Stephen Kan, "Metrics and Models in Software Quality", Addison – Wesley,	Second E	dition.
3. S. A. Kelkar, "Software quality and Testing", PHI Learning Pvt, Ltd.		
Evaluation/Assessment Methodology		
	Max.	Marks 100
1. Classtasks/Sessional Examination		15
2. Presentations /Seminar		
3. Assignments		
4. Research Project Report		10
5. Seminar On Research Project Report		
6. ESE		75
Total:		100
Prerequisites for the course: NIL		
Course Learning Outcomes:		
CO1: Students learn to apply software testing knowledge and engineering meth		
CO2: Students understand and identify various software testing problems, and		ese problems
by designing and selecting software test models, criteria, strategies, and i		
CO3: Students analyze and understand the use of software testing methods	and mode	ern software
testing tools for their testing projects		
CO4: Students identify defects and manage those defects for improvement	-	• •
CO5: Software Choose appropriate quality assurance models and develop	o quality	. Ability to
conduct formal inspections, record and evaluate results of inspections.		



Program	nme:De	gree	Year: II	
Class:MCA			Semester: III	
Credits		Subject:Digital Image	e Processing	
Theory:4	4Cr		-	
Course	Code:	Title:Digital Image P	rocessing	
MCA-02	25		-	
Course	Objectiv	ves:		
	Explain t color mo	-	wo-dimensional signal acquisition, sampling, qua	ntization and
	Apply in lomains.		ques for image enhancement in both the spatiala	nd frequency
			ration techniques in both spatial and frequency do	main.
		1 0	based segmentation algorithms for ROIextraction	
	-	6	s and descriptors for image processing.	
Nature	of Paper	: DSE		
Minimu	ım Passi	ng Marks/Credits:40	% Marks (ISE+ESE)	
L:3				
T:1				
P:0(In H		· · · · · · · · · · · · · · · · · · ·		
Theory-				
	l-2Hrs.=	1Credit(4Hrs./Week=4		
Unit			Contents	No. of
				Lectures Allotted
Ι			tals: Steps in Digital Image Processing –	08
	-		of Visual Perception – Image Sensing and	
	-	e 1	ng and Quantization – Relationships between	
	-	ē	nentals – RGB, HSI models, Two-dimensional	
			D transforms – DFT, DCT.	00
II	Histogr Sharper Transfo	am processing – I ning Spatial Filtering orm– Smoothing and worth and Gaussian	tial Domain: Gray level transformations – Basics of Spatial Filtering–Smoothing and , Frequency Domain: Introduction to Fourier Sharpening frequency domain filters – Ideal, filters, Homomorphic filtering, Color image	08
III	models – Band Filterin	– Mean Filters – Orde l pass Filters – Notcl g – Wiener filtering	estoration – degradation model, Properties, Noise r Statistics – Adaptive filters – Band reject Filters h Filters – Optimum Notch Filtering – Inverse	08
IV	Thresh splitting Segmen	olding – Region base g and merging – Me	detection, Edge linking via Hough transform – ed segmentation – Region growing – Region orphological processing- erosion and dilation, gical watersheds – basic concepts – Dam mentation algorithm.	08



V			1	
V	Image Compression and Recognition: Need for data compression, Hu		08	
	Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard			
	MPEG. Boundary representation, Boundary description, Fourier Des	•		
	Regional Descriptors - Topological feature, Texture - Patterns and	Pattern		
	classes – Recognition based on matching.			
Text Boo				
	el C. Gonzalez, Richard E. Woods, "Digital Image Processing", Pea	arson, Th	ird Edition,	
2010.				
	K. Jain, "Fundamentals of Digital Image Processing", Pearson, 2002.			
-	eth R. Castleman, "Digital Image Processing" Pearson, 2006.			
Reference				
	Dudgeon and R M. Mersereau, "Multidimensional Digital Signal Proce	essing", P	rentice Hall	
	ssional Technical Reference, 1990.			
	am K. Pratt, "Digital Image Processing" John Wiley, New York, 2002.			
	n Sonka et al, "Image processing, analysis and machine vision H	Brookes/O	Cole", Vikas	
Publi	shing House, 2 nd edition, 1999.			
	Evaluation/Assessment Methodology			
		Max.	Marks 100	
1. Clas	Evaluation/Assessment Methodology stasks/Sessional Examination	Max.	Marks 100	
		Max.		
 Pres Assi 	stasks/Sessional Examination entations /Seminar gnments	Max.		
 Pres Assi 	stasks/Sessional Examination entations /Seminar	Max.		
 Pres Assi Rese 	stasks/Sessional Examination entations /Seminar gnments	Max.	15	
 Pres Assi Rese 	stasks/Sessional Examination entations /Seminar gnments earch Project Report inar On Research Project Report	Max.	15	
 Pres Assi Rese Sem 	stasks/Sessional Examination entations /Seminar gnments earch Project Report inar On Research Project Report	Max.	15 10	
 Pres Assi Rese Sem ESE 	stasks/Sessional Examination entations /Seminar gnments earch Project Report inar On Research Project Report	Max.	15 10 75	
 Pres Assi Rese Sem ESE 	stasks/Sessional Examination entations /Seminar gnments earch Project Report inar On Research Project Report Total:	Max.	15 10 75	
 Pres Assi Rese Sem ESE Prerequised Course	stasks/Sessional Examination entations /Seminar gnments earch Project Report inar On Research Project Report Total: isites for the course: NIL	Max.	15 10 75	
 2. Pres 3. Assi 4. Rese 5. Sem 6. ESE Prerequi Course CO1: H	stasks/Sessional Examination entations /Seminar gnments earch Project Report inar On Research Project Report Total: isites for the course: NIL Learning Outcomes:	Max.	15 10 75	
 2. Pres 3. Assi 4. Rese 5. Sem 6. ESE Prerequi Course CO1: F CO2: A	stasks/Sessional Examination entations /Seminar gnments earch Project Report inar On Research Project Report <u>Total:</u> isites for the course: NIL Learning Outcomes: Review the fundamental concepts of a digital image processing system.	Max.	15 10 75	
 2. Pres 3. Assi 4. Rese 5. Sem 6. ESE Prerequit Course CO1: H CO2: A CO3: H 	stasks/Sessional Examination entations /Seminar gnments earch Project Report inar On Research Project Report <u>Total:</u> isites for the course: NIL Learning Outcomes: Review the fundamental concepts of a digital image processing system. Analyze images in the frequency domain using various transforms.	Max.	15 10 75	



IIMT UNIVERSITY Year-II/Semester-III

Progra	mme:D	egree Year: II		
Class:N		Semester:III		
Credits	5	Subject: Artificial Intelligence Lab		
Theory:				
Course	Code:	Title: Artificial Intelligence Lab		
MCA-2	231P			
Course	Object	ives:		
CO1:	Study ar	d understand AI tools such as Python / MATLAB.		
		I tools to analyze and solve common AI problems.		
		ent and compare various AI searching algorithms.		
		ent various machine learning algorithms.		
	_	ent various classification and clustering techniques.		
	of Pape			
	um Pass	ing Marks/Credits:50% Marks (ISE+ESE)		
L:0				
T:0				
	Hours/W			
2	-1Hr.=10			
	al-2Hrs.=	=1Credit(4Hrs./Week=4Credits)		
Unit		Contents	No. of	
			Lectures	
	1. Ins	tallation and working on various AI tools such as Duthon (MATI AD	Allotted 02	
		tallation and working on various AI tools such as Python /MATLAB.	02	
		ograms to solve basic AI problems.	02	
		plementation of different AI searching techniques.		
		plementation of different game playing techniques.	02	
		plementation of various knowledge representation techniques.	02	
		gram to demonstrate the working of Bayesiannet work.	02	
	-	plementation of pattern recognition problems such as handwritten racter/ digit recognition, speech recognition, etc.	02	
		plementation of different classification techniques.	02	
		plementation of various clustering techniques.	02	
	10. Natural language processing tool development02			
Text Bo			~=	
		nd Norvig P., "Artificial Intelligence – A Modern Approach", PearsonEd	ucation.	
		Knight K., "Artificial Intelligence", McGraw Hill Publications.		
	nce Boo			
Book:				
1. Khe	emani D	, "A First Course in Artificial Intelligence", McGrawHill.		



Evaluation/Assessment Methodology	Max. Marks 100
1. Class tasks/Sessional Examination	25
2. Presentations /Seminar	
3. Assignments	
4. Research Project Report	
5. Seminar On Research Project Report	
6. ESE	25
Total:	50
Prerequisites for the course: NIL	
Course Learning Outcomes:	

Course Learning Outcomes:

- CO1: Demonstrate understand AI tools such as Python / MATLAB.
- CO2: Apply various pre-processing techniques on different datasets.
- CO3: Construct Machine learning programs for Supervised, Unsupervised and Semisupervised learning models.
- CO4: Develop Deep learning programs for Supervised & Unsupervised learning models.
- CO5: Implement various classification and clustering techniques.



IIMT UNIVERSITY Year-II/Semester-III

0	nme: Degree	Year: II			
Class: MCA Semester: III					
Credits Subject: Software Engineering Lab					
Theory:2					
Course	e	neering Lab			
MCA-23					
	Objectives:				
	Identify ambiguities, inconsistencies and incompleteness from a requirements specification a				
	tate functional and non-function	1			
		use cases from a given problem statement and dra	aw use cas		
		with different types of relationship.			
		tifying classes and association among them.			
		UML diagrams and associations among them and			
		ndergoing in a system, and represent them pictoriall			
		g tools for specification, design, implementation and	i testing.		
	of Paper: Core				
	m Passing Marks/Credits: 5	0% Marks (ISE+ESE)			
L:0					
T:0	(West)				
	ours/Week) 1Hr.=1Credit				
-	-2Hrs.=1Credit(4Hrs./Week=4	(Credits)			
Unit	-211131C1Cut(41113./ WCCK	Contents	No. of		
Ome		Contents	Lectures		
l			Allotted		
	1. Prepare a SRS document	in line with the IEEE recommended standards.			
l	I I	n and specify the role of each of theactors.	02		
1			$\frac{02}{02}$		
1	13 Prepare state the precondi	tion post condition and function of each use case	02		
	1 1	tion, post condition and function of each use case.	02 02		
	4. Draw the activitydiagram		02 02 02		
	 Draw the activitydiagram. Identify the classes. Class 		02 02		
	 Draw the activitydiagram. Identify the classes. Class class diagram. 	sify them as weak and strong classes and drawthe	02 02 02 02		
	 Draw the activitydiagram. Identify the classes. Class class diagram. Draw the sequence diagram 	sify them as weak and strong classes and drawthe m for any two scenarios.	02 02 02 02 02 02		
	 Draw the activitydiagram. Identify the classes. Class class diagram. Draw the sequence diagra Draw the collaboration diagram. 	sify them as weak and strong classes and drawthe m for any two scenarios. agram.	02 02 02 02 02 02 02 02		
	 Draw the activitydiagram. Identify the classes. Class class diagram. Draw the sequence diagra Draw the collaboration diagram. Draw the state chart diagram. 	sify them as weak and strong classes and drawthe m for any two scenarios. agram. am.	02 02 02 02 02 02 02 02 02		
	 Draw the activitydiagram. Identify the classes. Class class diagram. Draw the sequence diagra Draw the collaboration diagram. 	sify them as weak and strong classes and drawthe m for any two scenarios. agram. am. ram.	02 02 02 02 02 02 02 02		

2. Pankaj Jalote, "Software Engineering", Wiley

Reference Book:

Book:

- 1. Ghezzi, M. Jarayeri, D. Manodrioli, "Fundamentals of Software Engineering", PHI Publication.
- 2. Ian Sommerville, "Software Engineering", Addison Wesley.



Evaluation/Assessment Methodology	
	Max. Marks 100
1. Class tasks/Sessional Examination	25
2. Presentations /Seminar	
3. Assignments	
4. Research Project Report	
5. Seminar On Research Project Report	
6. ESE	25
Total:	50
Prerequisites for the course: NIL	

Course Learning Outcomes:

CO1: Able to prepare SRS document, design document, test cases and software configuration management and risk management related document.

CO2: Develop function oriented and object oriented software design using tools like rational rose.

CO3: Able to perform unit testing and integration testing.

CO4: Apply various white box and black box testing techniques

CO5: Able to track the progress of a project using Open projtool.



Program	nma. De	gree Year: II			
Class: N		Semester: IV			
Credits	ICA	Subject :Privacy and Security in Online Social Media			
Theory:3	3Cr	Subject if fivacy and Security in Online Social Wedia			
Course		Title: Privacy and Security in Online Social Media			
MCA-03		The Trivacy and Security in Omine Social Media			
Course		 /PS:			
	0	nd working of online social networks			
		privacy policies of online social media			
	1 91				
		owledge of identity management in Online social networks			
		various privacy issues associated with popular social media.			
Nature					
		ng Marks/Credits:40% Marks (ISE+ESE)			
L:3					
T:0					
P:0(In H	lours/We	ek)			
Theory-1	1Hr.=1C	redit			
Practical	-2Hrs.=1	ICredit(4Hrs./Week=4Credits)			
Unit		Contents	No. of		
			Lectures		
			Allotted		
Ι		uction to Online Social Networks: Introduction to Social Networks,	08		
		offline to Online Communities, Online Social Networks, Evolution of			
		Social Networks, Analysis and Properties, Security Issues in Online			
		Networks, Trust Management in Online Social Networks, Controlled			
		ation Sharing in Online Social Networks, Identity Management in			
		Social Networks, data collection from social networks, challenges,			
		inities, and pitfalls in online social networks, APIs; Collecting data			
II		nline Social Media.	00		
11		Management in Online Social Networks: Trust and Policies, Trust and tion Systems, Trust in Online Social, Trust Properties, Trust	08		
	-	nents, Social Trust and Social Capital, Trust Evaluation Models, Trust,			
	-	lity, and reputations in social systems; Online social media and			
		g, Information privacy disclosure, revelation, and its effects in OSM			
		ine social net works; Phishing in OSM & Identifying fraudulent entities			
		ne social networks, i filsing in obsivit & identifying fiddedicht chitices			
III		Illed Information Sharing in Online Social Networks: Access	08		
		Models, Access Control in Online Social Networks, Relationship-			
		Access Control, Privacy Settings in Commercial Online Social			
		ks, Existing Access			
		Approaches			
IV		y Management in Online Social Networks: Identity Management,	08		
		Identity, Identity Management Models: From Identity 1.0 to Identity			



		1
2.0, Identity Management in Online Social Networks, Identity	y as Self-	
Presentation, Identity		
thefts, Open Security Issues in Online Social Networks		
V Case Study: Privacy and security issues associated with various soc	ial media	08
such as Facebook, Instagram, Twitter, LinkedIn etc.		
Text Book:		
1. Security and Privacy-Preserving in Social Networks, Editors: Chbeir, Ric	hard, Al Bo	una, Bechara
(Eds.), Spinger, 2013.		
2. Security and Trust in Online Social Networks, Barbara Carminati, Elena	1 Ferrari, M	arco Viviani,
Morgan & Clay pool publications.		
3. Security and Privacy in Social Networks, Editors: Altshuler, Y., Elov	vici, Y., Cr	emers, A.B.,
Aharony, N., Pentland, A. (Eds.), Springer, 2013		
Reference Book:		
1. Security and privacy preserving in social networks, Elie Raad & Richard	l Chbeir, Ri	chard Chbeir
& Bechara Al Bouna,2013		
2. Social Media Security: Leveraging Social Networking While Mitigatin	ng Risk, M	ichael Cross,
2013.		
Evaluation/Assessment Methodology		
	Max.	Marks 100
1. Class tasks/Sessional Examination		20
2. Presentations /Seminar		
3. Assignments		
4. Research Project Report		10
5. Seminar On Research Project Report		
6. ESE		70
Tota	մ:	100
Prerequisites for the course: NIL		
Course Learning Outcomes:		
CO1: Able to understand working of online social networks		
CO2: Describe privacy policies of online social media		
CO3: Analyse countermeasures to control information sharing in Online so	cial network	άς.
CO4: Apply knowledge of identity management in Online social networks		
	• 1 1•	

CO5: Compare various privacy and security issues associated with popular social media.



Progra	mme:De	gree	Year: II	
8			Semester: IV	
Credits		Subject:Soft Comput		
Theory:	3Cr	v 1		
Course		Title:Soft Computing	7	
MCA-0	32	1 0		
Course	Objecti	ves:		
	Recogniz computir		computing and study basic concepts and techni	ques of soft
CO2	-	nd the basic concepts	s of artificial neural network to analyze widely	used neural
			certainty in various real-world problems.	
			blutionary computing and evaluate genetic algorith	nm in solving
	•	tion problems.	stationaly comparing and evaluate generic algorith	
	1	1	lications of soft computing.	
	of Pape			
			% Marks (ISE+ESE)	
L:3		0		
T:0				
P:0(In H	Hours/W	eek)		
Theory-	-1Hr.=1C	Credit		
Practica	ll-2Hrs.=	1Credit(4Hrs./Week=4	Credits)	
Unit			Contents	No. of
				Lectures
				Allotted
I	compu compu Artific brain, buildin	ting, Concept of le ting, Applications of so ial Neural Networks Biological neural netw g blocks of an art	 aputing: Introduction, Comparison with hard arning and adaptation, Constituents of soft off computing. Basic concepts of neural networks, Human vork, History of artificial neural networks, Basic ificial neuron, Neural network architectures, eristics and limitation of neural networks. 	08
II	Reinfo Major percep Recurr maps.	rcement, Hebbian, Gra classes of neural tron model, Back-prop ent neural network, Ho	E Learning methods - Supervised, Unsupervised, dient descent, Competitive, Stochastic. networks: Perceptron networks, Multilayer pagation network, Radial basis function network, opfield networks, Kohonen self-organizingfeature	08
III	Proper sets, C and typ Fuzzy Inferen	ties of classical sets, (perations on fuzzy se bes of fuzzy membersh Systems: Crisp logic,	to Fuzzy Logic, Comparison with crisp logic, Operations on classical sets, Properties of fuzzy ts, Classical relations, Fuzzy relations, Features ip functions, Fuzzy arithmetic, Fuzzy measures. Predicate logic, Fuzzy logic, Fuzzy propositions, nference systems- Fuzzification, Inference, erence engines.	08 BOS



IV	Evolutionary Computing: Introduction, Evolutionary algorithm, Biological	08
	evolutionary process, Paradigms of evolutionary computing – Genetic	
	algorithm and Genetic programming, Evolutionary strategies, Evolutionary	
	programming.	
	Genetic Algorithm: Introduction, Traditional optimization and search	
	techniques, Comparison with traditional algorithms, Operations- Encoding,	
	Selection, Crossover and Mutation, Classification of Genetic algorithm.	
V	Hybrid Soft Computing Techniques: Introduction, Classification of hybrid	08
	systems, Neuro-fuzzy hybrid systems, Neuro-genetic hybrid systems, Fuzzy-	
	genetic hybrid systems.	
	Other Soft Computing Techniques: Tabu Search, Ant colony based	

Text Book:

- 1. Sivanandam S.N. and Deepa S.N., "Principles of Soft Computing", Wiley-India.
- 2. Rajasekaran S. and Vijayalakshmi Pai G.A., "Neural Networks, Fuzzy Logic and Genetic Algorithms- Synthesis and Applications", PHILearning.
- 3. Chakraverty S., Sahoo D.M. and Mahato N. R., "Concepts of Soft Computing- Fuzzy and ANN with Programming", Springer.

Reference Book:

- 1. Kaushik S. and Tiwari S., "Soft Computing Fundamentals, Techniques and Applications', McGrawHill Education.
- 2. Jang J.-S.R., Sun C.-T. and Mizutani E., "Neuro-Fuzzy and Soft Computing", Prentice-Hall of India.

Evaluation/Assessment Methodology			
	Max. Marks 100		
1. Classtasks/SessionalExamination	20		
2. Presentations /Seminar			
3. Assignments			
4. ResearchProjectReport	10		
5. SeminarOnResearchProjectReport			
6. ESE	70		
Total:	100		

Prerequisites for the course: NIL

Course Learning Outcomes:

- CO1: Recognize the need of soft computing and study basic concepts and techniques of soft computing.
- CO2: Apply neural networks, bidirectional associative memories and adaptive resonance theory for solving different engineering problems
- CO3: Identify and describe soft computing techniques and build supervised learning and unsupervised learning networks.
- CO4: Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering CO5: problems.

Evaluate and compare solutions by various soft computing approaches for a given problem.



Programme: Degree Year: II Class: MCA Semester: IV Credits Subject: Pattern Recognition Theory:3Cr Title: Pattern Recognition			
Theory:3Cr			
Theory:3Cr			
MCA-033			
Course Objectives:			
CO1: Study of basics of Pattern recognition. Understand the designing principles and Mathe	ematical		
foundation used in pattern recognition.			
CO2 Analysis the Statistical Patten Recognition.			
CO3: Understanding the different Parameter estimation methods.			
CO4: Understanding the different Nonparametric Techniques.			
CO5: Understand and Make use of unsupervised learning and Clustering in Pattern recognit	tion.		
Nature of Paper: DSE			
Minimum Passing Marks/Credits:40% Marks (ISE+ESE)			
L:3			
T:0			
P:0(In Hours/Week)			
Theory-1Hr.=1Credit			
Practical-2Hrs.=1Credit(4Hrs./Week=4Credits)			
	No. of		
	Lectures		
	Allotted		
I Introduction: Basics of pattern recognition, Design principles of pattern	08		
recognition system, Learning and adaptation, Pattern recognition approaches,			
Mathematical foundations – Linear algebra, Probability Theory, Expectation,			
mean and covariance, Normal distribution, multivariate normal densities, Chi			
squared test.			
II Statistical Patten Recognition: Bayesian Decision Theory, Classifiers,	08		
Normal density and discriminant functions III Parameter estimation methods: Maximum-Likelihood estimation, Bayesian	08		
Normal density and discriminant functions	08		
Normal density and discriminant functions III Parameter estimation methods: Maximum-Likelihood estimation, Bayesian	08		
Normal density and discriminant functions III Parameter estimation methods: Maximum-Likelihood estimation, Bayesian Parameter estimation, Dimension reduction methods - Principal Component	08		
Normal density and discriminant functionsIIIParameter estimation methods: Maximum-Likelihood estimation, Bayesian Parameter estimation, Dimension reduction methods - Principal Component Analysis (PCA), Fisher Linear discriminant analysis, Expectation- maximization (EM), Hidden Markov Models (HMM), Gaussian mixture 	08		
Normal density and discriminant functionsIIIParameter estimation methods: Maximum-Likelihood estimation, Bayesian Parameter estimation, Dimension reduction methods - Principal Component Analysis (PCA), Fisher Linear discriminant analysis, Expectation- maximization (EM), Hidden Markov Models (HMM), Gaussian mixture models.IVNonparametric Techniques: Density Estimation, Parzen Windows, K-	08 08		
Normal density and discriminant functions III Parameter estimation methods: Maximum-Likelihood estimation, Bayesian Parameter estimation, Dimension reduction methods - Principal Component Analysis (PCA), Fisher Linear discriminant analysis, Expectation- maximization (EM), Hidden Markov Models (HMM), Gaussian mixture models. IV Nonparametric Techniques: Density Estimation, Parzen Windows, K- Nearest Neighbor Estimation, Nearest Neighbor Rule, Fuzzyclassification.			
Normal density and discriminant functions III Parameter estimation methods: Maximum-Likelihood estimation, Bayesian Parameter estimation, Dimension reduction methods - Principal Component Analysis (PCA), Fisher Linear discriminant analysis, Expectation- maximization (EM), Hidden Markov Models (HMM), Gaussian mixture models. IV Nonparametric Techniques: Density Estimation, Parzen Windows, K- Nearest Neighbor Estimation, Nearest Neighbor Rule, Fuzzyclassification. V Unsupervised Learning & Clustering: Criterion functions for clustering,			
Normal density and discriminant functions III Parameter estimation methods: Maximum-Likelihood estimation, Bayesian Parameter estimation, Dimension reduction methods - Principal Component Analysis (PCA), Fisher Linear discriminant analysis, Expectation- maximization (EM), Hidden Markov Models (HMM), Gaussian mixture models. IV Nonparametric Techniques: Density Estimation, Parzen Windows, K- Nearest Neighbor Estimation, Nearest Neighbor Rule, Fuzzyclassification. V Unsupervised Learning & Clustering: Criterion functions for clustering, Clustering Techniques: Iterative square - error partitional clustering - K	08		
Normal density and discriminant functions III Parameter estimation methods: Maximum-Likelihood estimation, Bayesian Parameter estimation, Dimension reduction methods - Principal Component Analysis (PCA), Fisher Linear discriminant analysis, Expectation- maximization (EM), Hidden Markov Models (HMM), Gaussian mixture models. IV Nonparametric Techniques: Density Estimation, Parzen Windows, K- Nearest Neighbor Estimation, Nearest Neighbor Rule, Fuzzyclassification. V Unsupervised Learning & Clustering: Criterion functions for clustering,	08		
Normal density and discriminant functions III Parameter estimation methods: Maximum-Likelihood estimation, Bayesian Parameter estimation, Dimension reduction methods - Principal Component Analysis (PCA), Fisher Linear discriminant analysis, Expectation- maximization (EM), Hidden Markov Models (HMM), Gaussian mixture models. IV Nonparametric Techniques: Density Estimation, Parzen Windows, K- Nearest Neighbor Estimation, Nearest Neighbor Rule, Fuzzyclassification. V Unsupervised Learning & Clustering: Criterion functions for clustering, Clustering Techniques: Iterative square - error partitional clustering - K	08		
Normal density and discriminant functions III Parameter estimation methods: Maximum-Likelihood estimation, Bayesian Parameter estimation, Dimension reduction methods - Principal Component Analysis (PCA), Fisher Linear discriminant analysis, Expectation- maximization (EM), Hidden Markov Models (HMM), Gaussian mixture models. IV Nonparametric Techniques: Density Estimation, Parzen Windows, K- Nearest Neighbor Estimation, Nearest Neighbor Rule, Fuzzyclassification. V Unsupervised Learning & Clustering: Criterion functions for clustering, Clustering Techniques: Iterative square - error partitional clustering - K means, agglomerative hierarchical clustering, Cluster validation. Text Book: 1. Duda R. O., Hart P. E. and Stork D. G., "Pattern Classification", John Wiley.	08		
Normal density and discriminant functions III Parameter estimation methods: Maximum-Likelihood estimation, Bayesian Parameter estimation, Dimension reduction methods - Principal Component Analysis (PCA), Fisher Linear discriminant analysis, Expectation- maximization (EM), Hidden Markov Models (HMM), Gaussian mixture models. IV Nonparametric Techniques: Density Estimation, Parzen Windows, K- Nearest Neighbor Estimation, Nearest Neighbor Rule, Fuzzyclassification. V Unsupervised Learning & Clustering: Criterion functions for clustering, Clustering Techniques: Iterative square - error partitional clustering - K means, agglomerative hierarchical clustering, Cluster validation. Text Book:	08		



1 Singhal D "Dattorn Decognition: Technologies & Applications"	Oxford University Press			
1. Singhal R., "Pattern Recognition: Technologies & Applications", Oxford University Press.				
2. Theodoridis S. and Koutroumbas K., "Pattern Recognition", Academic Press.				
Evaluation/Assessment Methodology				
	Max. Marks 100			
1. Class tasks/Sessional Examination	20			
2. Presentations /Seminar				
3. Assignments				
4. Research Project Report	10			
5. Seminar On Research Project Report				
6. ESE	70			
Total:	100			
Prerequisites for the course: NIL				
Course Learning Outcomes:				
CO1: Study of basics of Pattern recognition. Understand the desig	gning principles and Mathematical			
foundation used in pattern recognition.				
CO2: Outline basic concepts of pattern recognition.				
CO3: Classify decision-making algorithms in pattern recognition.				
CO4: Apply Hierarchical and Partition clustering techniques in pattern recognition applications.				
CO5: Analyze feature selection algorithms in pattern recognition.				



Program	nme• De	oree	Year: II	
Programme: Degree Class: MCA		gice	Semester: IV	
	Credits Subject: Data Analytics			
Theory:3Cr				
Course Code: Title: Data Analytics				
MCA-03		The Data Thatytes		
Course		ves:		
	Describe the life cycle phases of Data Analytics through discovery, planning and building.			milding
		nd and apply Data Ana		anang.
		nt various Data streams		
			g, frame works & Visualizations.	
			l evaluating real time applications.	
Nature				
	A	ng Marks/Credits:40	% Marks (ISE+ESE)	
L:3		2	· · · · ·	
T:0				
P:0(In H	lours/We	eek)		
Theory-	1Hr.=1C	redit		
Practical	l-2Hrs.=	1Credit(4Hrs./Week=4	Credits)	
Unit			Contents	No. of
				Lectures
				Allotted
Ι			tics: Sources and nature of data, classification of	08
			ctured, unstructured), characteristics of data,	
			form, need of data analytics, evolution of analytic	
			and tools, analysis vs reporting, modern data	
		c tools, applications of	•	
			Need, key roles for successful analytic projects,	
			ics lifecycle – discovery, data preparation, model	
			nmunicating results, operationalization	
II			n modeling, multivariate analysis, Bayesian	08
			ayesian networks, support vector and kernel	
		-	series: linear systems analysis & nonlinear	
	-		Neural Networks: Learning and generalisation,	
	-	• • •	al component analysis and neural networks, fuzzy	
	-		els from data, fuzzy decision trees, stochastic	
111		methods.	duction to streams concerts stream data we del	00
III		-	duction to streams concepts, stream data model	08
			mputing, sampling data in a stream, filtering	
		•	ments in a stream, estimating moments, counting	
		-	g window, Real-time Analytics Platform (RTAP)	
			- Real time sentiment analysis, stock market	
13.7	predict		toring Mining for most items (1 (1 1	00
IV	Freque	ent Itemsets and Clus	stering: Mining frequent itemsets, market based	08



modelling, Apriori algorithm, handling large data sets in m				
limited pass algorithm, counting frequent itemsets in a stream, Clustering				
techniques: hierarchical, K-means, clustering high dimensional data, CLIQUE				
and ProCLUS, frequent pattern based clustering methods, clust	ering in non-			
euclidean space, clustering for streams and parallelism.		08		
V Frame Works and Visualization: Map Reduce, Hadoop, Pig, Hive, H Base,				
Map R, Sharding, NoSQL Databases, S3, Hadoop Distributed File Systems,				
Visualization: visual data analysis techniques, interaction techniq	ques, systems			
and applications.				
Introduction to R - R graphical user interfaces, data import	t and export,			
attribute and data types, descriptive statistics, exploratory d	lata analysis,			
visualization before analysis, analytics for unstructured data.				
Text Book:				
1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer				
2. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massi	ve Datasets",	Cambridge		
University Press.				
Reference Book:				
1. Bill Franks, "Taming the Big Data Tidalwave: Finding Opportunities i	n Huge Data S	treams with		
Advanced Analytics", John Wiley & Sons.				
2. John Garrett, "Data Analytics for IT Networks : Developing Innova	tive Use Cases	s", Pearson		
Education.				
Evaluation/Assessment Methodology				
	Max. N	Iarks 100		
1. Class tasks/Sessional Examination	20			
2. Presentations /Seminar				
3. Assignments				
4. Research Project Report	10			
5. Seminar On Research Project Report				
6. ESE 70				
Total: 100				
Prerequisites for the course: NIL				
Course Learning Outcomes:				
CO1: Understand the concepts of visualization.				
CO2: Explain and Analyse the Big Data using Map-reduce programming	in Both Hadoo	op and Spark		
frame work.		1 1		
CO3: Demonstrate spark programming and graph algorithms using progr	amming langua	ages.		
CO4: Analyse and implement different frame work tools by taking samp	0 0	C		
CO5: Ilustrate and implement the concepts by taking an application prob				



Program	nme:Degr	ee	Year: II	
Class:MCA			Semester:IV	
Credits	S	Subject: Software Qu	ality Engineering	
Theory:		U C		
Course		Fitle: Software Quali	ty Engineering	
MCA-03		x		
Course	Objective	s:		
CO1: U	Understand	l basic concepts of So	oftware Quality along with its documents and proce	ess
CO2 A	Apply know	wledge of Software Q	Quality in various types of software	
CO3: 0	Compare th	ne various reliability	models for different scenarios	
CO4: I	llustrate th	e software Quality P	lanning and Assurance	
CO5: N	Make use c	of various testing tech	iniques in software implementation	
Nature	of Paper:	DSE		
Minimu	m Passing	g Marks/Credits:40	% Marks (ISE+ESE)	
L:3				
T:0				
P:0(In H	lours/Weel	K)		
Theory-1	1Hr.=1Cre	dit		
Practical	l-2Hrs.=10	Credit(4Hrs./Week=4	Credits)	
Unit			Contents	No. of
				Lectures
				Allotted
Ι			n, Software Quality Attributes and Specification,	08
			lts, Failures, Defect Rate and Reliability, Defect	
			Containment, Overview of Different Types of	
			ion to Measurement and Inspection Process,	
		nts and Metrics.		
II			Product Quality Metrics: Defect Density,	08
			Customer Satisfaction Metrics, Function Points,	
			Defect Arrival Pattern, Phase-Based Defect	
		,	Removal Effectiveness, Metrics for Software	
		U .	gement Index, Fix Response Time, Fix Quality,	
		Quality Indicators.		0.0
III			ent and Models: Modeling Process, Software	08
			Layleigh Model, Exponential Distribution and	
		•	Models, Software Reliability Allocation Models,	
			tion, Software Quality Assessment Models:	
157			re Quality Assessment.	00
IV		- v	nce: Quality Planning and Control, Quality	08
	-		ion of Software Quality Assurance (SQA), Major	
	-	5	Issues, Zero Defect Software, SQA Techniques,	
		l Quality	accoment Quality Standards and Processor	
17			agement, Quality Standards and Processes.	00
V	Soltware	e verification, value	dation & Testing: Verification and Validation,	08



Evolutionary Nature of Verification and Validation, Impracticality of Testing all Data and Paths, Proof of Correctness, Software Testing, Functional, Structural and Error-Oriented Analysis & Testing, Static and Dynamic Testing Tools, Characteristics of Modern Testing Tools.

Text Book:

- 1. Jeff Tian, Software Quality Engineering (SQE), Wiley-Interscience, 2005; ISBN 0-471-71345 -7
- 2. Metrics and Models in Software Quality Engineering, Stephen H. Kan, AddisonWesley (2002), ISBN:0201729156

Reference Book:

- 1. Norman E. Fenton and Shari Lawrence P fleeger, "Software Metrics" Thomson, 2003
- Mordechai Ben Menachem and Garry S. Marliss, "Software Quality", Thomson Asia Pte Ltd, 2003.

Evaluation/Assessment Methodology			
	Max. Marks 100		
1. Class tasks/Sessional Examination	20		
2. Presentations/Seminar			
3. Assignments			
4. Research Project Report	10		
5. Seminar On Research Project Report			
6. ESE	70		
Total:	100		
Prerequisites for the course: NIL			
Course Learning Outcomes:			

CO1: Outline software testing and software quality assurance principles.

CO2: Prepare test case and test suites for completely testing all aspects of a system under test.

CO3: Compile findings of a quality assurance cycle.

CO4: Illustrate the software Quality Planning and Assurance

CO5: Make use of various testing techniques in software implementation



Drogram	nma. Da	egree Year: II		
Programme: Degree Class: MCA		Semester: IV		
Credits	ICA	Subject: Block chain Architecture		
Theory:4	1Cr	Subject. Block chain Arcinecture		
Course Code: Title: Block chain Architecture				
MCA-04		The block chain Arcinecture		
Course		766.		
	•	d understand basic concepts of blockchain architecture.		
	-	various requirements for consensus protocols.		
	•	d evaluate the consensus process.		
		nd the concepts of Hyperledger fabric.		
		and evaluate various use cases in financial software and supply chain.		
Nature				
	^	ng Marks/Credits:40% Marks (ISE+ESE)		
L:4		· · ·		
T:0				
P:0(In H	lours/We	vek)		
Theory-	1Hr.=1C	redit		
	l-2Hrs.=	1Credit(4Hrs./Week=4Credits)		
Unit		Contents	No. of	
			Lectures	
Ι	Introd	uction to Blockchain: Digital Money to Distributed Ledgers, Design	Allotted 08	
1		ves: Protocols, Security, Consensus, Permissions, Privacy.	Vð	
		hain Architecture and Design: Basic crypto primitives: Hash,		
		ire, Hashchain to Blockchain, Bitcoin Basic, Basic consensus		
	mechai			
II		isus: Requirements for the consensus protocols, Proof of Work (PoW),	08	
		lity aspects of Blockchain consensus protocols, distributed consensus,	00	
		sus in Bitcoin.		
	Permis	ssioned Blockchains: Design goals, Consensus protocols for		
		sioned Blockchains		
III	Hyper	ledger Fabric: Decomposing the consensus process, Hyperledger fabric	08	
	compo	nents.		
		code Design and Implementation Hyperledger Fabric: Beyond		
		ode: fabric SDK and Front End, Hyperledger composer tool.		
IV		ase 1: Blockchain in Financial Software and Systems (FSS): (i)	08	
		nents, (ii) KYC, (iii) Capital markets, (iv)Insurance.		
		ase 2: Blockchain in trade/supply chain: (i) Provenance of goods,		
		ty, trade/supply chain finance, invoice management discounting, etc.		
V		se 3: Blockchain for Government: (i) Digital identity, land records and	08	
		inds of record keeping between government entities, (ii) public		
		ntion system social welfare systems, Blockchain Cryptography, Privacy		
	and Se	curity on Blockchain		



Text Book:				
1. Andreas Antonopoulos, "Mastering Bitcoin: Unlocking Digital Cryptocurrencies", O'Reilly				
2. Melanie Swa, "Blockchain", O' Reilly				
Reference Book:				
1. "Hyperledger Fabric", https://www.hyperledger.org/projects/fabric				
2. Bob Dill, David Smits, "Zero to Blockchain - An IBM	Redbooks course",			
https://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/crse0401.h	tml			
Evaluation/Assessment Methodology				
	Max. Marks 100			
1. Class tasks/Sessional Examination	20			
2. Presentations /Seminar				
3. Assignments				
4. Research Project Report	10			
5. Seminar On Research Project Report				
6. ESE	70			
Total: 100				
Prerequisites for the course: NIL				
Course Learning Outcomes:				
CO1: Describe the basic concepts and technology used for block chain.				
CO2: Describe the primitives of the distributed computing and cryptography r	CO2: Describe the primitives of the distributed computing and cryptography related to block chain.			
CO3: Illustrate the concepts of Bitcoin and their usage.				
CO4: Implement Ethereum block chain contract.				
CO5. A maly acquity factures in block chain technologies				

CO5: Apply security features in block chain technologies.



Due que v		V		
Programme: Degree Class: MCA		e		
	ACA	Semester: IV Subject: Blockchain Architecture		
Credits				
Theory:4Cr Course Code: Title: Blockchain Architecture				
MCA-041				
Course		2001		
		d understand basic concepts of blockchain architecture.		
		various requirements for consensus protocols.		
	•	d evaluate the consensus process.		
		nd the concepts of Hyperledger fabric.		
		and evaluate various use cases in financial software and supp	oly chain.	
Nature		11	ny chum.	
	_	ng Marks/Credits:40% Marks (ISE+ESE)		
L:4				
T:0				
P:0(In H	lours/We	eek)		
Theory-				
		1Credit(4Hrs./Week=4Credits)		
Unit		Contents	No. of	
			Lectures	
			Allotted	
Ι		uction to Blockchain: Digital Money to Distributed Led	gers, Design 08	
		ves: Protocols, Security, Consensus, Permissions, Privacy.		
		chain Architecture and Design: Basic crypto primit		
	-	ure, Hashchain to Blockchain, Bitcoin Basic, Basic	consensus	
	mechar			
II		nsus: Requirements for the consensus protocols, Proof of W		
		ility aspects of Blockchain consensus protocols, distributed	consensus,	
		sus in Bitcoin.	taala far	
		ssioned Blockchains: Design goals, Consensus pro	nocols for	
III		sioned Blockchains	ledger fabric 08	
111	compoi	ledger Fabric: Decomposing the consensus process, Hyper		
	1	code Design and Implementation Hyperledger Fabi	ric: Beyond	
		ode: fabric SDK and Front End, Hyperledger composer tool.	5	
IV		ase 1: Blockchain in Financial Software and Systems		
		nents, (ii) KYC, (iii) Capital markets, (iv)Insurance.		
		ase 2: Blockchain in trade/supply chain: (i) Provenanc	e of goods.	
		ty, trade/supply chain finance, invoice management discount	-	
V		se 3: Blockchain for Government: (i) Digital identity, land i		
		inds of record keeping between government entities, (ii) pub		
		ution system social welfare systems, Blockchain Cryptograph		
		curity on Blockchain		
	•	-		



Text Book:				
1. Andreas Antonopoulos, "Mastering Bitcoin: Unlocking Digital Cryptocurrencies", O'Reilly				
2. Melanie Swa, "Blockchain", O' Reilly				
Reference Book:				
1. "Hyperledger Fabric", https://www.hyperledger.org/projects/fabric				
2. Bob Dill, David Smits, "Zero to Blockchain - An IBM	Redbooks course",			
https://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/crse0401.h	tml			
Evaluation/Assessment Methodology				
	Max. Marks 100			
1. Class tasks/Sessional Examination	20			
2. Presentations /Seminar				
3. Assignments				
4. Research Project Report	10			
5. Seminar On Research Project Report				
6. ESE	70			
Total: 100				
Prerequisites for the course: NIL				
Course Learning Outcomes:				
CO1: Describe the basic concepts and technology used for block chain.				
CO2: Describe the primitives of the distributed computing and cryptography r	CO2: Describe the primitives of the distributed computing and cryptography related to block chain.			
CO3: Illustrate the concepts of Bitcoin and their usage.				
CO4: Implement Ethereum block chain contract.				
CO5. A maly acquity factures in block chain technologies				

CO5: Apply security features in block chain technologies.



Program	me:Degree	Year: II	
Class:MCA		Semester:IV	
Credits	Subject:Internet of 7		
Theory:3	, and the second s	Bo	
Course (ngs	
MCA-04			
Course (Dbjectives:		
	•	rinciples and challenges in IoT.	
CO2 II	lustrate functioning of hardwa	are devices and sensors used for IoT.	
CO3: A	nalyze network communication	on aspects and protocols used in IoT.	
		life applications using Ardunio programming.	
CO5: T	o develop IoT infrastructure f	for popular applications	
	f Paper: DSE		
Minimu	n Passing Marks/Credits:40	0% Marks (ISE+ESE)	
L:3			
T:0			
	ours/Week)		
	Hr.=1Credit		
-	2Hrs.=1Credit(4Hrs./Week=		
Unit		Contents	No. of
			Lectures
-			Allotted
Ι	8	: Vision, Definition, Conceptual Framework,	08
		logy behind IoT, Sources of the IoT, M2M	
		ples. Design Principles for Connected Devices:	
		and design standardization, communication	
	affordability	ent and consolidation, ease of designing and	
II	ý l	ors, Digital sensors, actuators, radio frequency	08
11		nology, wireless sensor networks, participatory	Vð
		Ided Platforms for IoT: Embedded computing	
	0 01	poprted Hardware platforms such as Arduino, Net	
		le Bone, Intel Galileo boards and ARM cortex.	
III		n aspects in IoT: Wireless Medium access issues,	08
		ey routing protocols, Sensor deployment & Node	
	discovery, Data aggregation		
IV		o: Ardunio Platform Boards Anatomy, Ardunio	08
	0	, using libraries, additions in ardunio, programming	
	the ardunio for IoT.		
V	Challenges in IoT Design	challenges: Development Challenges, Security	08
		IoT Applications: Smart Metering, E-health, City	
		Applications, home automation, smart cards,	
		I/W units, mobiles, tablets, Designing of smart	
1	street lights in smart city.		



Text Book:

- 1. Olivier Hersent, David Boswarthick, Omar Elloumi "The Internet of Things key applications and protocols", willey
- 2. Jeeva Jose, Internet of Things, Khanna Publishing House
- 3. Michael Miller "The Internet of Things" byPearson

Reference Book:

- 1. Raj Kamal "INTERNET OF THINGS", McGraw-Hill, 1ST Edition, 2016
- 2. ArshdeepBahga, Vijay Madisetti "Internet of Things (A hands on approach)" 1ST edition, VPI publications,2014
- 3. Adrian McEwen, HakinCassimally "Designing the Internet of Things" WileyIndia

	Evaluation/Assessment Methodology	
		Max. Marks 100
1. Classtasks	SessionalExamination	20
2. Presentati	ons /Seminar	
3. Assignme	nts	
4. Research	ProjectReport	10
5. SeminarO	nResearchProjectReport	
6. ESE		70
	Total:	100
Prerequisites	for the course: NIL	

CourseLearningOutcomes:

- CO1: Able to understand the application areas of IOT
- CO2: Able to realize the revolution of Internet in Mobile Devices, Cloud & SensorNetworks
- CO3: Able to understand building blocks of Internet of Things and characteristics.
- CO4: Apply IoT for developing real life applications using Ardunio programming.
- CO5: To develop IoT infrastructure for popular applications



Drogram	nma: Do	aroo	Year: II		
Programme: Degree Class:MCA		gree	Semester: IV		
Credits					
Theory:					
Course					
MCA-04		The would Applic	ation Development		
	^{1→} Objectiv	/0 6 •			
	U		Kotlin Programing for Android Application Develo	nmont	
			nitecture of Android Operating System.	opinent.	
			sing Jetpack Library based on MVVM Architectur	re .	
			based on REST API using Volley and Retrofit Lib		
			e and Security of Android Applications.	iuiy.	
Nature					
		ng Marks/Credits:409	% Marks (ISE+ESE)		
L:3		B THE INDI CI CUIUSI TO			
T:0					
P:0(In H	lours/We	ek)			
Theory-					
		Credit(4Hrs./Week=40	Credits)		
Unit		· · · · · · · · · · · · · · · · · · ·	Contents	No. of	
				Lectures	
				Allotted	
Ι	Kotlin	Fundamental: Introd	uction to Kotlin, Basic Syntax, Idioms, Coding	08	
	Conver	ntions, Basics, Basic	Types, Packages, Control Flow, Returns and		
	Jumps,	Classes and Objects,	Classes and Inheritance, Properties and Fields,		
			ers, Extensions, Data Classes, Generics, Nested		
			cts, Delegation, Delegated Properties, Functions		
			nbdas, Inline Functions, Higher-Order Functions,		
	-		ns, Ranges, Type Checks and Casts, This		
	-		rator overloading, Null Safety, Exceptions,		
		tions, Reflection.			
II			droid Architecture: Introduction to Android,	08	
			es, Activities and Intents, Activity Lifecycle and		
		State, Implicit or Expl			
			ive Navigation: Material Design, Theme, Style		
		1	s, Menus, Widgets, Screen Navigation, Recycler		
111	View, ListView, Adapters, Drawables, Notifications.			00	
III	-		eving Data in Android Applications: Overview	08	
			erences, App settings, Store and query data in option Providers, Contant Providers, Loading data		
	using lo		ontent Providers, Content Resolver, Loading data		
	0		ments Latpack Navigation Lifeovale Lifeovale		
	-		ments, Jetpack Navigation, Lifecycle, Lifecycle View Model, View Model Factory, View Model		
		-	API, Data Binding, View Binding, MVVM		
		cture Basics	A I, Data Dinding, View Dinding, WIVVIII		
	Archite	Ciule Dasies			



IV	Asynchronous Data Handling, Networking and Files: Asynchronou	s Task, 08		
	Coroutines, API Handling, JSON Parsing, Volley Library, Retrofit I	Library,		
	File Handling, HTML and XML Parsing, Broadcast receivers, Services			
V	V Permissions, Performance and Security:			
	Firebase, AdMob, APK Singing, Publish App, Packaging and deplo	oyment,		
	Google Maps, GPS and Wi-Fi, Download Manager, Work Manager, Alarms,			
	Location, Map and Sensors, APK Singing, Publish App			
Text B	ook:			
	ier R., "Professionai Android 2 Application Development", Wiley.			
	shimi S., Komatineni S. And MacLean D., "Pro Android 2", Apress.			
	rphy M., "Beginning Android 2", Apress.			
Refere	nce Book:			
	essio C. and Darcey L., "Android Application Development", Pearson Edu	ication.		
2. DiN	Marzio J.F., "Android a Programming Guide", Tata McGrawHill.			
	Evaluation/Assessment Methodology			
		Max. Marks 100		
	ass tasks/Sessional Examination	20		
	esentations /Seminar			
	signments			
	search Project Report	10		
	minar On Research Project Report			
6. ES		70		
	Total:	100		
-	uisites for the course: NIL			
	e Learning Outcomes:			
	Describe principles, techniques and usage of modern software developme	ent process.		
	Solve problems related to real world application development.			
	Use standard practices to develop modern application.			
	Implement recent devices to develop application.			
	Evaluate modern trends of software development			



0	nme: Degree	Year: II			
Class: N	ICA	Semester:IV			
Credits	5				
Theory:	3Cr				
Course	rse Code: Title: Distributed Database Systems				
MCA-04	45				
Course	e Objectives:				
CO1:	Understand theoretical and p	practical aspects of distributed database systems.			
CO2	Study and identify various is	ssues related to the development of distributed databa	ase system		
		ects of object-oriented database system and related	development		
		es and knowledge of distributed reliability.			
		es and knowledge of parallel and object-oriented dat	abases.		
Nature	of Paper: DSE				
Minimu	m Passing Marks/Credits:	40% Marks (ISE+ESE)			
L:3					
T:0					
· ·	lours/Week)				
	1Hr.=1Credit				
Practical	-2Hrs.=1Credit(4Hrs./Week	=4Credits)			
Unit		Contents	No. of		
			Lectures		
			Allotted		
Ι		Data Processing, Distributed Database System,	08		
		roblem areas. Distributed DBMS Architecture:			
		r Distributed DBMS, DDMBS Architecture.			
		ign: Alternative Design Strategies, Distribution			
	Design issues, Fragmentation				
II		decomposition: Query processing objectives,	08		
		processors, layers of query processing, query			
	1 /	on of distributed data. Distributed query			
		ization, centralized query optimization, distributed			
	query optimization algorith		0.0		
III	e	Definition, properties of transaction, types of	08		
		concurrency control: Serializability, concurrency			
	-	orithms, time - stamped & optimistic concurrency			
15.7	control Algorithms, deadlo		00		
IV		bility: Reliability concepts and measures, fault-	08		
		ystems, failures in Distributed DBMS, local &			
		cols, site failures and network partitioning. Parallel			
	•	el database system architectures, parallel data			
X 7		rocessing, load balancing, database clusters.			
V	, and the second s	base Management Systems: Fundamental object	08		
	1 0	ect distributed design, architectural issues, object			
	management, distributed of	oject storage, object query Processing.			



Object Oriented Data Model: Inheritance, object identity, persistent					
programming languages, persistence of objects, comparison OODBMS a	ind				
ORDBMS					

Text Book:

- 1. M. Tamer OZSU and Patuck Valduriez: Principles of Distributed Database Systems, Pearson Edn. Asia, 2001.
- 2. Stefano Ceri and Giuseppe Pelagatti: Distributed Databases, McGraw Hill.

Reference Book:

 Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom: "Database Systems: The Complete Book", Second Edition, Pearson International Edition

Evaluation/Assessment Methodology	
	Max. Marks 100
1. Class tasks/Sessional Examination	20
2. Presentations /Seminar	
3. Assignments	
4. Research Project Report	10
5. Seminar On Research Project Report	
6. ESE	70
Total:	100
Prerequisites for the course: NIL	

Course Learning Outcomes:

- CO1: Describe distributed database concept and architecture.
- CO2: Compare the type of distributed database systems.
- CO3: Display knowledge of the fragmentation in distributed database systems.
- CO4: Understand of query processing, data and access control of distributed database systems.
- CO5: Describe transaction management in distributed database systems



IIMT UNIVERSITY Year-II/Semester-IV

Programme:Degree			/ear: II	
Class:MCA			emester:IV	
Credits		Subject: Mobile Compu	ıting	
Theory:				
	Course Code: Title: Mobile Computing			
MCA-0				
Course	Objectiv	es:		
CO1:	Study and	l aware fundamentals of i	mobile computing.	
CO2	Study and	l analyze wireless networ	rking protocols, applications and environment.	
			ent issues in mobile computing.	
CO4:	Analyze	lifferent environment typ	be of security issues in mobile computing	
CO5:	Study, an	alyze, and evaluate vario	us routing protocols used in mobile computing.	
Nature	of Paper	: DSE		
Minim	um Passi	ng Marks/Credits:40%	Marks (ISE+ESE)	
L:3				
Г:0				
P:0(In H	Hours/We	ek)		
Theory-	-1Hr.=1C	redit		
Practica	al-2Hrs.=	Credit(4Hrs./Week=4Cr	edits)	
Unit			Contents	No. of
				Lectures
				Allotted
Ι	Introdu	ction, Issues in mobile	computing, Overview of wireless telephony,	08
	Cellula	r concept, GSM- ai	r interface, channel structure; Location	
	manage	ment- HLR-VLR, hierar	chical, handoffs; Channel allocation in cellular	
	system	s, CDMA, GPRS, MAC f	for cellular system.	
II	Wireles	s Networking, Wireless	LAN Overview- MAC issues, IEEE 802.11,	08
	Blue T	ooth, Wireless multiple a	access protocols, TCP over wireless, Wireless	
	applica	tions, Data broadcasting,	Mobile IP, WAP- architecture, protocol stack,	
	applica	tion environment, applica	ations.	
III	Data n	anagement issues in mo	obile computing, data replication for mobile	08
	comput	ers, adaptive clustering	for mobile wireless networks, File system,	
	Discon	nected operations.		
IV	Mobile	Agents computing, Secu	rity and fault tolerance, Transaction processing	08
	in mob	le computing environment	nt.	
V	Adhoc	networks, Localization,	MAC issues, Routing protocols, Global state	08
			equenced distance vector routing (DSDV),	
	0), Adhoc on demand distance vector routing	
	•		routing algorithm (TORA), QoS in Adhoc	
		ks, applications		
Fext Bo		/ 11		
		Iobile Communications"	'. Pearson	
			bile Computing". Springer	

Upadhyaya S. and Chaudhury A., "Mobile Computing", Springer
 Kamal R., "Mobile Computing", Oxford UniversityPress.



Reference Book:

- 1. Talukder A. K. and Ahmed H., "Mobile Computing Technology, Applications and Service Creation", McGraw Hill Education
- Garg K., "Mobile Computing Theory and Practice", Pearson.
 Kumar S., "Wireless and Mobile Communication", New Age International Publishers

Evaluation/Assessment Methodology				
	Max. Marks 100			
1. Class tasks/Sessional Examination	20			
2. Presentations /Seminar				
3. Assignments				
4. Research Project Report	10			
5. Seminar On Research Project Report				
6. ESE	70			
Total:	100			
Prerequisites for the course: NIL				
Course Learning Outcomes:				
CO1: Explain the basics of mobile Computing				
CO2: Describe the functionality of Mobile IP and Transport Layer				
CO3: Classify different types of mobile telecommunication systems				
CO4: Demonstrate the Adhoc networks concepts and its routing protocols				
CO5: Make use of mobile operating systems in developing mobile applications				



Progran	nme: De	gree	Year: II		
Class: MCA		0	Semester: IV		
Credits		Subject: Computer G	braphics and Animation		
	'heory:3Cr				
· · · · ·	Course Code: Title: Computer Graphics and Animation				
MCA-05	52	1 1			
Course	Objectiv	es:			
CO1: U	Jnderstar	nd the graphics hardwa	are used in field of computer graphics.		
CO2 L	Jnderstar	nd the concept of gra	aphics primitives such as lines and circle based	on different	
a	lgorithm	s.			
CO3: A	Apply the	2D graphics transform	nations, composite transformation and Clipping co	ncepts.	
			iniques used in 3D computer graphics, includ	ing viewing	
			rve and hidden surfaces.		
-		*	dia and animation in real life.		
Nature o					
-	m Passii	ng Marks/Credits: 40	9% Marks (ISE+ESE)		
L:3					
T:0					
P:0(In H		,			
Theory-1					
	-2Hrs.=1	Credit(4Hrs./Week=4			
Unit			Contents	No. of	
				Lectures	
т	T 4		terre Transformation and the Counting	Allotted	
Ι			neration: Types of computer graphics, Graphic	08	
			ays, Raster scan displays, Frame buffer and video		
			, Line drawing algorithms, Circle generating generating algorithm, and parallel version of these		
	algorith		cherating argorithm, and paramer version of these		
II	5		transformation, Matrix representations and	08	
11	homoge		Composite transformations, Reflections and	00	
	shearin		composite autoroniations, refrections and		
		0	Viewing pipeline, Viewing transformations, 2-D		
			pping algorithms such as Cohen Sutherland line		
		00	Barsky algorithm, Line clipping against		
			s; Polygon clipping – Sutherland Hodgeman		
			Atherton polygon clipping, Curve clipping, Text		
	clipping				
III			ometric Primitives, 3-D Object representation, 3-	08	
			ng, projections, 3-D Clipping.		
			lric surfaces, Spheres, Ellipsoid, Blobby objects,		
			ne, Bspline and Bezier curves and surfaces.		
TT 7					
IV	Hidden	Lines and Surfaces	Back Face Detection algorithm, Depth buffer	08	



Ambient light, Diffuse reflection, Specular reflection and Phot	e
Combined approach, Warn model, Intensity Attenuation, Color consi	deration,
Transparency and Shadows.	
V Multimedia Systems: Design Fundamentals, Back ground of An	
theory overview, Sketching & illustration, Storyboarding, different	tools for
animation.	
Animation: Principles of Animations, Elements of animation and t	
Power of Motion, Animation Techniques, Animation File Format, Mal	
animation for Rolling Ball, making animation for a Bouncing Ball, A	
for the web, GIF, Plugins and Players, Animation tools for World Wid	e Web.
Text Book:	,•
I. Hearn D. and Baker M. P., "Computer Graphics C Version", Pearson Educa	
2. Foley, Vandam, Feiner, Hughes, "Computer Graphics principle", Pearson Ed	Jucation.
3. Rogers, "Procedural Elements of Computer Graphics", McGraw Hill	
Reference Book:	
1. Newman W. M., Sproull R. F., "Principles of Interactive computer Graphics	", McGraw Hill.
2. Sinha A. N. and Udai A. D.," Computer Graphics", McGraw Hill.	
Evaluation/Assessment Methodology	
	Max. Marks 100
1. Classtasks/Sessional Examination	20
2. Presentations /Seminar	
3. Assignments	10
4. Research Project Report	10
5. Seminar On Research Project Report	70
6. ESE Total:	70
	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	2D abiant and marine
CO1: Understand how to generate line, circle and ellipse also how to create	2D object and various
transformation techniques.	
CO2: Understand various 3D Transformation techniques using OpenGL.	

- CO2: Understand various 3D Transformation techniques using OpenGL. CO3: Understand multimedia compression techniques and applications. Apply the concepts and
- CO4: techniques used in 3D computer graphics, including viewing transformations, projections, curve and hidden surfaces.
- CO5: Perform the concept of multimedia and animation in real life.



Program	nme• D	egree Year: II	
Class: N		Semester: IV	
Credits		Subject: Natural Language Processing	
Theory:			
	Course Code: Title: Natural Language Processing		
MCA-0		The function and anguage i recessing	
Course		ves:	
	<u> </u>	d understand basic concepts, background and representations of natural 1	anguage
		various real-world applications of NLP.	anguage.
	•	fferent parsing techniques in NLP.	
		nd grammatical concepts and apply them in NLP.	
		rious statistical and probabilistic grammar methods to handle and evalua	te ambiguity.
Nature			
		ing Marks/Credits:40% Marks (ISE+ESE)	
L:3			
T:0			
P:0(In H	lours/W	eek)	
Theory-			
-		1Credit(4Hrs./Week=4Credits)	
Unit		Contents	No.
			ofLectures
			Allotted
Ι	Introd	uction to Natural Language Understanding: The study of Language,	08
	Applic	ations of NLP, Evaluating Language Understanding Systems, Different	
	levels	of Language Analysis, Representations and Understanding,	
	Organi	zation of Natural language Understanding Systems, Linguistic	
		ound: An outline of English syntax.	
II	Introdu	ction to semantics and knowledge representation, some applications	08
		chine translation, database interface.	
III	Gramn	nars and Parsing: Grammars and sentence Structure, Top-Down and	08
	Bottom	h-Up Parsers, Transition Network Grammars, Top- Down Chart	
	Parsing	g. Feature Systems and Augmented Grammars: Basic Feature system	
	for Eng	glish, Morphological Analysis and the Lexicon, Parsing with Features,	
	5	ented Transition Networks.	
IV	Gram	nars for Natural Language: Auxiliary Verbs and Verb Phrases,	08
	Moven	nent Phenomenon in Language, Handling questions in Context-Free	
	Gramn		
		inistic Parser.	
V		uity Resolution: Statistical Methods, Probabilistic Language	08
		sing, Estimating Probabilities, Part-of Speech tagging, Obtaining	
		Probabilities, Probabilistic Context-Free Grammars, Best First	
	-	g. Semantics and Logical Form, Word senses and Ambiguity, Encoding	
	Ambig	uity in Logical Form.	



Text Book:

- 1. Akshar Bharti, Vineet Chaitanya and Rajeev Sangal, "NLP: A Paninian Perspective", Prentice Hall, New Delhi.
- 2. James Allen, "Natural Language Understanding", Pearson Education.
- 3. D. Jurafsky, J. H. Martin, "Speech and Language Processing", Pearson Education.

Reference Book:

- 1. L. M. Ivansca, S. C. Shapiro, "Natural Language Processing and Language Representation", AAAI Press, 2000.
- 2. T. Winograd, Language as a Cognitive Process, Addison-Wesley.

Evaluation/Assessment Methodology		
	Max. Marks 100	
1. Classtasks/Sessional Examination	20	
2. Presentations /Seminar		
3. Assignments		
4. Research Project Report	10	
5. Seminar On Research Project Report		
6. ESE	70	
Total:	100	
Prerequisites for the course: NIL		

Course Learning Outcomes:

- CO1: Apply the principles and Process of Human Languages such as English and other Indian Languages using computers.
- CO2: Realize semantics and pragmatics of English language for text processing
- CO3: Create CORPUS linguistics based on digestive approach (Text Corpus method)
- CO4: Check a current methods for statistical approaches to machine translation.
- CO5: Perform POS tagging for a given natural language and Select a suitable language modeling technique based on the structure of the language.



Program	mme: Degree Year: II	
Class: N	ACA Semester: IV	
Credits	Subject: Machine Learning Techniques	
Theory:		
Course	Code: Title: Machine Learning Techniques	
MCA-0	54	
Course	Objectives:	
CO1: 7	Fo understand the need for machine learning for various problem solving	
CO2 7	To understand a wide variety of learning algorithms and how to evaluate mode	ls generated
f	from data	
	To understand the latest trends in machine learning	
	To design appropriate machine learning algorithms and apply the algorithms to	a real-world
-	problems	
	To optimize the models learned and report on the expected accuracy that can	
	be achieved by applying the models	
	of Paper: DSE	
	m Passing Marks/Credits:40% Marks (ISE+ESE)	
L:3		
T:0		
•	lours/Week)	
-	1Hr.=1Credit	
	-2Hrs.=1Credit(4Hrs./Week=4Credits)	
Unit	Contents	No. of
		Lectures
		Allotted
Ι	INTRODUCTION – Learning, Types of Learning, Well defined learning	
		08
	problems, Designing a Learning System, History of ML, Introduction of	08
	Machine Learning Approaches - (Artificial Neural Network, Clustering,	08
	Machine Learning Approaches – (Artificial Neural Network, Clustering, Reinforcement Learning, Decision Tree Learning, Bayesian networks, Support	08
	Machine Learning Approaches – (Artificial Neural Network, Clustering, Reinforcement Learning, Decision Tree Learning, Bayesian networks, Support Vector Machine, Genetic Algorithm), Issues in Machine Learning and Data	08
п	Machine Learning Approaches – (Artificial Neural Network, Clustering, Reinforcement Learning, Decision Tree Learning, Bayesian networks, Support Vector Machine, Genetic Algorithm), Issues in Machine Learning and Data Science Vs Machine Learning;	
II	Machine Learning Approaches – (Artificial Neural Network, Clustering, Reinforcement Learning, Decision Tree Learning, Bayesian networks, Support Vector Machine, Genetic Algorithm), Issues in Machine Learning and Data Science Vs Machine Learning; REGRESSION: Linear Regression and Logistic Regression	08
II	 Machine Learning Approaches – (Artificial Neural Network, Clustering, Reinforcement Learning, Decision Tree Learning, Bayesian networks, Support Vector Machine, Genetic Algorithm), Issues in Machine Learning and Data Science Vs Machine Learning; REGRESSION: Linear Regression and Logistic Regression BAYESIAN LEARNING - Bayes theorem, Concept learning, Bayes Optimal 	
II	 Machine Learning Approaches – (Artificial Neural Network, Clustering, Reinforcement Learning, Decision Tree Learning, Bayesian networks, Support Vector Machine, Genetic Algorithm), Issues in Machine Learning and Data Science Vs Machine Learning; REGRESSION: Linear Regression and Logistic Regression BAYESIAN LEARNING - Bayes theorem, Concept learning, Bayes Optimal Classifier, Naïve Bayes classifier, Bayesian belief networks, EM algorithm. 	
II	 Machine Learning Approaches – (Artificial Neural Network, Clustering, Reinforcement Learning, Decision Tree Learning, Bayesian networks, Support Vector Machine, Genetic Algorithm), Issues in Machine Learning and Data Science Vs Machine Learning; REGRESSION: Linear Regression and Logistic Regression BAYESIAN LEARNING - Bayes theorem, Concept learning, Bayes Optimal Classifier, Naïve Bayes classifier, Bayesian belief networks, EM algorithm. SUPPORT VECTOR MACHINE: Introduction, Types of support vector 	
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Evaluation/Assessment MethodologyMax. Marks 1001. Classtasks/Sessional Examination202. Presentations /Seminar203. Assignments104. Research Project Report105. Seminar On Research Project Report706. ESE70Total: 100Prerequisites for the course: NILCourse Learning Outcomes: CO1: Learn the basics of learning problems with hypothesis and version spaces CO2: Understand the features of machine learning to apply on real world problems	 Classtasks/Session Presentations /Second Assignments Research Project Seminar On Resecond ESE Prerequisites for the Course Learning Out CO1: Learn the base CO2: Understand the CO3: Characterize learning and CO4: learning						
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2. Presentations /Seminar3. Assignments4. Research Project Report5. Seminar On Research Project Report6. ESE70Total:100Prerequisites for the course: NILCourse Learning Outcomes:CO1: Learn the basics of learning problems with hypothesis and version spacesCO2: Understand the features of machine learning to apply on real world problems	 2. Presentations /Set 3. Assignments 4. Research Project 5. Seminar On Rese 6. ESE Prerequisites for the Course Learning Ou CO1: Learn the bas CO2: Understand t CO3: Characterize learning and CO4: learning	Classiasks/Sassianal Examination					
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5. Seminar On Research Project Report 70 6. ESE 70 Total: 100 Prerequisites for the course: NIL Course Learning Outcomes: CO1: Learn the basics of learning problems with hypothesis and version spaces CO2: Understand the features of machine learning to apply on real world problems	5. Seminar On Rese 6. ESE Prerequisites for the Course Learning Ou CO1: Learn the bas CO2: Understand t CO3: Characterize learning and CO4: learning	-	10				
6. ESE 70 Total: 100 Prerequisites for the course: NIL Course Learning Outcomes: CO1: Learn the basics of learning problems with hypothesis and version spaces CO2: Understand the features of machine learning to apply on real world problems	6. ESE Prerequisites for the Course Learning Ou CO1: Learn the bas CO2: Understand t CO3: Characterize learning and CO4: learning	5 I	10				
Total:100Prerequisites for the course: NILCourse Learning Outcomes: CO1:CO1:Learn the basics of learning problems with hypothesis and version spaces CO2:CO2:Understand the features of machine learning to apply on real world problems	Prerequisites for the Course Learning Ou CO1: Learn the bas CO2: Understand t CO3: Characterize learning and CO4: learning	5 I					
Prerequisites for the course: NIL Course Learning Outcomes: CO1: Learn the basics of learning problems with hypothesis and version spaces CO2: Understand the features of machine learning to apply on real world problems	Course Learning Ou CO1: Learn the bas CO2: Understand t CO3: Characterize learning and CO4: learning						
Course Learning Outcomes: CO1: Learn the basics of learning problems with hypothesis and version spaces CO2: Understand the features of machine learning to apply on real world problems	Course Learning Ou CO1: Learn the bas CO2: Understand t CO3: Characterize learning and CO4: learning						
CO1: Learn the basics of learning problems with hypothesis and version spaces CO2: Understand the features of machine learning to apply on real world problems	CO1: Learn the bas CO2: Understand t CO3: Characterize learning and CO4: learning						
CO2: Understand the features of machine learning to apply on real world problems	CO2: Understand t CO3: Characterize learning and CO4: learning	e					
	CO3: Characterize learning and CO4: learning						
CO3: Characterize the machine learning algorithms as supervised learning and unsupervised	learning and CO4: learning						
	CO4: learning						
learning and Apply and analyze the various algorithms of supervised and unsupervised	-		ed and unsupervised				
		•					
CO5: Analyze the concept of neural networks for learning linear and non-linear activation functions	CO5: Analyze the	•					
Learn the concepts in Bayesian analysis from probability models and method.	Learn the con	5: Analyze the concept of neural networks for learning linear and non-linea	a delivation functions				



IIMT UNIVERSITY Year-II/Semester-IV

Class: M			Year: II	
C 1:4-	ICA		Semester: IV	
Credits		Subject: Quantum Co	omputing	
Theory:3	Cr			
Course (Code:	Title: Quantum Comp	outing	
MCA-05	5			
Course (Objectiv	es:		
aı	0	red tractable by quan	nt computational complexity and explain why certa tum computation with reference to the relevant	1
ac	classical	computer, and state	of a quantum computing algorithm by simu some of the practical challenges in building	-
C		e to a medium-scale a	pplication program as part of a co-operative team	, making use
P	roduce of	code and documentation	elopment tools (such as version control systems). on that is comprehensible to a group of different j	
A	.pply kr	nowledge, skills, and	ground and results of a project in written and verba understanding in executing a defined project and in identifying and implementing relevant outcor	of research,
Nature o	of Paper	: DSE		
Minimu	m Passi	ng Marks/Credits:40°	% Marks (ISE+ESE)	
L:3				
T:0				
P:0(In Ho	ours/We	ek)		
Theory-1	Hr.=1C	redit		
Practical-	-2Hrs.=1	Credit(4Hrs./Week=4	Credits)	
Unit			Contents	No. of Lectures Allotted
Ι	Funda	mental Concents. (Global Perspectives, Quantum Bits, Quantum	08
	Compu Quantu	tation, Quantum Alg m Mechanisms.	gorithms, Quantum Information, Postulates of	
II	Orbit Gates, estimat Speedin unstruc	operations, Control C Simulation of Quantu ion, Applications, Quang up the solution of N tured database.	Lantum Circuits – Quantum algorithms, Single Operations, Measurement, Universal Quantum m Systems, Quantum Fourier transform, Phase antum search algorithms – Quantum counting – P – complete problems – Quantum Search for an	08
III	Compu Quantu	tation, Harmonic Os	uiding Principles, Conditions for Quantum scillator Quantum Computer, Optical Photon al cavity Quantum electrodynamics, Ion traps,	08
IV	Quant	um Information: Qua	ntum noise and Quantum Operations – Classical s, Quantum Operations, Examples of Quantum	



		noise and Quantum Operations – Applications of Quantum op	erations,	
		Limitations of the Quantum operations formalism, Distance Measure	ures for	
		Quantum information.		
	V	Quantum Error Correction: Introduction, Shor code, Theory of Q	uantum	08
		Error – Correction, Constructing Quantum Codes, Stabilizer codes,	Fault –	
		Tolerant Quantum Computation, Entropy and information – Shannon E	ntropy,	
		Basic properties of Entropy, Von Neumann, Strong Sub Additivity	y, Data	
		Compression, Entanglement as a physical resource.		
Tex	xt Bo	ok:		
1.	Mich	neal A. Nielsen. & Issac L. Chiang, "Quantum Computation and Qu	antum I	nformation",
	Cam	bridge University Press, Fint South Asian edition, 2002.		
2.	Elea	nor G. Rieffel, Wolfgang H. Polak, "Quantum Computing - A	Gentle I	Introduction"
	(Scie	entific and Engineering Computation) Paperback –Import,3 Oct 2014		
3.	Com	puting since Democritus by Scott Aaronson		
Ref	feren	ce Book:		
1.	Com	puter Science: An Introduction by N. David Mermin		
2.	Yand	ofsky's and Mannucci, Quantum Computing for Computer Scientists.		
		Evaluation/Assessment Methodology		
			Max.	Marks 100
1.	Cla	ss tasks/Sessional Examination		20
2.	Pres	sentations /Seminar		
3.	Ass	ignments		
4.	Res	earch Project Report		10
5.	Sen	ninar On Research Project Report		
6.	ESE	3		70
		Total:		100
Pr	erequ	isites for the course: NIL		
		Learning Outcomes:		
		Able to access the quantum computing services provided by IBM,	and oth	ner quantum
		computing services Simulators.		-
C	O2:	Able to think independently of quantum circuits, algorithm and appli	cations	for real-time
		stochastic problems in QC.		
~	~ •			

CO3: Trained to design QC circuits and reversible logics for real world problems. Produce code and documentation that is comprehensible to a group of different programmers and present the

CO4: theoretical background and results of a project in written and verbal form.Apply knowledge, skills, and understanding in executing a defined project of research,CO5: development, or investigation and in identifying and implementing relevant outcomes.



IIMT UNIVERSITY Year-II/Semester-IV

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Derivation of Backpropagation Algorithm, Generalization, Unsup	ervised			
Learning – SOM Algorithm and its variant;				
DEEP LEARNING - Introduction, concept of convolutional neural n				
Types of layers – (Convolutional Layers, Activation function, poolin				
connected), Concept of Convolution (1D and 2D) layers, Training of the				
Case study of CNN for eg on Diabetic Retinopathy, Building a smart	speaker,			
Self-deriving car etc.				
V REINFORCEMENT LEARNING –Introduction to Reinforcement Lea	•			
Learning Task, Example of Reinforcement Learning in Practice, L	e			
Models for Reinforcement – (Markov Decision process, Q Learning	-			
Learning function, Q Learning Algorithm), Application of Reinfor	cement			
Learning, Introduction to Deep Q Learning.				
GENETIC ALGORITHMS: Introduction, Components, GA cy				
reproduction, Crossover, Mutation, Genetic Programming, Mod	els of			
Evolution and Learning, Applications				
Text Book:				
1. Tom M. Mitchell, —Machine Learning, McGraw-Hill Education (India) Priva				
2. Ethem Alpaydin, -Introduction to Machine Learning (Adaptive Computation and Machine				
Learning), MIT Press2004.				
3. Stephen Marsland, —Machine Learning: An Algorithmic Perspective, CRC P	ress, 2009.			
Reference Book:				
1. Bishop, C., Pattern Recognition and Machine Learning. Berlin: Springer-Verl	ag.			
2. M. Gopal, "Applied Machine Learning", McGraw Hill Education				
Evaluation/Assessment Methodology				
	Max. Marks 100			
1. Class tasks/Sessional Examination	20			
2. Presentations /Seminar				
3. Assignments				
4. Research Project Report	10			
5. Seminar On Research Project Report				
6. ESE 70				
Total:	100			
Drangquisites for the course NII				
Prerequisites for the course: NIL				
Course Learning Outcomes:				
	;			
Course Learning Outcomes: CO1: Learn the basics of learning problems with hypothesis and version spaces CO2: Understand the features of machine learning to apply on real world probl	ems			
Course Learning Outcomes: CO1: Learn the basics of learning problems with hypothesis and version spaces	ems			
Course Learning Outcomes: CO1: Learn the basics of learning problems with hypothesis and version spaces CO2: Understand the features of machine learning to apply on real world probl	ems g and unsupervised			
Course Learning Outcomes: CO1: Learn the basics of learning problems with hypothesis and version spaces CO2: Understand the features of machine learning to apply on real world probl CO3: Characterize the machine learning algorithms as supervised learning	ems g and unsupervised			

CO5: Learn the concepts in Bayesian analysis from probability models and method.



IIMT UNIVERSITY Year-II/Semester-IV

Program	me: Degree Year: II						
Class: MO	•						
Credits	Subject: Machine Learning Techniques						
Theory:30	v						
Course C							
MCA-054							
Course O	Dbjectives:						
CO1: To	•						
CO2 To	o understand a wide variety of learning algorithms and how to evaluate mode	els generated					
fro	rom data						
CO3: To	o understand the latest trends in machine learning						
CO4: To	b design appropriate machine learning algorithms and apply the algorithms to	a real-world					
pre	roblems						
CO5: To	o optimize the models learned and report on the expected accuracy that can						
-	e achieved by applying the models						
Nature of	f Paper: DSE						
Minimun	n Passing Marks/Credits:40% Marks (ISE+ESE)						
L:3							
T:0							
	ours/Week)						
	Hr.=1Credit						
	2Hrs.=1Credit(4Hrs./Week=4Credits)						
Unit	Contents	No. of					
		Lectures					
		Allotted					
	INTRODUCTION – Learning, Types of Learning, Well defined learning	08					
	problems, Designing a Learning System, History of ML, Introduction of						
	Machine Learning Approaches – (Artificial Neural Network, Clustering,						
	Reinforcement Learning, Decision Tree Learning, Bayesian networks, Support						
	Vector Machine, Genetic Algorithm), Issues in Machine Learning and Data						
	Science Vs Machine Learning; REGRESSION: Linear Regression and Logistic Regression	<u></u>					
	BAYESIAN LEARNING - Bayes theorem, Concept learning, Bayes Optimal	08					
	Classifier, Naïve Bayes classifier, Bayesian belief networks, EM algorithm.						
	SUPPORT VECTOR MACHINE: Introduction, Types of support vector						
	kernel– (Linear kernel, polynomial kernel, and Gaussian kernel), Hyper plane –						
1 1	(Decision surface), Properties of SVM, and Issues in SVM.						
	(2 constant outlines), i toperates of S (11), und issues in S (11).						
	DECISION TREE LEARNING - Decision tree learning algorithm Inductive	08					
III	DECISION TREE LEARNING - Decision tree learning algorithm, Inductive bias, Inductive inference with decision trees, Entropy and information theory,	08					
III	bias, Inductive inference with decision trees, Entropy and information theory,	08					
III	bias, Inductive inference with decision trees, Entropy and information theory, Information gain, ID-3 Algorithm, Issues in Decision tree learning.	08					
III	bias, Inductive inference with decision trees, Entropy and information theory, Information gain, ID-3 Algorithm, Issues in Decision tree learning. INSTANCE-BASED LEARNING – k-Nearest Neighbour Learning, Locally	08					
III	bias, Inductive inference with decision trees, Entropy and information theory, Information gain, ID-3 Algorithm, Issues in Decision tree learning.	08					



 Derivation of Back propagation Algorithm, Generalization, Unsupervised Learning – SOM Algorithm and its variant; DEEP LEARNING - Introduction, concept of convolutional neural network , Types of layers – (Convolutional Layers , Activation function , pooling , fully connected) , Concept of Convolution (1D and 2D) layers, Training of network, Case study of CNN for eg on Diabetic Retinopathy, Building a smart speaker,Self-deriving car etc. V REINFORCEMENT LEARNING–Introduction to Reinforcement Learning Models for Reinforcement – (Markov Decision process, Q Learning - Q Learning function, Q Learning Algorithm), Application of Reinforcement Learning, Introduction to Deep Q Learning. GENETIC ALGORITHMS: Introduction, Components, GA cycle of reproduction, Crossover, Mutation, Genetic Programming, Models of Evolution and Learning, Applications Tom M. Mitchell, —Machine Learning, McGraw-Hill Education (India) Private Limited,2013. Ethem Alpaydin, —Introduction to Machine Learning (Adaptive Computation and Machine Learning), MIT Press2004. Stephen Marsl and, —Machine Learning: An Algorithmic Perspective, CRC Press,2009. 					
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V REINFORCEMENT LEARNING -Introduction to Reinforcement Learning , Learning Task, Example of Reinforcement Learning in Practice, Learning Models for Reinforcement – (Markov Decision process, Q Learning - Q Learning function, Q Learning Algorithm), Application of Reinforcement Learning, Introduction to Deep Q Learning. 08 GENETIC ALGORITHMS: Introduction, Components, GA cycle of reproduction, Crossover, Mutation, Genetic Programming, Models of Evolution and Learning, Applications 08 Text Book: 1. Tom M. Mitchell, —Machine Learning, McGraw-Hill Education (India) Private Limited,2013. 2. Ethem Alpaydin, —Introduction to Machine Learning (Adaptive Computation and Machine Learning), MIT Press2004. 3. Stephen Marsl and, —Machine Learning: An Algorithmic Perspective, CRC Press,2009. Reference Book:					
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Reference Book:					
1. Bishop, C., Pattern Recognition and Machine Learning. Berlin: Springer-Verlag.					
2. M. Gopal, "Applied Machine Learning", McGraw Hill Education					
Evaluation/Assessment Methodology					
Max. Marks 100					
1) Classtasks/Sessiona Examination20					
2) Presentations /Seminar					
3) Assignments					
4) Research Project Report 10					
5) Seminar On Research Project Report					
6) ESE 70					
Total: 100					
Prerequisites for the course: NIL					
Course Learning Outcomes:					
CO1: Learn the basics of learning problems with hypothesis and version spaces					
CO2: Understand the features of machine learning to apply on real world problems					
CO3: Characterize the machine learning algorithms as supervised learning and unsupervised					
learning and Apply and analyze the various algorithms of supervised and unsupervised					
CO4: learning					
e					
CO5: Analyze the concept of neural networks for learning linear and non-linear activation functions					



IIMT UNIVERSITY Year-II/Semester-IV

U	mme:De					
Class:		Semester:IV				
Credit		Subject: Quantum Computing				
Theory		Titles Ossentary Commercial				
	e Code:	Title: Quantum Computing				
MCA-						
	e Objectiv					
COI:	-	sh problems of different computational complexity and explain why certa ered tractable by quantum computation with reference to the relevant theory.	-			
CO2	Demonstrate an understanding of a quantum computing algorithm by simulating it on a classical computer, and state some of the practical challenges in building a quantum computer.					
CO3:	of approp	te to a medium-scale application program as part of a co-operative team, priate collaborative development tools (such as version control systems).	_			
CO4:	and prese	code and documentation that is comprehensible to a group of different p ont the theoretical background and results of a project in written and verba	l form.			
CO5:		nowledge, skills, and understanding in executing a defined project				
		nent, or investigation and in identifying and implementing relevant outcon	nes.			
Nature	e of Paper	:: DSE				
Minim	um Passi	ng Marks/Credits:40% Marks (ISE+ESE)				
L:3						
T:0						
P:0(In	Hours/We	eek)				
Theory	-1Hr.=1C	redit				
Practic	al-2Hrs.=	1Credit(4Hrs./Week=4Credits)				
Unit		Contents	No. of			
			Lectures			
			Allotted			
Ι	Compu Quantu	mental Concepts: Global Perspectives, Quantum Bits, Quantum itation, Quantum Algorithms, Quantum Information, Postulates of im Mechanisms.	08			
II	Orbit Gates, estima Speedi	um Computation : Quantum Circuits – Quantum algorithms, Single operations, Control Operations, Measurement, Universal Quantum Simulation of Quantum Systems, Quantum Fourier transform, Phase tion, Applications, Quantum search algorithms – Quantum counting – ng up the solution of NP – complete problems – Quantum Search for an extured database.	08			
III	Quant Compu Quantu	um Computers: Guiding Principles, Conditions for Quantum Itation, Harmonic Oscillator Quantum Computer, Optical Photon Im Computer – Optical cavity Quantum electrodynamics, Ion traps, r Magnetic resonance	08			
IV	Noise	um Information: Quantum noise and Quantum Operations – Classical and Markov Processes, Quantum Operations, Examples of Quantum and Quantum Operations – Applications of Quantum operations,	08			



	Limitations of the Quantum operations formalism, Distance Meas	ures for			
	Quantum information.				
V	Quantum Error Correction: Introduction, Shor code, Theory of Q	uantum	08		
	Error - Correction, Constructing Quantum Codes, Stabilizer codes,	Fault –			
	Tolerant Quantum Computation, Entropy and information – Shannon E	Intropy,			
	Basic properties of Entropy, Von Neumann, Strong Sub Additivity	y, Data			
	Compression, Entanglement as a physical resource.				
Text Bo	ok:				
1. Mich	heal A. Nielsen. &Issac L. Chiang, "Quantum Computation and Qu	antum Inf	ormation",		
Cam	bridge University Press, Fint South Asian edition, 2002.				
2. Elear					
(Scie	(Scientific and Engineering Computation) Paperback –Import,3 Oct 2014				
3. Com	puting since Democritus by Scott Aaronson				
Referen	ce Book:Computer Science: An Introduction by N. David Mermin				
1. Yan	of sky's and Mannucci, Quantum Computing for Computer Scientists.				
	Evaluation/Assessment Methodology				
		Max. M	larks 100		
1. Clas	sstasks/Sessional Examination	4	20		
2. Pres	sentations/Seminar				
3. Ass	ignments				
4. Res	4. Research Project Report 10				
5. Sem	ninar On Research Project Report				
6. ESE	E	-	70		
	Total:	1	00		
Prerequ	isites for the course: NIL				
Course	Learning Outcomes:				
	Able to access the quantum computing convices mervided by DM	and athe			

- CO1: Able to access the quantum computing services provided by BM, and other quantum computing services Simulators.
- CO2: Able to think independently of quantum circuits, algorithm and applications for real-time stochastic problems in QC.

CO3: Trained to design QC circuits and reversible logics for real world problems.Produce code and documentation that is comprehensible to a group of different programmers and present the CO4: theoretical healsground and neulta of a project in written and workal form

CO4: theoretical background and results of a project in written and verbal form. Apply knowledge, skills, and understanding in executing a defined project of research,

CO5: development, or investigation and in identifying and implementing relevant outcomes.



School of Computer Science & Applications ACADEMIC HAND BOOK



Ordinance &Academic Regulations For Master of Computer Applications (MCA (AI & ML)) (Established by Govt .of U.P. Vide U.P act No. 32 of 2016) (Effective from the Session: 2022-23)



DEFINITIONSANDNOMENCLATURE:

- (i) "**Programme**" means Post Graduate Degree Programme like Master of Computer Application (MCA). Hence further MCA and MCA (AI & ML) will call MCA in this document. AI means Artificial Intelligence and ML means Machine Learning.
- (ii) Academic Year: Two consecutive (one odd + one even) semesters constitute one academic year.
- (iii) Semester: Each semester will consist of 15-18 weeks of academic work equivalent to 90 actual teaching days. The odd semester may be scheduled from July to December and even semester from January to June.
- (iv) **Program:** An educational program leading to award of a degree.
- (v) "VC, Vice-Chancellor of IIMT-University" means the Head of the University.
- (vi) Course: Usually referred to, as 'papers' is a component of a program. All courses need not carry the same weightage. The courses should define learning objectives and learning outcomes. A course may be designed to comprise lectures/tutorials/laboratory work/ field work/ outreach activities/project work/ vocational training/viva/ seminars/ term papers/assignments/ presentations/ self-study etc. or a combination of some of these.
- (vii) Branch: Master of Computer Applications (MCA).
- (viii) Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters A, B, C, D, E and F.
- (ix) Grade Point: It is a numerical weightage allotted to each letter grade on a 10-pointscale.
- (x) **Credit:** A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lectureor tutorial) or two hours of practical work/field work per week.
- (xi) Credit Point: It is the product of grade point and number of credits for a course.
- (xii) Semester Grade Point Average (SGPA): It is a measure of academic performance of student/s in a semester. It is thereto of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to two decimal places.
- (xiii) Cumulative Grade Point Average (CGPA): It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points earned by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.
- (xiv) First Attempt: If a student has completed all formalities and become eligible to attend the examinations and has attended at least one subject of passing, such attempt (first sitting) shall be considered as first attempt.
- (xv) Transcript or Grade Card or Certificate: Based on the grades earned, a grade sheet/certificate shall be issued to all the registered students at the end of every academic year. The grade sheet/certificate will display the course details (code, title, number of credits, grade secured) along with SGPA of both semesters and CGPA earned till that academic year.
- (xvi) UGC: University Grants Commission.
- (xvii) AIU: Association of Indian universities

The CBCS provides choice forstudents to select from the prescribed courses. Sequencing Plan for the MCA Post Graduate Degree Curriculum



Semesters

Course Coverage

- I–II Foundation Course for Computer Applications and Programming Techniques, Mathematical Foundations, Numerical & Statistical Techniques and Course on Computer Organizations and Entrepreneurial Skills etc.
- III-IV Core Courses including Design & Development of Applications, Design& Analysis of Algorithms, Operating Systems, Applications of Information Systems, Web Application Development, Artificial Intelligence, Elective Courses, Mini ProjectWork etc.

1. PREAMBLE

As the technological enhancement and availability of technology to every person of world a huge demand of computer skilled professional is ample. In this world of opportunities, impact of higher education is so inevitable for getting desired guidance to secure, right kind of employment. It is compulsory to pursue higher related- education in the best institutes. The syllabus development is a step to ensure development of the undergraduates for both, academia and employability. Latest technical trends, industry standards, market needs, and interests of students, future expectations the need has been taken into consideration while developing the syllabus.

This is an effort to develop a student centric framework where they are expected to have a concrete understanding of fundamentals of computer science along with the latest trends and techniques like Artificial Intelligence, Internet of Things (IoT), Machine Learning (ML) with advanced skill sets that include Mobile Application environment, Object Oriented Programming (OOPs) among many courses. Each course aims to present learning targets and objectives, and thus provide learning and teaching strategies, assessment and resources. The students shall be equipped with the latest trends in computer science, after completion of the programme.

With this an education temple of nation should ensure an environment, which should be bias free, irrespective of cast, religion, races, sex difference and easily available to youths of the nation. The human value, ethics and environmental teaching is also introduced with this.

2. VISION AND MISSION OF THE SCHOOL

VISION

To achieve heights in computer education domain by creating appropriate environment for students, faculties and staff with availability of latest technological infrastructure.

MISSION

- 1. To dissipate appropriate all types of practical and theoretical computer science knowledge to our young students.
- 2. Inculcate professional efficiency in the students for brighter career opportunity as per industry latest requirement.
- 3. To provide learning environment for students with our reputed academics partner in the field of computer science.
- 4. To prepare our student as an IT professional with full of ethics and human values.



3. PROGRAM EDUCATIONAL OBJECTIVES (PEO)

- **PEO1:** The Postgraduates Programs are designated to produce skilled Postgraduates who will be proficient professionals in private sector, semi government and government institutions.
- **PEO2:** The pass out Postgraduates will be able to handle the overall world requirements and will become effective employees or employers.
- **PEO3:** The pass out Postgraduates will be a good team leader and will be able to lead the team to find inexpensive and optimal solutions and, achieve expertise in their fields or become entrepreneurs and play the proficiently managing roles in all types of institutions, establishment, and industry ventures.

4. **PROGRAM OUTCOMES (PO'S)**

- **PO1:** Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **PO2: Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO3:** Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **PO4:** Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **PO5:** Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools prediction and modeling to complex engineering activities with an understanding of the limitations.
- **PO6:** The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional engineering practice.
- **PO7:** Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and the need for sustainable development.
- **PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **PO9:** Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **PO10: Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and receive clear instructions.
- **PO11: Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in team, to manage projects and in multidisciplinary environments.
- **PO12: Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



5. PROGRAM SPECIFIC OUTCOMES (PSO'S)

PSO1: The Postgraduates are capable in basic principles and methods of Computer era with sufficient Mathematical and Scientific grounds and can:

- Apply fundamental concepts of integration, Artificial intelligence with deep learning, differentiation, vector calculus, probability & statistics, and discrete mathematics.
- Design, create & evaluate programming algorithms appropriate to all types of current real frequent changing difficulties.

PSO2: The Postgraduates have deep sense acknowledgement for:

- Present capability for computers, computer network and server environments and their troubleshooting.
- Capacity to handle ever changing cloud computing environments and related solutions.
- Well defined knowledge for solving problems of security and threats in knowledge and financial domain.

6. ADMISSION

- 6.1 Admission to MCA first year in Ist Semester.
- **6.2** Admission on migration of a candidate from any other University to the University is not permitted.

7. ELIGIBILITY FORADMISSIONS

7.1 Admission to MCA First Year:

For admission to first year of MCA in IIMT University, Meerut, a candidate must have passed Bachelor degree course of 03 Years minimum duration from any recognized Indian University; or its equivalent, recognized by **A.I.U.** securing minimum 50% (45% for SC/ST) marks in aggregate. Candidate must have passed Mathematics at 10+2 level or Graduation level.

7.2 The Academic Council shall have power to amend or repeal the eligibility criteria laid down at clause 7.1 as per the guidelines of AICTE.

8. ATTENDANCE

- **8.1** Every student is required to attend all the Lectures, Tutorials, Practical Classes and other prescribed curricular and co-curricular activities. The attendance can be condoned up to 25% on medical grounds or for other genuine reasons beyond the control of students.
- **8.2** A further relaxation of attendance up to 15% for a student can be given by Head of School/College provided that he/she has been absent with prior permission of the Head of the School/college for the reasons acceptable to him.
- **8.3** No student will be allowed to appear in the end semester examination if he / she do not satisfy the overall average attendance requirements of Clause Nos. 8.1, and 8.2. Such candidate(s) shall be treated as having failed and will be further governed by clause no. 9.2 &9.3.
- **8.4** The attendance shall be counted from the date of admission in the college or start of academic session whichever is later.



9. DURATION OFCOURSE

- **9.1** Total duration of the MCA Course shall be 2 years, each year comprising two semesters. Each semester shall normally have teaching for the 90 working days or as prescribed by A.I.C.T.E. from time to time.
- **9.2** The student admitted to 1st year MCA Course shall complete the course within a period of five (05 Years) Academic Years from the date of first admission, failing which he/she has to discontinue the course.
- **9.3** A Student, who has failed twice in first year due to any reason (either due to his/her non-appearance or he/she being not permitted to appear in semester examinations) shall not be allowed to continue his/her studies further. Provided further that if a student wishes to continue third time in first year, he/she may be allowed on the terms and conditions laid down by the University for such permission but the maximum time allowed for completing the course will remain the same as described in clause 4.2.
- **9.4** The minimum percentage requirement for MCA Degree is 40%.

10. CURRICULUM

- **10.1** The 2 Year curriculum has been divided into 4Semesters and shall include Lectures, Tutorials, Practical Labs, Seminars and Projects etc. in addition to industrial training as defined in the scheme and executive instructions issued by the University from time to time.
- **10.2** The curriculum will also include other curricular, co-curricular and extracurricular activities as may be prescribed by the University from time to time.
- **10.3** The subjects listed in semester I or II for MCA will be as per Course Structure of MCA Program and shall not be offered exactly in the same sequence.

11. EXAMINATION

- 11.1 The performance of a student in a semester shall be evaluated through continuous class assessment and end semester examination. The continuous assessment shall be based on class tests, assignments/tutorials, quizzes/viva-voce and attendance. The marks for continuous assessment (Sessional marks) shall be awarded at the end of the semester. The end semester examination shall be comprised of written papers, Practical and Viva-voce, Record of Lab Work, Project Work, Design Reports or by means of any combination of these methods.
- **11.2** The distribution of marks for sessional, end semester theory papers, practical and other examinations, seminar, project and industrial training shall be as prescribed by the University in prescribed Course Structure. The practical, viva-voce, projects and reports shall be examined/evaluated through internal and external examiners as and when required, as per university guidelines.



11.3 The marks obtained in a subject shall consist of marks allotted in end semester theory paper and sessional work.

12. ELIGIBILITY OFPASSING

- **12.1** A student who obtained Grades A⁺to E shall be considered as passed. If a student secured "F" grade, he /she has to reappear for the examination. It is mandatory for a student to earn the required credits as mentioned in each semester.
 - (a) For a pass in a Theory Subject, a student shall secure minimum of 30% of the maximum marks prescribed in the University Examination and 40% of marks in the aggregate marks in the subject including sessional marks. i.e., Minimum Passing Grade is "E".
 - (b) For a pass in a Practical/Project/Viva-voce examination, a student shall secure a minimum of 50% of the maximum marks prescribed for the University Examination in the relevant Practical/Project/Viva-voce and 40% of marks in the aggregate marks in the Practical/Project/Viva-voce including sessional marks i.e., Minimum Passing Grade in a course is "E".
- **12.2** The students who do not satisfy the condition 12.1 or the student who remains absent shall be deemed to have failed in that subject and may reappear for the University examination in the subsequent examinations. However, the Sessional marks awarded to the student/s at previous attempt in the concerned subject will be carried forward.
- **12.3** A student may, at his/her desire, opt to abandon his/her performance of a semester in following manner.
 - (a) A student may opt to abandon his/her performance only in University Examination of the Semester.
 - (b) A student may opt to abandon his/her Total Performance of the Semester which includes performance in University Examination and Sessional Marks.
 - (c) A student may opt to abandon his/her performance in University Examination of any or both semesters of the same academic year only.
 - (d) A student shall be allowed to abandon the performance maximum twice during the entire course of study.
 - (e) Performance of a semester, once abandoned, cannot be claimed again.
- **12.4** The student, who opts to abandon the performance of a semester as per clause 12.3, shall abandon performance in all the courses of that semester, irrespective of the fact whether the student has passed or failed in any subject of that semester.
- **12.5** A student, who opts to abandon the total performance of the semester including sessional marks, has to take readmission for the relevant semester. Readmission to the First semester in such cases shall not be considered as fresh admission i.e., the student will continue to have the same University Roll Number, which was allotted earlier.
- **12.6** The student, who opted to abandon his / her performance only in the University examination of a semester and does not desire readmission, shall be permitted to re-appear for examinations of



all the subjects of the semester in the subsequent examinations as an Ex- Student. However, the sessional marks obtained by the student in the abandoned semester shall be retained.

- **12.7** Such students who opted to abandon the performance at final year are eligible for the award of Class and Distinction at the MCA degree level, but are not eligible for the award of ranks.
- **12.8** The student who passes a course of a semester as per 12.1 shall not be allowed to appear for the same again, unless he/she opts for *abandoning of results* as per12.3-12.7.
- **12.9** A student shall be declared to have completed the program of MCA degree, provided the student has undergone the stipulated course work as per the regulations and has overall 40 percent marks.

13. ELIGIBILITYFORPROMOTION

- **13.1** There shall not be any restriction for promotion from an odd semester to the next even semester.
- **13.2** For promotion from even semester to the next odd semester (i.e., of the next academic year) the student has cleared in at least seven subjects in the immediately preceding two semesters including theory and practical exam.
- **13.3** The result of the semester shall be declared pass only on securing E or above grades in all subjects and minimum Semester Grade Point Average (SGPA) is5.0.
- **13.4** Student himself can decide to abandon the performance of any or both the semesters of same academic year as per clause 8.3 and reappear in abandoned semester examination as per clauses 7.4, 7.5 &7.6.

13.5 Grace Marks:

- **13.5.1** A candidate may be awarded grace marks a maximum of total 10 marks distributed in maximum four subjects, not more than 5 marks in an individual subject, including theory papers, practical, seminar, project and/or aggregate marks in each academic year provided he/she can be declared to have passed the academic year by the award of these marks.
- **13.5.2** The grace marks shall not be added to the aggregate marks.

14. CARRYOVERSYSTEM

- **14.1** Following rules shall be followed for carry over papers:
 - (a) A candidate who satisfies the requirements of clause 12.2 (a) will be required to appear in those theory papers / practical's during respective end semester exams in which he/she failed.
 - (b) A candidate satisfying clause 12.2 (b) shall be required to exercise his/her choice of theory papers in which he/she desires to appear in the examination to fulfill the



requirements of clause12.1(a).

- (c) A candidate shall be required to exercise his/her choice of minimum theory papers in which he/she desires to appear in the examination for improvement to fulfill the requirements of clause13.3.
- (d) Candidate appearing for carry over paper in any semester shall be examined with the examination paper of that subject running in that semester.
- 14.2 All carryover examinations shall be held only with end semester examination.

15. RE-ADMISSION IN THE SCHOOL/ COLLEGE

A candidate may be allowed for re-admission provided he/she satisfies one of the following conditions:

- (a) A candidate is declared fail.
- (b) A candidate did not appear in a semester examination / or he/she was not granted permission to appear in the examination.
- (c) A candidate has been detained by the institute and subsequently has been permitted to takere-admission.
- (d) A candidate has own desire to abandon the performance of semester(s).

16. COMPUTATION OF SGPA ANDCGPA

16.1 The IIMT University Meerut adopts absolute grading system wherein the marks areconverted to grades, and every semester results will be declared with semester grade point average (SGPA) and Cumulative Grade Point Average (CGPA). The CGPA will be calculated every semester, except the first semester. The grading system is with the following letter grades and grade points scale as given below:

Level	Outstanding	Excellent	Very	Good	Above	Average	Poor	Fail
			Good		Average			
Letter Grade	A+	Α	B +	В	С	D	Е	F
Grade Points	10	9	8	7	6	5	4	00
Score (Marks)	≥ 90	<90	<80,	<70,	<60	<50,	<45,	< 40
Range			≥70	≥60	≥50	≥45	≥40	
(%)	(90-100)	(80-89)	(70-79)	(60-69)	(50-59)	(45-49)	(40-44)	(0-39)

- **16.2** A student obtaining Grade "F" shall be considered failed and will be required to reappear in the examination. Such students after passing the failed subject in subsequent examination/s will be awarded with "E" grade irrespective of marks he/she scores in the subsequent examination/s. Number of attempts taken to clear a subject/s shall be shown in the transcripts.
- **16.3** The University has right to scale/moderate the theory exam/practical exam/sessional marks of any subject whenever required for converting of marks in to letter grades on the basis of the result statistics of university as in usual practice.
 - (a) The modality for moderation of marks before the declaration of result shall be decided by a committee of Pro-Vice Chancellor, Dean UG, Assoc. Dean UG and Controller of Examination.



- (b) The modality for moderation of marks if needed after the declaration of result shall be decided by a committee of Pro-Vice Chancellor, Dean UG, Assoc. Dean UG, Controller of Examination and an external member not below the rank of Professor nominated by the Vice Chancellor.
- (c) If the candidate(s) appeared in the examination but theory marks are not available due to missing of copy by any reason, the average marks may be awarded as decided by the committee mentioned in 16.3(a). In case of missing/unavailable of sessional marks, Controller of Examination can take decision as per the provision laid down by the Examination Committee.
- (d) The Committee defined in16.3 (a) shall also fix up the responsibility and recommend the punishment for occurrence of such case(s)in16.3(c).
- (e) All the matters defined under 15.3(a) to 15.3 (d) shall be executed subject to the approval of Academic Council of the IIMTU.

16.4 Computation of SGPA and CGPA

The following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

(a) The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

SGPA (S_i) =
$$\Sigma$$
(C_i x G_i) / Σ C_i

Where C_i is the number of credits of the i^{th} course and Gi is the grade point scored by the student in the i^{th} course.

(b) The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

$$\mathbf{CGPA} = \Sigma \left(\mathbf{C}_{i} \times \mathbf{S}_{i} \right) / \Sigma \mathbf{C}_{i}$$

where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester.

(c) The SGPA and CGPA shall be rounded off to 2 decimal places and reported in the transcripts.

Illustration for Computation of SGPA and CGPA Computation of SGPAIllustration No.1

Course	Credit	Grade letter	Grade point	CreditPoint (Credit x Grade)
Course 1	4	B ⁺	8	4x8 = 32
Course 2	4	С	6	4x6 = 24
Course 3	4	В	7	4x7 = 28
Course 4	3	A+	10	3x10=30
Course 5	3	D	4	3x4 = 12
Course 6	2	С	6	2x6 = 12
Course 7	2	Α	9	2x9 = 18
Course 8	2	С	6	2x6 = 12
Total	24			168

Thus, SGPA= 168/24=7.00



Illustration No.2

Course	Credit	Grade letter	Grade point	Credit Point
				(Credit x Grade)
Course 1	4	B+	8	4x8 = 32
Course 2	4	С	6	4x6 = 24
Course 3	4	B	7	4x7 = 28
Course 4	3	A+	10	3x10=30
Course 5	3	F	0	3x0=00
Course 6	2	С	6	2x6 = 12
Course 7	2	Α	9	2x9 = 18
Course 8	2	С	6	2x6 = 12
Total	24			156

Thus, SGPA= 156/24=6.50

Illustration No.2 (a)

Course	Credit	Grade letter	Grade point	Credit Point (Credit xGrade)
Course 1	3	Ε	4	3x4 = 12

 C_i (First Attempt)156+ C_i (subsequent attempt)12= 168 Thus, **SGPA= 168/24=7.00**

Illustration No.3

Course	Credit	Grade letter	Grade point	Credit Point
				(Credit x Grade)
Course 1	4	B+	8	4x8 = 32
Course 2	4	С	6	4x6 = 24
Course 3	4	В	7	4x7 = 28
Course 4	3	A+	10	3x10=30
Course 5	3	Α	9	3x9=27
Course 6	2	С	6	2x6 = 12
Course 7	2	Α	9	2x9 = 18
Course 8	2	С	6	2x6 = 12
Total	24			183

Thus, SGPA= 183/24=7.63 CGPA= 24x7.00+24x7.63/48=7.3125

CGPA after Final Semester

Sem 1	Sem 2	Sem 3	Sem. – 4
Credit: 24	Credit: 24	Credit: 27	Credit: 27
SGPA:7	SGPA:8.5	SGPA:9.2	SGPA:6.86



Thus, **CGPA=**24*x*7 + 24*x*8.5 + 27*x*9.2 + 27*x*6.86 + 24*x*8.18 + 24*x*7.73 **=7.92**

- **16.5 Transcript (Format):** Based on the above recommendations on Letter grades, grade points, SGPA and CCPA, the transcript for each semester and a consolidated transcript indicating the performance in all semesters may be issued.
- 17. CONVERSION OF GRADES INTOPERCENTAGE Conversion formula for the conversion of CGPA into Percentage is CGPA Earned x 10= Percentage of marks scored. Illustration: CGPA Earned 7.92 x 10 = 79.2%

18. AWARD OF DIVISION, RANKANDMEDALS

- **18.1** Division shall be awarded only after the final semester examination based on integrated performance of the candidate for all the six semesters (four semesters for lateral entry) as per following details.
 - (a) A candidate who qualifies for the award of the degree securing E or above grades in all subjects pertaining to all semesters in his/her first attempt within six consecutive semesters (three academic years)/ four consecutive semesters (two academic years) as applicable, and in addition secures a CGPA of 7.5 and above for the semesters I to VI and in case of lateral entry (III to VI) shall be declared to have passed the examination in FIRST DIVISION WITHHONOURS.
 - (b) A candidate who qualifies for the award of the degree by securing E or above grades in all subjects of all the semesters within a maximum period of six semesters/four semesters as applicable, after his/her commencement of study in the 1st/3rd semester and secures CGPA not less than 6.5 shall be declared to have passed the examination in **FIRSTDIVISION**.
 - (c) All other candidates who qualify for the award of degree by securing E or above grades in all subjects of all semesters within a maximum period of six / four semesters as applicable, after his/her commencement of study in the 1st/3rdsemester an addition secures CGPA not less than 5.0 shall be declared to have passed the examination in **SECOND DIVISION**.
- **18.2** For award of ranks a minimum of 10 students should have appeared in the 4th semester examination. The total number of ranks awarded shall be 10% of total number of students appeared in 6th semester or 10 students, whichever isless.

Illustration:

- 1. If 100 students appeared for the 4th semester in MCA, the number of ranks to be awarded for MCA will be 10.
- 2. If 90 students appeared for the 4thsemester in MCA, the number of ranks to be awarded for MCA will be 09.

For award of rank in MCA, the CGPA secured by the student from



- (a) 1stto 6th semester for the students admitted to MCA. Program from 1st year, AndA student shall be eligible for a rank at the time of award of degree in MCA, provided the student
- (b) Has passed 1st to 4th (students joining from 1st semester) semester in all the subjects in first attempt only
- (c) Has not repeated/rejected any of the lower semesters.

If two students get the same *CGPA*, the tie should be resolved by considering the number of times a student has obtained higher *SGPA*; but, if it is not resolved even at this stage, the number of times a student has obtained higher grades like A^+ , A, B^+ , B etc. shall be taken into account in rank ordering of the students in a program.

18.3 The Gold, Silver and any other Medals as decided by the university shall be awarded to students falls in the top ranks of various courses as per university rules.

19. SCRUTINY ANDREVALUATION

- **19.1** Scrutiny shall be allowed in only theory papers.
- **19.2** Revaluation of theory/practical papers is permitted only with certain conditions as laid down by university.

20. UNFAIRMEANS

Cases of unfair means shall be dealt as per the rules and regulations of the University.

21. AWARD OF SESSIONALMARKS

Sessional marks for theory subjects, practical and project shall be awarded as prescribed and at present the break-up of sessional marks shall be as follows:

(a) Theory Subjects:

- (i) Class test which will comprise 20 % of total theory marks with two mid-term tests of equal weightage.
- (ii) Teacher Assessment Tutorial/Assignment/ Quizzes/ Attendance comprises 10% of total theory marks.

(b) **Practical**:

- (iii) Two mid-term viva-voce/tests of equal weightage 30% of total Practical marks.
- (iv) Teacher Assessment: Lab, Record/ Attendance 20% of total Practical marks.
- (c) Make-up test may be held only for those students who could not appear in any one of midterm class tests due to genuine reasons for which the prior permission from the Head of Institution/College was taken. Make up test shall ordinarily be held about two weeks before the semester examination. The syllabus for the make-up test shall be the whole syllabus covered by the subject teacher up to that time.

22. AWARD OF SEMINAR INDUSTRIAL TRAINING, EDUCATIONAL TOUR MARKS AT INSTITUTION/COLLEGELEVEL

22.1 The marks of Seminar, Industrial Training, Educational tour marks shall be awarded on the following basis:



- (a) Write-up / Report50%
- (**b**) Presentation 50%
- **22.2** The marks in Seminar, Industrial Training and Educational Tour shall be awarded by a committee consisting of following members:
 - (a) Head of the Department or his/her nominee.
 - (**b**) Concerned Officer In charge.
 - (c) Senior Faculty Member of the department nominated by the Head of Department.

23. CANCELLATION OF ADMISSION

The admission of a student at any stage of study shall be cancelled if:

- (i) He / She is not found qualified as per AICTE / State Government norms and guidelines or the eligibility criteria prescribed by the University. or
- (ii) He / She is found unable to complete the course within the stipulated time as prescribed in clause 4.2or
- (iii) He / She are found involved in creating indiscipline in the Institution / College or in the University.

24. STUDENT DISCIPLINE

Every student is required to observe utmost discipline and decorum both inside and outside the campus and not to indulge in any activity which may affect adversely the prestige reputation of the University and School.

25. RAGGING

Ragging in any form is a criminal and non-bailable offence in our country. The current State andCentrallegislationsprovidestringentpunishmentsincludingimprisonment.Oncetheinvolvemen tofastudent(s) is established in ragging, offending fellow students/staff, harassment of any nature to the fellow students/staff etc. the student(s) will be liable to be dismissed from the University, as per the laid down procedures of the UGC / Govt. /Institute. Every senior student at the University, along with their parent, shall give an undertaking every year in this regard and the same should be submitted at the time of Registration.

29. POWER TO MODIFY

Not with stand in gall that has been stated above, the Academic Council is vested with powers to modify any or all the above regulations from time to time, if required, subject to the approval by the Board of Studies and final approval by Vice-Chancellor.



Evaluation Scheme



MCA (AI&ML) SEMESTER-I

S.No.	Subject	SubjectName		Peri	iods		Internal	External	Total	Credit
	Code		CourseType	L	Т	Р				
1.	MCA-111	FundamentalofComputers&Emerging Technologies	DSE	3	1	0	30	70	100	4
2.	MCA-112	ProblemSolvingusingC	CoreTheory	3	1	0	30	70	100	4
3.	MCA-118	PythonProgramming	CoreTheory	4	0	0	30	70	100	4
4.	MCA-119	Probability&Statistics	DSE	4	0	0	30	70	100	4
5.	MCA-115	ComputerOrganization&Architecture	CoreTheory	3	1	0	30	70	100	4
6.	MCA-116P	ProblemSolvingusingC Lab	CorePractical	0	0	4	20	30	50	2
7.	MCA-117P	ComputerOrganization&Architecture Lab	CorePractical	0	0	4	20	30	50	2
8.	MCA-P1	MiniProjectlab	SkillEnhancementCours e	0	0	4	20	30	50	2
9.	ECC-111	IndustrialVisits/SeminarorPresentationBasedontheReportofVisits	SkillEnhancementCourse	0	0	0	0	0	25	0
10	ECC-112	UniversitySocialResponsibility	SkillEnhancementCourse	0	0	0	0	0	25	0
11		Sports	AuditCourse	0	0	0	50	0	50	0
	1	Total		17	3	12	210	440	750	26



MCA (AI&ML) SEMESTER-II

S.No.		SubjectName	CourseType	Peri	ods		Internal	External	Total	Credit
	Code			L	Т	Р				
1.	MCA-128	Advanced MicrosoftExcelwithTableau	DSE	4	0	0	30	70	100	4
2.	MCA-122	ObjectOrientedProgramming	CoreTheory	3	1	0	30	70	100	4
3.	MCA-129	LINUXADMINISTRATIONWITHSCRIPTING	CoreTheory	3	1	0	30	70	100	4
4.	MCA-124	DatabaseManagementSystems	CoreTheory	3	1	0	30	70	100	4
5.	MCA-125	DataStructures&AnalysisofAlgorithms	DSE	4	0	0	30	70	100	4
7.	MCA-126P	ObjectOrientedProgrammingLab	CorePractical	0	0	4	20	30	50	2
9.	MCA-127P	DBMSLAB	CorePractical	0	0	4	20	30	50	2
10.	MCA-P2	MiniProjectLab	SkillEnhancementCourse	0	0	4	20	30	50	2
11.	ECC-121	IndustrialVisits/SeminarorPresentationBasedontheReportofVisits	SkillEnhancementCourse	0	0	0	0	0	25	0
12.	ECC-122	UniversitySocialResponsibility	SkillEnhancementCourse	0	0	0	0	0	25	0
13.		Sports	AuditCourse	0	0	0	50	0	50	0
		Total		17	3	12	260	440	750	26



MCA (AI & ML) SEMESTER-III

S.	Subject Code	Subject Name	Course Type	Peri	ods		Internal	External	Total	Credit
No.				L	Т	Р	•			
1.	MCA-234	Machine Learning	Core Theory	3	1	0	30	70	100	4
2.	MCA-235	Advance Machine Learning	Core Theory	3	1	0	30	70	100	4
3.	MCA-233	Computer Network	Core Theory	4	0	0	30	70	100	4
4.		Elective – 1	DSE	4	0	0	30	70	100	4
5.		Elective – 2	DSE	3	1	0	30	70	100	4
6.	MCA-234P	Machine Learning	Core Practical	0	0	4	20	30	50	2
7.	MCA-235P	Advance Machine Learning	Core Practical	0	0	4	20	30	50	2
8.	MCA-P3	Mini Project lab	Skill Enhancement Course	0	0	4	20	30	50	2
9.	ECC-111	Industrial Visits/Seminar or Presentation Based on the Report of Visits	Skill Enhancement Course	0	0	0	25	0	25	0
10	ECC-112	University Social Responsibility	Skill Enhancement Course	0	0	0	25	0	25	0
11		Sports	Audit Course	0	0	0	50	0	50	0
		Total		17	3	12	310	440	750	26
Elective	e-1	MCA011	Cryptography & Network	Security						
		MCA012	Data Warehousing & Data	a Mining						
		MCA013	Software Project Manager	nent						

	MCA012	Data Warehousing & Data Mining
	MCA013	Software Project Management
	MCA014	Cloud Computing
	MCA015	Compiler Design
Elective-2	MCA021	Web Technology
	MCA022	Big Data
	MCA023	Simulation & Modeling
	MCA024	Software Testing & Quality Assurance
	MCA025	Digital Image Processing



MCA (AI & ML) SEMESTER-IV

S. No.	Subject	Subject Name	Course Type	Periods		Periods		Periods		External	Total	Credit
	Code			L	Т	Р						
1.		Elective – 3	DSE	3	0	0	30	70	100	3		
2.		Elective – 4	DSE	3	0	0	30	70	100	3		
3.		Elective – 5	DSE	3	0	0	30	70	100	3		
4.	MCA-451	Project	Core Theory		-	-	200	500	700	14		
		Total					290	710	1000	23		

Elective-3	MCA031	Privacy & Security in Online social media
	MCA032	Soft Computing
	MCA033	Pattern Recognition
	MCA034	Data Analytics
	MCA036	Artificial Intelligence
Elective-4	MCA041	Block chain Architecture
	MCA042	Neural Network
	MCA044	Modern Application Development
	MCA045	Distributed Database Systems
Elective-5	MCA056	IOT
	MCA052	Computer Graphics and Animation
	MCA053	Natural Language Processing
	MCA054	Machine Learning
	MCA055	Quantum Computing



IIMT UNIVERSITY

Year-I/ Semester –I

Program:	Degree	Year:I	
Class:MC	A(AI & ML)	Semester: I	
Credits	Subject: Computer	Organization & Architecture Lab	
Theory: 0			
Practical :	2		
Course Co	ode: Title: Computer Org	anization & Architecture Lab	
MCA -117	P		
Course Ol	0		
		al circuits (adder, code converter, decoder, mul	tiplexer) using
	c gates.		
	ign and verify various flip-f	lops.	
	ign I/O system and ALU.		
	nonstrate combinational circ	cuit using simulator.	
	Paper: Core		
	Passing Marks/Credits:50)% Marks	
L:0			
T:0			
P:4(In Hou	·		
	Hr. = 1 Credit		
	2 Hrs.=1Credit		
	ek=4Credits)		N f
Unit	Contents		No. of
			Lectures
Ι	Implementing HALE ADD	DER, FULL ADDER using basic logic gates	Allotted 02
I		Gray, Gray -to -Binary code conversions.	02
11		ECODER. Implementing 4x1 and 8x1 MULTI	02
III	PLEXERS.		02
IV	Verify the excitation tables	s of various FLIP-FLOPS	02
V	Design of an 8-bit Inp Registers.	ut/Output system with four 8-bit Internal	02
VI	Design of an 8-bit ARITH	METIC LOGICUNIT	02
		computer from its register transfer language	02
VII	description.		
VIII		a computer using either hardwiring or micro register transfer language description.	02
Reference	/ Text Books:		
		ture and Organization", McGraw Hill.	
		anization and Architecture-Designing for Perform	ance" Doorson
2. Willian Educat	U 1 U	anization and Architecture-Designing for Periorit	
Euucal	1011.		



Evaluation/Assessment Methodology		
		Max. Marks:50
1) Class tasks/ Sessional Examination	10	
2) Presentations /Seminar		
3) Assignments	10	
4) Research Project Report		
Seminar On Research Project Report		
5) ESE	30	
Total:	50	
Program Learning Outcomes:		
CO 1: Students will be able to develop flip-flops.		
CO 2: Students will be able to solve problems based on circuit design.		

CO 3: Students will be able to learn working of ALU.

CO 4: Students will be able to Implement Binary -to -Gray, Gray-to -Binary code conversions

CO 5: Students will be able to work with logic gates.



IIMT UNIVERSITY Year – I /Semester – I

Program	me: Degree Year	•• T	
	e	ester: I	
Credits	Subject: Computer Organization &		
Theory:4	• • •	ireinteeture	
Course		hitecture	
MCA - 1			
	Dbjectives:		
	escribe functional units of digital system and	explain how arithmetic and logical ope	erations
	e performed by computers.		
CO2: D	escribe the operations of control unit and v	write sequence of instructions for carry	ing out
sir	nple operation using various addressing mode	S.	
CO3: Do	esign various types of memory and its organiz	ation	
	escribe the various modes in which IO devices		
	ist the criteria for classification of parallel	computer and describe various archi	tectural
	nemes.		
	of Paper: CORE COURSE		
-	m Passing Marks/Credits:40% Marks		
L:3			
T:1			
	ours/Week) 1 Hr. = 1 Credit		
•	- 2 Hrs.=1Credit(4Hrs./Week=4Credits)		
Unit	Contents		lo. of
Omt	Contents		ctures
			lotted
Ι	Introduction: Functional units of digital s	ystem and their interconnections,	8
	buses, bus architecture, types of buses and	bus arbitration. Register, bus and	
	memory transfer.	-	
	Processor organization: general registers of	ganization, stack organization and	
	addressing modes.		
II	Arithmetic and logicunit: Look ahead	carries adders. Multiplication:	8
	Signedoperand multiplication, Booth's algor	ithm andarray multiplier. Division	
	and logicoperations.		
	Floating point arithmetic operation, A	rithmetic & logicunit design.	
	IEEEStandard for Floating Point Numbers.		0
III	Control Unit: Instruction types, formats,		8
	(fetch and execute etc.), micro-operations, etc.		
	Program Control, Reduced Instruction Set C	omputer, Pipelining. Hardwire and	
	micro programmed	t of horizontal and vertical micro	
	control: micro-program sequencing, concep	i of norizonital and vertical inicro	
IV	programming. Memory: Basic concept and hierarchy,	somiconductor DAM momories	8
11	2D&21/2Dmemory organization. ROM me		0
	and design issues & performance, address m	_	
	memories: magnetic disk, magnetic tape a		



	concept implementation.			
V		to Interrupto.	8	
v	Input / Output: Peripheral devices, I/O interface, I/O ports, Interrupts: interrupt hordware turge of interrupts and executions. Modes of Data Transform			
	interrupt hardware, types of interrupts and exceptions. Modes of Data Transfer:			
	Programmed I/O, interrupt initiated I/O and Direct Memory	Access., I/O		
	channels and processors.	• ,•		
	Serial Communication: Synchronous & asynchronous co standard communication interfaces.	ommunication,		
Text Bo	oks:			
1. Johr	P. Hayes, "Computer Architecture and Organization", McGraw H	lill.		
2. Will	iam Stallings, "Computer Organization and Architecture-Design	ning for Perfor	mance",	
Pear	rson Education.	C		
3. M. I	Morris Mano, "Computer System Architecture", PHI.			
Referen				
1. Da	vid A. Patterson and John L. Hennessy, "Computer Architecture-A	Quantitative A	pproacl	
	evier Pub.	C C	11	
2. Ta	nnenbaum, "Structured Computer Organization", PHI.			
	Evaluation/Assessment Methodology			
		Max	. Marks100	
1) Class t	asks/ Sessional Examination	20		
2) Present	tations /Seminar			
3) Assign	ments			
4) Resear	ch Project Report	10		
Semin	ar On Research Project Report			
5) ESE		70		
	Total:	100)	
Prerequis	sites for the course: NIL			
Course l	Learning Outcomes:			
CO1: Fo	r a microprocessor system, student should be able to deal with the	ne internal archi	tecture of 8	
bit	s and 16-bit microprocessor to analyze the working operation	on and to know	ow the pin	
	ifiguration for the respective microprocessor. A student should be			
	errupts internally or externally.	-		
CO2. 11-	(above above date of the second stand the basis concerns of Assembly)			

- CO2: He/she should be able to understand the basic concepts of Assembly language programming. For a particular data instruction set, student should be having a clear idea of solving machine language programs using kit. He/she shall be having an idea to tackle with counter delays and subroutines.
- CO3: He/she should be able to know the concept of pipelining and parallelism in uniprocessor system for hazard detection. Understand the basic concept of Parallel computing.
- CO4: A student should have a basic idea of job levels that are governed by an organization on priority basis. He/she should know the Pipeline scheduling theory.
- CO5: For good networking, a student should be able to draw SIMD interconnections and FFTr a butterfly method system for collision prevention and vector dispatching. He/she should be able to make Cube Interconnection Network, Shuffle-Exchange and Omega Network



IIMT UNIVERSITY

Year-I/ Semester –I

Program:	Degree Year: I						
0	A(AI &ML) Semester: I						
Credits	Subject: Problem-Solving using C Lab						
Theory: 0							
Practical: 2							
Course Co	de: Title: Problem-Solving using C Lab						
MCA -116	Р						
Course Ob	jectives:						
CO1: Stude	CO1: Students will be able to learn the basics of programming language and Fundamental concepts of						
	C Language.						
	ents will be able to learn and understand Concepts of basic programming with	n Conditional					
	erative Control statements.						
	ents will be familiar with the concept of Arrays, Pointers, Functions, categorie	s of function,					
	ecursion.						
	ents will be able to develop a Program with Structure; learn Union and Con	mplete String					
1	itions.						
	nts will be familiar with File handling programs to perform read-write operati	ons.					
	Paper: Core						
	Passing Marks/Credits: 50% Marks						
L:0							
T:0							
P:4(In Hou							
	Hr. = 1 Credit Hrs.=1Credit(4Hrs./Week=4Credits)						
Unit	Contents	No. of					
Umt	Contents	Lectures					
		Allotted					
Ι	Write a program to display "hello world" in C.						
1	Write a program to find the largest and smallest among three entered	(1)					
II		02					
		02 02					
	numbers and also display whether the identified largest/smallest number						
	numbers and also display whether the identified largest/smallest number is even or odd.	02					
III	numbers and also display whether the identified largest/smallest number is even or odd. Write a program to check whether the entered year is a leap year or not (a						
III	numbers and also display whether the identified largest/smallest number is even or odd. Write a program to check whether the entered year is a leap year or not (a year is a leap if it is divisible by 4 and divisible by 100 or 400.)	02					
	numbers and also display whether the identified largest/smallest number is even or odd. Write a program to check whether the entered year is a leap year or not (a year is a leap if it is divisible by 4 and divisible by 100 or 400.) Write a program to read a string and check for palindrome without using	02					
III IV	numbers and also display whether the identified largest/smallest number is even or odd. Write a program to check whether the entered year is a leap year or not (a year is a leap if it is divisible by 4 and divisible by 100 or 400.) Write a program to read a string and check for palindrome without using string-related functions (a string is a palindrome if its half is mirror by	02					
IV	numbers and also display whether the identified largest/smallest number is even or odd. Write a program to check whether the entered year is a leap year or not (a year is a leap if it is divisible by 4 and divisible by 100 or 400.) Write a program to read a string and check for palindrome without using string-related functions (a string is a palindrome if its half is mirror by itself.	02 02 02					
	numbers and also display whether the identified largest/smallest number is even or odd. Write a program to check whether the entered year is a leap year or not (a year is a leap if it is divisible by 4 and divisible by 100 or 400.) Write a program to read a string and check for palindrome without using string-related functions (a string is a palindrome if its half is mirror by itself. Write a program to find the biggest among three numbers using a pointer.	02 02 02 02 02					
IV V	numbers and also display whether the identified largest/smallest number is even or odd. Write a program to check whether the entered year is a leap year or not (a year is a leap if it is divisible by 4 and divisible by 100 or 400.) Write a program to read a string and check for palindrome without using string-related functions (a string is a palindrome if its half is mirror by itself. Write a program to find the biggest among three numbers using a pointer. Create a structure named company which has a name, address, phone, and	02 02 02					
IV	numbers and also display whether the identified largest/smallest number is even or odd. Write a program to check whether the entered year is a leap year or not (a year is a leap if it is divisible by 4 and divisible by 100 or 400.) Write a program to read a string and check for palindrome without using string-related functions (a string is a palindrome if its half is mirror by itself. Write a program to find the biggest among three numbers using a pointer. Create a structure named company which has a name, address, phone, and as member variables. Read the name of the company, its address, phone,	02 02 02 02 02					
IV V	numbers and also display whether the identified largest/smallest number is even or odd. Write a program to check whether the entered year is a leap year or not (a year is a leap if it is divisible by 4 and divisible by 100 or 400.) Write a program to read a string and check for palindrome without using string-related functions (a string is a palindrome if its half is mirror by itself. Write a program to find the biggest among three numbers using a pointer. Create a structure named company which has a name, address, phone, and	02 02 02 02 02					
IV V VI VII	numbers and also display whether the identified largest/smallest number is even or odd. Write a program to check whether the entered year is a leap year or not (a year is a leap if it is divisible by 4 and divisible by 100 or 400.) Write a program to read a string and check for palindrome without using string-related functions (a string is a palindrome if its half is mirror by itself. Write a program to find the biggest among three numbers using a pointer. Create a structure named company which has a name, address, phone, and as member variables. Read the name of the company, its address, phone, and no Of Employee. Finally display these members' values. The BCT class and display the details from the function.	02 02 02 02 02 02 02					
IV V VI	numbers and also display whether the identified largest/smallest number is even or odd. Write a program to check whether the entered year is a leap year or not (a year is a leap if it is divisible by 4 and divisible by 100 or 400.) Write a program to read a string and check for palindrome without using string-related functions (a string is a palindrome if its half is mirror by itself. Write a program to find the biggest among three numbers using a pointer. Create a structure named company which has a name, address, phone, and as member variables. Read the name of the company, its address, phone, and no Of Employee. Finally display these members' values.	02 02 02 02 02 02					



The C Programming Language" by Brian W. Kernighan and Dennis M. Ritchie.				
C Programming: A Modern Approach" by K. N. King.				
Evaluation/Assessment Methodology				
	Max. Marks:50			
1) Class tasks/ Sessional Examination	10			
2) Presentations /Seminar	10			
3) Assignments				
4) Research Project Report				
Seminar On Research Project Report				
5) ESE	30			
Total:	50			
Program Learning Outcomes:				
CO1: Students will be able to develop programs based on fundamental concepts of programming in C.				
CO2: Students will be able to solve problems based on Conditional and Iterative Control				
Statements.				
CO3: Students will be able to learn Complete Programming Concepts of Arrays, Pointers and get				
familiar with modular programming Concepts of C using Functions.				
CO4: Students will be able to learn conceptual programming with String, Structure, and its				
differentiation with Union.				
CO5: Students will be able to perform File handling programs with read and write concepts				



IIMT UNIVERSITY

Year – I /Semester – I

Programme: Degree Year: I					
Class: MCA(AI & ML)			Semester: I		
Credit					
	eory:4Cr				
•	rse Code: Title: Fundamental of Computers & Emerging Technologies				
MCA	- 111				
Cours	e Objectives				
CO1 D	Demonstrate	the knowledge of the b	asic structure, components, features and g	enerations of	
с	omputers.	-			
CO2: I	Describe the	concept of computer lan	iguages, language translators and construct	algorithms to	
S	olve problem	s using programming cor	ncepts.		
			ning & types of operating system and compu		
		_	& services of the Internet and basics of multi		
			nologies in the field of Information Technolo	gy.	
	e of Paper: I				
	um Passing	Marks/Credits: 40% M	larks		
L:3					
T:1		、 、			
	Hours/Weel				
•	y - 1 Hr. = 1 (1'4-)		
	cal-2 Hrs.=1Credit(4Hrs./Week=4Credits)				
Unit		Contents No. of		No. of Lectures	
				Allotted	
Ι	Introductio	n to Computer Defi	nition, Computer Hardware & Computer	8	
1	Software	in to computer. Dem	intion, computer mateware & computer	0	
		ts: Hardware–Introductio	on, Input devices, Output devices, Central		
	-		and Secondary. Software-Introduction,		
	-	em and Application.	,		
	• •	11	on, Concept of Compiler, Interpreter &		
	Assembler				
	Problem	solving concept:	Algorithms–Introduction, Definition,		
			ons in pseudo-code, Loops in pseudo code.		
II	· ·	•	ctions, Types, Classification, Element	8	
		l based and GUI based of			
	—		Types (LAN, WAN and MAN), Data		
		tion, topologies.			
III			Functioning, Basic services like WWW,	8	
		· · · · · · · ·	ines, E-mail, Web Browsers.		
			on, Sensors, their types and features, Smart		
-		strial Internet of Things.			
IV			, features, limitations and application areas	8	
		ls of Block Chain.			
			pplications and use cases		
	CloudCom	puting: Itnatureandbenefi	its,AWS,Google,Microsoft&IBMServices		



V Emerging Technologies: Introduction, overview, features, limitations and 8				
application areas of Augmented Reality, Virtual Reality, rid computing, Green				
computing, Big data analytics, Quantum Computing and Brain Computer				
Interface				
Text Books:				
1. Rajaraman V., "Fundamentals of Computers", Prentice-Hall of Inc	lia.			
2. Norton P., "Introduction to Computers", McGraw Hill Education.	2. Norton P., "Introduction to Computers", McGraw Hill Education.			
3. GoelA., "Computer Fundamentals", Pearson.				
Reference				
1. Balagurusamy E., "Fundamentals of Computers", Mc Graw Hill				
2. TharejaR., "Fundamentals of Computers", Oxford University Pres	SS.			
Evaluation/Assessment Methodology	7			
	Ma	x. Marks100		
1) Class tasks/ Sessional Examination	20			
2) Presentations /Seminar				
3) Assignments				
4) Research Project Report	10			
Seminar On Research Project Report				
5) ESE	70			
Total:	100			
Prerequisites for the course: NIL				
Course Learning Outcomes:				
CO1: Demonstrate the use of mathematical software and solve simple mathematical problems.				
CO2: Explain the needs of hardware and software required for a computation task.				
CO3: State typical provisions of cyber law that govern the proper usage of Internet and computing				
resources.				
CO4: Explain the working of important application software and their use to perform any engineering				
activity				

activity. CO5: Demonstrate the use of Operating system commands and shell script.



D			Verm			
Programme: Degree Class: MCA(AI &ML)			Year: I			
-	-		Semester: I			
Credits		Subject: Probability	& Statistics			
Theory		T:4 Due h e h 11:4 0	Q4-4:-4:			
	Course Code:Title: Probability & StatisticsICA-119					
	Course Objectives:					
	O1: Understand the concepts of curve and central tendency.O2 Understand the basic concepts of probability and events.					
		1 1				
		eorems about the con				
	-	oblem on mean and va				
		he data based on diffe	rent parameters.			
	of Paper: I					
	in Passing	Marks/Credits: 40%	0 IVIATKS			
L:4 T:0						
	Hours/Week	-)				
	1Hr.=1Crec					
•		redit(4Hrs./Week=4C	radits)			
Unit	1-2111510	1cull(41115./ Week-4C	Contents	No. of		
Umt			Contents	Lectures		
				Allotted		
Ι	Basics of	Data Science:-		10		
1			opulation(universe), collection of data-census,	10		
	-		of collecting data-questionnaire, telephonic			
			line surveys, Classification of Data-based on			
			e, gender, education etc., Tabulation of Data-			
	-	he tables for further A	•			
	0	endency: -	in u y 515.			
			rage and their needs-Mean (AM, GM, HM),			
			M is used as Average generally, Locational			
		Quartiles, Deciles, Pe				
	U	n of Data: -				
	-		viation (rms value), Different Coefficient of			
			Range, Standard Deviation, Combined Mean			
	-	-	, Coefficient of variation & its Applications,			
		ding Six-sigma Scale				
II		0 0	Normal tendency of Data: ->Skewness&	10		
			nents and Moment Generating Functions,			
	Moments	about Actual Meano	r Arbitrary Origin, defining SKEWNESS as			
		l distortion of Data-Ka				
	Pearson's	coefficient of Ske	wness, Bowley's coefficient of Skewness,			
			oments, Defining KURTOSIS as Vertical			
	distortion	of Data-Platykurt	ic, Mesokurtic, Lep to kurtic curves,			
	Understan	ding the Normal Curv	ve through Skewness & Kurtosis.			
	BOS					



III	Theory of Probability-1:-Basics of Probability-Simple events, Sure events,	10
	impossible events, Compound Events, equally likely events, Exhaustive	
	Events, Understanding the Sample Space, empirical definition of probability,	
	Defining the logical connectives OR, IF THEN & AND in probability,	
	Understanding OR-Addition Theorem of Probability-Mutually& Non-Mutually	
	Exclusive events.	
	TheoryofProbability-2:-	
	ConditionalprobabilityTheorem:DefiningIFTHEN,Understandingthecompound	
	events-Independentevents, dependent (Non-Independent) Events, Multiplications	
	Theorem of Probability, Understanding the Priori and Posterior events,	
	Understanding the total Probability The theorem, Baye's The oremandits	
	applications, Bernoullior Binomial approach of Probability.	
	Or Binomial approach of Probability.	
	Theory of Probability-2:-Defining Probability as Function of Random	
	variable, Understanding the Discrete and continuous Random Variable,	
	Probability Distribution Functions for discrete Random variable, Probability	
	Distribution Functions for Discrete R and omvariable & its mean and Variance,	
	Probability Density Functions for Continuous R and omvariable & its mean	
	and Variance.	
IV	Discrete Theoretical Distributions:-Binomial The oretical Distributions and	10
	its Parameters, Poisson The oretical Distributions and its Parameters,	
	Applications of the oretical distribution to create expected frequencies.	
	Continuous Theoretical Distributions:- Defining Normal (or Gaussian)	
	Distribution-	
	Understandingitscharacteristicsmean&variance,DefiningThestandardnormalDis	
	tribution-Understanding Area under Normal Curve, Understanding the	
	Normalization of Data.	
	Correlation & Regression:- Simple Correlation-Karl Pearson coefficient of	
	Correlation, Spearmen's rank Correlation, Multiple & Partial Correlation,	
	Regression Analysis- Least square Method, Fitting of Line, Fitting of	
	Quadratic, Fitting of Exponential Regression Analysis, Logistic Regression-	
	Sigmoidcurves Analysis.	
V	Test of significance of samples:- Elementary theory of Testing of Hypothesis-	10
v	two types of errors, Small and Large Samples, various Test- Standard normal	10
	test, t-Test, F-test, Fishers z-Test, Chi-Square Test-For Test of goodness of fit	
	of an Experiment, Test of independence of Attributes, Introduction of	
	ANOVA.	
	Introduction of Linear Algebra(in Brief):- Vectors & Scalars- Products,	
	cosine	
	law,Orthogonalvectors,linearcombination,linearindependenceofvectors,Matrice	
	s-addition, Product, transpose, determinant, Identify matrix, Invertible matrix,	
	Inverse, rank of Matrix, Trace, Spur, Popular Types of Matrices-Symmetric,	
	Diagonal, Orthogonal, Orthonormal, Eigen values & Eigen Vectors.	
	Introduction of Topology (In Brief):- Introduction of Metric spaces (Metric	
	distances)-Varioustypes of Metric.	
Text Bo	ook:	
	ty Challenging Problems in Probability with Solutions": By Frederick Mosteller.	
2. "An	Introduction to Probability Theory and Its Applications": By William Feller.	

Reference Book:



1. "Probability Statistics and Queueing Theory" by P Kandasamy					
Evaluation/Assessment Methodology					
	Max. Marks 100				
1) Class tasks/Sessional Examination	20				
2) Presentations /Seminar					
3) Assignments					
4) Research Project Report	10				
5) Seminar On Research Project Report					
6) ESE	70				
Total:	100				
Prerequisites for the course: NIL					
Course Learning Outcomes:					
CO1: Able to understand the discrete and continuous distributions.					
CO2: Able to understand the basic rules and theorems in probability.					
CO3: Able to solve the problems on mean and variance.					
CO4: Able to understand the key concepts of probability.					
CO5: Able to define various types of metrics.					

CO5: Able to define various types of metrics.



IIMT UNIVERSITY Year – I /Semester – I

	nme: Degree Year: I	
Class: N	ICA(AI &ML) Semester: I	
Credits	Subject: PROBLEM SOLVING USING C	
Theory:		
Course	Code: Title: PROBLEM SOLVING USING C	
MCA - 1	12	
Course (Objectives:	
CO1: D6	escribe the functional components and fundamental concepts of a digital compu	iter system
inc	luding number systems.	
CO2: Co	nstruct flow chart and write algorithms for solving basic problems.	
CO3: W	rite simple programs using the basic elements like control statements, functions,	arrays and
stri	ngs.	
CO4: W	rite advanced programs using the concepts of pointers, structures, unions and enum	nerated data
typ		
-	oply pre-processor directives and basic file handling and graphics operations in	n advanced
-	gramming.	
	of Paper: CORE COURSE	
	m Passing Marks/Credits:40% Marks	
L:3		
T:1		
•	ours/Week)	
	1 Hr. = 1 Credit	
1	- 2 Hrs.=1Credit(4Hrs./Week=4Credits)	
Unit	Contents	No. of
		Lectures
1	Basics of programming: Approaches to problem solving. Use of high level	Allotted
Ι	Basics of programming: Approaches to problem solving, Use of high-level programming language for systematic development of programs. Concept of	
1	programming language for systematic development of programs, Concept of	Allotted
1	programming language for systematic development of programs, Concept of algorithm and flow chart, Concept and role of structured programming.	Allotted
1	programming language for systematic development of programs, Concept of algorithm and flow chart, Concept and role of structured programming. Basics of C : History of C, Salient features of C, Structure of C Program,	Allotted
1	 programming language for systematic development of programs, Concept of algorithm and flow chart, Concept and role of structured programming. Basics of C: History of C, Salient features of C, Structure of C Program, Compiling C Program, Link and Run C Program, Character set, Tokens, 	Allotted
1	 programming language for systematic development of programs, Concept of algorithm and flow chart, Concept and role of structured programming. Basics of C: History of C, Salient features of C, Structure of C Program, Compiling C Program, Link and Run C Program, Character set, Tokens, Keywords, Identifiers, Constants, Variables, Instructions, Data types, 	Allotted
	 programming language for systematic development of programs, Concept of algorithm and flow chart, Concept and role of structured programming. Basics of C: History of C, Salient features of C, Structure of C Program, Compiling C Program, Link and Run C Program, Character set, Tokens, Keywords, Identifiers, Constants, Variables, Instructions, Data types, Standard Input / Output, Operators and expressions. 	Allotted 8
I II	 programming language for systematic development of programs, Concept of algorithm and flow chart, Concept and role of structured programming. Basics of C: History of C, Salient features of C, Structure of C Program, Compiling C Program, Link and Run C Program, Character set, Tokens, Keywords, Identifiers, Constants, Variables, Instructions, Data types, Standard Input / Output, Operators and expressions. Conditional Program Execution: if, if-else, and nest edif-els estatements, 	Allotted
	 programming language for systematic development of programs, Concept of algorithm and flow chart, Concept and role of structured programming. Basics of C: History of C, Salient features of C, Structure of C Program, Compiling C Program, Link and Run C Program, Character set, Tokens, Keywords, Identifiers, Constants, Variables, Instructions, Data types, Standard Input / Output, Operators and expressions. Conditional Program Execution:if, if-else, and nest edif-els estatements, Switch statements, Restriction sons witch values, Use of break and default 	Allotted 8
	 programming language for systematic development of programs, Concept of algorithm and flow chart, Concept and role of structured programming. Basics of C: History of C, Salient features of C, Structure of C Program, Compiling C Program, Link and Run C Program, Character set, Tokens, Keywords, Identifiers, Constants, Variables, Instructions, Data types, Standard Input / Output, Operators and expressions. Conditional Program Execution:if, if-else, and nest edif-els estatements, Switch statements, Restriction sons witch values, Use of break and default with switch, Comparison of switch and if-else. 	Allotted 8
	 programming language for systematic development of programs, Concept of algorithm and flow chart, Concept and role of structured programming. Basics of C: History of C, Salient features of C, Structure of C Program, Compiling C Program, Link and Run C Program, Character set, Tokens, Keywords, Identifiers, Constants, Variables, Instructions, Data types, Standard Input / Output, Operators and expressions. Conditional Program Execution:if, if-else, and nest edif-els estatements, Switch statements, Restriction sons witch values, Use of break and default with switch, Comparison of switch and if-else. Loops and Iteration:for, while and do-while loops, Multiple loop variables, 	Allotted 8
	 programming language for systematic development of programs, Concept of algorithm and flow chart, Concept and role of structured programming. Basics of C: History of C, Salient features of C, Structure of C Program, Compiling C Program, Link and Run C Program, Character set, Tokens, Keywords, Identifiers, Constants, Variables, Instructions, Data types, Standard Input / Output, Operators and expressions. Conditional Program Execution:if, if-else, and nest edif-els estatements, Switch statements, Restriction sons witch values, Use of break and default with switch, Comparison of switch and if-else. 	Allotted 8
	 programming language for systematic development of programs, Concept of algorithm and flow chart, Concept and role of structured programming. Basics of C: History of C, Salient features of C, Structure of C Program, Compiling C Program, Link and Run C Program, Character set, Tokens, Keywords, Identifiers, Constants, Variables, Instructions, Data types, Standard Input / Output, Operators and expressions. Conditional Program Execution:if, if-else, and nest edif-els estatements, Switch statements, Restriction sons witch values, Use of break and default with switch, Comparison of switch and if-else. Loops and Iteration:for, while and do-while loops, Multiple loop variables, Nested loops, Assignment operators, break and continue statement. 	Allotted 8
	 programming language for systematic development of programs, Concept of algorithm and flow chart, Concept and role of structured programming. Basics of C: History of C, Salient features of C, Structure of C Program, Compiling C Program, Link and Run C Program, Character set, Tokens, Keywords, Identifiers, Constants, Variables, Instructions, Data types, Standard Input / Output, Operators and expressions. Conditional Program Execution:if, if-else, and nest edif-els estatements, Switch statements, Restriction sons witch values, Use of break and default with switch, Comparison of switch and if-else. Loops and Iteration:for, while and do-while loops, Multiple loop variables, Nested loops, Assignment operators, break and continue statement. Functions: Introduction, Types, Declaration of a Function, Function calls, 	Allotted 8
	 programming language for systematic development of programs, Concept of algorithm and flow chart, Concept and role of structured programming. Basics of C: History of C, Salient features of C, Structure of C Program, Compiling C Program, Link and Run C Program, Character set, Tokens, Keywords, Identifiers, Constants, Variables, Instructions, Data types, Standard Input / Output, Operators and expressions. Conditional Program Execution:if, if-else, and nest edif-els estatements, Switch statements, Restriction sons witch values, Use of break and default with switch, Comparison of switch and if-else. Loops and Iteration:for, while and do-while loops, Multiple loop variables, Nested loops, Assignment operators, break and continue statement. Functions: Introduction, Types, Declaration of a Function, Function calls, defining functions, Function Proto types, Passing arguments to a Function 	Allotted 8
	 programming language for systematic development of programs, Concept of algorithm and flow chart, Concept and role of structured programming. Basics of C: History of C, Salient features of C, Structure of C Program, Compiling C Program, Link and Run C Program, Character set, Tokens, Keywords, Identifiers, Constants, Variables, Instructions, Data types, Standard Input / Output, Operators and expressions. Conditional Program Execution:if, if-else, and nest edif-els estatements, Switch statements, Restriction sons witch values, Use of break and default with switch, Comparison of switch and if-else. Loops and Iteration:for, while and do-while loops, Multiple loop variables, Nested loops, Assignment operators, break and continue statement. Functions: Introduction, Types, Declaration of a Function, Function calls, defining functions, Function Proto types, Passing arguments to a Function Return values and their types, writing multi-function program, Calling function 	Allotted 8
II	 programming language for systematic development of programs, Concept of algorithm and flow chart, Concept and role of structured programming. Basics of C: History of C, Salient features of C, Structure of C Program, Compiling C Program, Link and Run C Program, Character set, Tokens, Keywords, Identifiers, Constants, Variables, Instructions, Data types, Standard Input / Output, Operators and expressions. Conditional Program Execution:if, if-else, and nest edif-els estatements, Switch statements, Restriction sons witch values, Use of break and default with switch, Comparison of switch and if-else. Loops and Iteration:for, while and do-while loops, Multiple loop variables, Nested loops, Assignment operators, break and continue statement. Functions: Introduction, Types, Declaration of a Function, Function calls, defining functions, Function Proto types, Passing arguments to a Function by value, Recursive functions. 	Allotted 8 8



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CO4: Students will be able to learn conceptual programming with String, Structure and its differentiation with Union.

CO5: Students will be able to perform File handling programs with read and write concepts.



Program	me: Degree	Year: I	
0	CA(AI &ML)	Semester: I	
Credits	. ,	Subject: Python Programming	
Theory:4		Subject I yaion I togramming	
Course (Title: Python programming	
MCA=1		rice i yulon programming	
	Dbjectives:		
	derstand and us	se variables	
		non Python data types, like integers, floats, strings as well a	s pandas Data
	mes.	ion i futori duda offos, into integero, itodas, sumigo do wor d	o punduo Dud
		ntrol including for loops and conditionals.	
	ad data from te		
		nary statistics from data files.	
	f Paper: Core	•	
	—	·ks/Credits: 40% Marks	
L:4	0		
T:0			
P:0(In Ho	ours/Week)		
	Hr.=1Credit		
Practical	-2Hrs.=1Credit	(4Hrs./Week=4Credits)	
Unit		Contents	No. of
			Lectures
			Allotted
	Getting Help	b, How To execute Python program, writing your first	10
Ι		honcoding Introduction, Python keywords and Identifiers,	
1		nents, Comments inpython, Getting user input, Variables,	
	Data types, N	umbers, Strings, Lists, tuples & Dictionary.	
		and syntax, if statement, Python operators, while Loop, Break	10
Π		, for Loop, Pass statement, Introduction of function, calling	
**		unction arguments, builtinfunction, scope of variables,	
		assing functiontoa function, Lamb daexpression.	
		l Packages, Importing Modules, Standard Modules-sys,	10
III		dules-OS, the dir Function, Packages, Exception Handling,	
	errors, Run T	ime Errors, handling IO Exception, Try except statement,	
	Raise, Assert.		
		o File Handling in Python, Files and Directories, writing data	10
		ling data from a file, Additional file methods, working with	
IV		ng with Directories, pickle Module, Classes & Objects,	
		of classes and objects, Creating Classes, Instance method,	
	-	method, Inheritance Method overriding, Data hiding.	
		mputing with Num Py, N-Dimensional Array Object, Array	10
V	Slicing Methe	od, Array reshaping methods, Numericalroutinesin Numpy,	
v	Introduction	to Matplotlib, Python 2D plotting, Plotting with default	
	settings,	Customizing matplotlibGraphicwithcolorsandlinewidth,	



Concretenlete histograme nerver spectre. Concrete herehorte es				
Generateplots, histograms, power spectra, Generate barcharts, so	± '			
introduction To Pandas, Pandas data structures and data analysis Text Books:				
1. Python Cook book Author: By David Beazley and Brian K. Jones				
2. The Python Book: The Ultimate Guide to Coding with Python by Aard				
Functional Programming in Python Author: David N	viertz			
Reference: 1. Python-(Mark Lutz) Python Training guide (BPB Publications)				
Evaluation/Assessment Methodology				
	Max. Marks 100			
1) Class tasks/Sessional Examination	20			
2) Presentations/Seminar				
3) Assignments				
4) Research Project Report	10			
5) Seminar On Research Project Report	70			
6) ESE				
Total:	100			
Prerequisites for the course: NIL				
Course Learning Outcomes:				
CO1: The course is designed to provide Basic knowledge of Python.				
CO2: Interpret the fundamental Python syntax and semantics and be f	Interpret the fundamental Python syntax and semantics and be fluent in the use of Python			
control flow statements.				
CO3: Express proficiency in the handling of strings and functions.				
	Identify the commonly used operations involving file systems and regular expressions.			
CO5: Articulate the Object-Oriented Programming concepts such as	<u> </u>			
and polymorphism as used in Python.				



Program	mme:Degree		Year:I	
-	ICA(AI&ML		Semester:II	
Credits		Subject:DATA BASE M	ANAGEMENT SYSTEM	
Theory:	4Cr	ů –		
	Course Code: Title:DATA BASE MANAGEMENT SYSTEM			
MCA-1	124			
Course	Objectives:			
CO 1:	Explain the concept of features of a database system and its application and compare various			
	types of data models.			
CO 2:	Describe the E-R Models and Relational Database.			
CO 3:	Explain the	concept of SQL Comma	inds, relational algebra, tuple calculus ar	nd domain
	calculus.			
CO 4:			normalize a given relation to the desired nor	
CO 5:			isaction processing and concurrency control	l.
	of Paper: CC			
	um Passing M	larks/Credits:40% Marks	6	
L:3				
T:1	T (11)			
	Hours/Week)	- 1'4		
•	-1 Hr. $= 1$ Cr			
	1 - 2 Hrs.=1Cr	edit(4Hrs./Week=4Credits)		No. of
Unit		Co	ntents	No. of Lectures
				Allotted
Ι	Introduction	n• Overview Database S	ystem vs File System, Database System	8
1			Model Schema and Instances, Data	0
			age and Interfaces, Data Definitions	
			ructure. Data Modeling Using the Entity	
	0 0		epts, Notation for ER Diagram, Mapping	
	-		er Key, Candidate Key, Primary Key,	
			n of an ER Diagrams to Tables, Extended	
		Relationship of Higher Deg		
II		· _ · _ · _ · _ · _ · _ · _ · _	age: Relational Data Model Concepts,	8
		e	0 1	
	Integrity Co	nstraints, Entity Integrity,	Referential Integrity, Keys Constraints,	
	•••		a, Relational Calculus, Tuple and Domain	
	Domain Cor	straints, Relational Algebr		
	Domain Cor Calculus. In	straints, Relational Algebration and the straints of the second strain s	a, Relational Calculus, Tuple and Domain	
	Domain Cor Calculus. In Data Type a	straints, Relational Algebratroduction to SQL: Charact and Literals. Types of SQ	a, Relational Calculus, Tuple and Domain teristics of SQL, Advantage of SQL. SQL	
	Domain Cor Calculus. In Data Type a Procedure.	straints, Relational Algebration troduction to SQL: Charact and Literals. Types of SQ Fables, Views and Indexe	a, Relational Calculus, Tuple and Domain teristics of SQL, Advantage of SQL. SQL L Commands. SQL Operators and their	
	Domain Cor Calculus. In Data Type a Procedure. 7 Functions. I	straints, Relational Algebration troduction to SQL: Charact and Literals. Types of SQ Fables, Views and Indexe	a, Relational Calculus, Tuple and Domain teristics of SQL, Advantage of SQL. SQL L Commands. SQL Operators and their es. Queries and Sub Queries. Aggregate Operations, Joins, Unions, Intersection,	
III	Domain Cor Calculus. In Data Type a Procedure. 7 Functions. I Minus, Curs	istraints, Relational Algebra production to SQL: Charact and Literals. Types of SQ Fables, Views and Indexe nsert, Update and Delete ors, Triggers, Procedures in	a, Relational Calculus, Tuple and Domain teristics of SQL, Advantage of SQL. SQL L Commands. SQL Operators and their es. Queries and Sub Queries. Aggregate Operations, Joins, Unions, Intersection,	8
III	Domain Cor Calculus. In Data Type a Procedure. 7 Functions. I Minus, Curs Data Base first, second	Istraints, Relational Algebra roduction to SQL: Charact and Literals. Types of SQ Fables, Views and Indexe nsert, Update and Delete ors, Triggers, Procedures in Design & Normalization: , third normal forms, BCN	a, Relational Calculus, Tuple and Domain teristics of SQL, Advantage of SQL. SQL DL Commands. SQL Operators and their es. Queries and Sub Queries. Aggregate Operations, Joins, Unions, Intersection, a SQL/PL SQL Functional dependencies, normal forms, IF, inclusion dependence, loss less joined	8
III	Domain Cor Calculus. In Data Type a Procedure. 7 Functions. I Minus, Curs Data Base first, second composition	Istraints, Relational Algebra roduction to SQL: Charact and Literals. Types of SQ Tables, Views and Indexe nsert, Update and Delete ors, Triggers, Procedures in Design & Normalization: , third normal forms, BCN s, normalization using FD,	a, Relational Calculus, Tuple and Domain teristics of SQL, Advantage of SQL. SQL L Commands. SQL Operators and their es. Queries and Sub Queries. Aggregate Operations, Joins, Unions, Intersection, a SQL/PL SQL Functional dependencies, normal forms,	8
III	Domain Cor Calculus. In Data Type a Procedure. 7 Functions. I Minus, Curs Data Base first, second	Istraints, Relational Algebra roduction to SQL: Charact and Literals. Types of SQ Fables, Views and Indexe nsert, Update and Delete ors, Triggers, Procedures in Design & Normalization: , third normal forms, BCN s, normalization using FD, sign	a, Relational Calculus, Tuple and Domain teristics of SQL, Advantage of SQL. SQL L Commands. SQL Operators and their es. Queries and Sub Queries. Aggregate Operations, Joins, Unions, Intersection, a SQL/PL SQL Functional dependencies, normal forms, IF, inclusion dependence, loss less joined MVD, and JDs, alternative approaches to	8



Serializability, Serializ ability of Schedules, Conflict & View Serializability	rializable
Schedule, Recoverability, Recovery from Transaction Failures, Lo	g Based
Recovery, Checkpoints, Dead lock Handling. Distributed Database: Di	istributed
Data Storage, Concurrency Control, Directory System	
V Concurrency Control Techniques: Concurrency Control, Locking Te	chniques 8
for Concurrency Control, Time Stamping Protocols for Concurrency	-
Validation Based Protocol, Multiple Granularity, Multi Version	-
Recovery with Concurrent Transaction, Case Study of Oracle.	
Text Books:	Ι
1. Korth, Silbertz, Sudarshan," Database Concepts", McGraw Hill.	
2. Date C J, "An Introduction to Database Systems", Addision Wesley.	
3. Elmasri, Navathe, "Fundamentals of Database Systems", Addision Wesley.	
4. O'Neil, "Databases", Elsevier Pub	
Reference	
1. Rama krishnan, "Database Management Systems", McGraw Hill.	
2. Leon & Leon, "Database Management Systems", Vikas Publishing House.	
3. Bipin C. Desai, "An Introduction to Database Systems", Gagotia Publications.	
4. Majumdar & Bhattacharya, "Database Management System", McGraw Hill.	
Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/ Sessional Examination	20
 Presentations /Seminar 	-0
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	10
5) ESE	75
Total:	100
Prerequisites for the course: SQL	100
Course Learning Outcomes:	
CO1: Describe the features of a database system and its application and comp	are various types o
data models.	
CO2: Construct an ER Model for a given problem and transform it into a relation	n database schema
CO3: Formulate solution to a query problem using SQL Commands, relation	
calculus and domain calculus.	ionai aigeora, tupi
CO4: Explain the need of normalization and normalize a given relation to the de	sired normal form
2017. Explain the need of normalization and normalize a given relation to the de	

CO5: Explain different approaches of transaction processing and concurrency control.



IIMTU-NEP IMPLEMENTATION Year-I / Semester-II

Progra	mme:Deg	ree	Year:I	
Class:MCA			Semester:II	
Credits Subject: Data structure			nd analysis of algorithms	
Theory		5	, ,	
Course		Title:Data structure and a	analysis of algorithms	
MCA-	125			
Course	Objective	es:		
CO 1:	and basic data organization schemes such as arrays and linked lists.			f algorithms
			and queues and implement various operations of	on them
CO 3:		the properties of graphs and traversal on them.	and trees and implement various operation	ons such as
CO 4:	Compare		and-conquer approaches of designingal going.	rithms for
CO 5:	Apply an	d analyze various design a	pproaches such as Divide-and-Conquer, greedy	y and
	dynamic	for problem solving.		
Nature	of Paper:	DSE		
Minim	um Passin	g Marks/Credits:40% M	arks	
L:4 T:0				
	Hours/Wee	k)		
	- 1 Hr. = 1	·		
Practica	al- 2 Hrs.=	1Credit(4Hrs./Week=4Cre	dits)	
Unit			Contents	No. of
				1101 01
Ι				Lectures
1			re: Data, Entity, Information, Difference Data type, Build in data type, Abstract data	
1	betwe type,	en Data and Information, Definition of data structu	Data type, Build in data type, Abstract data ures, Types of Data Structures: Linear and	Lectures Allotted
1	betwe type, Non-l	en Data and Information, Definition of data structu Linear Data Structure, I	Data type, Build in data type, Abstract data ares, Types of Data Structures: Linear and ntroduction to Algorithms: Definition of	Lectures Allotted
1	betwee type, Non-I Algor	en Data and Information, Definition of data structu Linear Data Structure, I ithms, Difference betwee	Data type, Build in data type, Abstract data ures, Types of Data Structures: Linear and ntroduction to Algorithms: Definition of en algorithm and programs, properties of	Lectures Allotted
1	betwee type, Non-l Algori algori	en Data and Information, Definition of data structu Linear Data Structure, I ithms, Difference betwee thm, Algorithm Design	Data type, Build in data type, Abstract data ures, Types of Data Structures: Linear and ntroduction to Algorithms: Definition of en algorithm and programs, properties of Techniques, Performance Analysis of	Lectures Allotted
	betwee type, Non-I Algori algori Algori	en Data and Information, Definition of data structu Linear Data Structure, I ithms, Difference betwee thm, Algorithm Design ithms, Complexity of va	Data type, Build in data type, Abstract data ures, Types of Data Structures: Linear and ntroduction to Algorithms: Definition of en algorithm and programs, properties of	Lectures Allotted
1	betwee type, Non-I Algori Algori Algori Asym	en Data and Information, Definition of data structu Linear Data Structure, I ithms, Difference betwee thm, Algorithm Design ithms, Complexity of va ptotic Notations.	Data type, Build in data type, Abstract data ures, Types of Data Structures: Linear and ntroduction to Algorithms: Definition of en algorithm and programs, properties of Techniques, Performance Analysis of	Lectures Allotted
	betwee type, Non-l Algori algori Algori Asym Arra	en Data and Information, Definition of data structur Linear Data Structure, I ithms, Difference betwee thm, Algorithm Design ithms, Complexity of va ptotic Notations. ys: Definition, Single and	Data type, Build in data type, Abstract data ures, Types of Data Structures: Linear and ntroduction to Algorithms: Definition of en algorithm and programs, properties of Techniques, Performance Analysis of arious code structures, Order of Growth,	Lectures Allotted
	betwee type, Non-I Algori algori Algori Asym Array	en Data and Information, Definition of data structu Linear Data Structure, I ithms, Difference betwee thm, Algorithm Design ithms, Complexity of va ptotic Notations. ys: Definition, Single and s: Row Major Order, and	Data type, Build in data type, Abstract data ures, Types of Data Structures: Linear and ntroduction to Algorithms: Definition of en algorithm and programs, properties of Techniques, Performance Analysis of arious code structures, Order of Growth, Multidimensional Arrays, Representation of	Lectures Allotted
	betwee type, Non-l Algori algori Algori Asym Array Form they'n	en Data and Information, Definition of data structur Linear Data Structure, I ithms, Difference betwee thm, Algorithm Design ithms, Complexity of va ptotic Notations. ys: Definition, Single and s: Row Major Order, and ulae for 1-D,2-D Array A re representations.	Data type, Build in data type, Abstract data ures, Types of Data Structures: Linear and ntroduction to Algorithms: Definition of en algorithm and programs, properties of Techniques, Performance Analysis of arious code structures, Order of Growth, Multidimensional Arrays, Representation of Column Major Order, Derivation of Index pplication of arrays, Sparse Matrices and	Lectures Allotted
	betwee type, Non-I Algori algori Algori Asym Array Form they'i Linke	en Data and Information, Definition of data structu Linear Data Structure, I ithms, Difference betwee thm, Algorithm Design ithms, Complexity of va ptotic Notations. ys: Definition, Single and s: Row Major Order, and ulae for 1-D,2-D Array A re representations. ed lists: Array Implement	Data type, Build in data type, Abstract data ures, Types of Data Structures: Linear and ntroduction to Algorithms: Definition of en algorithm and programs, properties of Techniques, Performance Analysis of arious code structures, Order of Growth, Multidimensional Arrays, Representation of Column Major Order, Derivation of Index pplication of arrays, Sparse Matrices and ation and Pointer Implementation of Singly	Lectures Allotted
	betwee type, Non-J Algori algori Algori Algori Asym Array Form they'n Linke	en Data and Information, Definition of data structu Linear Data Structure, I ithms, Difference betwee thm, Algorithm Design ithms, Complexity of va ptotic Notations. ys: Definition, Single and s: Row Major Order, and ulae for 1-D,2-D Array A re representations. ed lists: Array Implement d Lists, Doubly Linked L	Data type, Build in data type, Abstract data ures, Types of Data Structures: Linear and ntroduction to Algorithms: Definition of en algorithm and programs, properties of Techniques, Performance Analysis of arious code structures, Order of Growth, Multidimensional Arrays, Representation of Column Major Order, Derivation of Index pplication of arrays, Sparse Matrices and ation and Pointer Implementation of Singly ist, Circularly Linked List, Operations on a	Lectures Allotted
	betwee type, Non-l Algori algori Algori Asym Array Form they'n Linke Linke	en Data and Information, Definition of data structur Linear Data Structure, I ithms, Difference betwee thm, Algorithm Design ithms, Complexity of va ptotic Notations. ys: Definition, Single and s: Row Major Order, and ulae for 1-D,2-D Array A re representations. ed lists: Array Implement d Lists, Doubly Linked L d List. Insertion, Deletion	Data type, Build in data type, Abstract data ures, Types of Data Structures: Linear and ntroduction to Algorithms: Definition of en algorithm and programs, properties of Techniques, Performance Analysis of arious code structures, Order of Growth, Multidimensional Arrays, Representation of Column Major Order, Derivation of Index pplication of arrays, Sparse Matrices and ation and Pointer Implementation of Singly ist, Circularly Linked List, Operations on a d, Traversal, Polynomial Representation and	Lectures Allotted
1	betwee type, Non-J Algori algori Algori Asym Array Form they'n Linke Linke Addit	en Data and Information, Definition of data structu Linear Data Structure, I ithms, Difference betwee thm, Algorithm Design ithms, Complexity of va ptotic Notations. ys: Definition, Single and s: Row Major Order, and ulae for 1-D,2-D Array A re representations. ed lists: Array Implement d Lists, Doubly Linked L d List. Insertion, Deletion ion Subtraction & Multipli	Data type, Build in data type, Abstract data ures, Types of Data Structures: Linear and ntroduction to Algorithms: Definition of en algorithm and programs, properties of Techniques, Performance Analysis of arious code structures, Order of Growth, Multidimensional Arrays, Representation of Column Major Order, Derivation of Index pplication of arrays, Sparse Matrices and ation and Pointer Implementation of Singly ist, Circularly Linked List, Operations on a	Lectures Allotted



r		I		
	Post fix Expressions, Evaluation of post fix expression, Iteration	on and		
	Recursion-Principles of recursion, Tailrecursion, Removal of rec	cursion		
	Problem solving using iteration and recursion with examples such as	binary		
	search, Fibonacci numbers, and Hanoitowers.			
	Queues: Operation son Queue: Create, Add, Delete, Full and I	Empty.		
	Circular queues, Array and linked implementation of queues in C, D			
	and Priority Queue.	equeue		
	Searching: Concept of Searching, Sequential search, Index Sequentia	1		
	Search, Binary Search. Concept of Hashing & Collisionre se			
	Techniques used in Hashing.	olution		
TTT	U			
III	Sorting: Insertion Sort, Selection Sort, Bubble Sort, Heap Sort, Comp			
	of Sorting Algorithms, Sorting in Linear Time: Counting Sort and	Bucket		
	Sort.	~ .		
	Graphs: Terminology used with Graph, Data Structure for	-		
	Representations: Adjacency Matrices, Adjacency List, Adjacency.	-		
	Traversal: Depth First Search and Breadth First Search, Con	inected		
	Component.			
IV	Trees:Basic terminology used with Tree, Binary Trees ,Binary	Tree 8		
	Representation: Array Representation and Pointer (Linked	List)		
	Representation, Binary Search Tree, Complete Binary Tree, Ex	tended		
	Binary Trees, Tree Traversal algorithms: In-order, Preorder and Post	-order,		
	Constructing Binary Tree from given Tree Traversal, Operation of Ins	sertion,		
	Deletion, Searching & Modification of data in Binary Search Tree.			
	Threaded Binary trees, Huffman coding using Binary Tree, AVL Tr	ee and		
	B-Tree.			
V	Divide and Conquer with Examples Such as Merge Sort, Quick Sort, I	Matrix 8		
	Multiplication: Strassen's Algorithm			
	Dynamic Programming: Dijikstra Algorithm, Bellman Ford Algorithm	n. All-		
	pair Shortest Path: Warshal Algorithm, Longest Common Sub-sec			
	Greedy Programming: Primsand Kruskalalgorithm.	quenee		
Text Book				
	n T.H., Leiserson C.E., Rivest R.L., and Stein C., "Introduction to Algo	rithms" PHI		
	itz Ellis, Sahni Sartaj and Rajasekharan S., "Fundamentals of Compu			
	Universities Press.	, <u>-</u>		
Reference	,			
	utz, Data Structures With C-SIE-SOS,McGraw Hill			
	ta D, "Classic Data Structures", 2 nd Edition Prentice Hall India.			
_, Sumuli	Evaluation/Assessment Methodology			
		Max. Marks100		
1) Class ta	asks/ Sessional Examination	20		
/	ations /Seminar	20		
3) Assign				
	ch Project Report	10		
		10		
Seminar On Research Project Report 5) ESE				
	Total:	70 100		
		100		



Prerequisites for the course: NIL

Course Learning Outcomes:

- CO1: Understand the concept of data structure and various algorithms.
- CO2: Able to analyze the performance of algorithms.
- CO3: Understand which algorithm or data structure to use in different scenarios.
- CO4: Use various data structures effectively in application programs.
- CO5: Understand various types of sorting and their algorithms



Image: LectureLectureILinux History, overview, Principles, Getting started with GNOME and edit10textfiles with gedit, Manage files graphically and access remote system with Nautilus, Getting help in graphical environment, Installation overview, directory structure, Installation Graphical, Configuring Local Services, date and time, Configuration of printer, Basic commands vieditor, manage users and groups.10IIPartition, Swap Creation Ivm, quota management and permanent mounting, Raid, Luks, Basic job control or cron use of helping command scp or ssh, filter command, Understand run levels.10IIIPackage installation with rpm, package installation with yum, usehard links, soft links, archives, Regular Expressions, Pipelines, and I/O Redirection, nfs, cifs and autofs, Ldap, Controlling Access to files, Analyzing and Storing Logs,10	Program	me:Degree		Year: I			
Theory:4Cr Title:LINUX ADMINISTRATION WITH SCRIPTING Course Code: Title:LINUX ADMINISTRATION WITH SCRIPTING MCA-129 Course Objectives: CO1: To understand and make effective use of Linux utilities and shell scripting language to se problems CO2: To implement in C some standard Linux utilities like mv,cp,ls, etc. CO3: To Develop the skills the necessary for systems programming including file system programming, process and signal management and interposes communication CO4: To develop the basic skills required to write network programs using sockets Nature of Paper: Core Minimum Passing Marks/Credits: 40% Marks L:3 T:1 P:0(In Hours/Week) Theory - 1 Hr. = 1 Credit Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits) Unit Contents No. Lextfiles with gedit, Manage files graphically and access remote system with Natullus, Getting help in graphical environment, Installation overview, directory structure, Installation Graphical, Configuring Local Services, date and time, Configuration of printer, Basic commands vieditor, manage users and groups. I0 II Partition, Swap Creation Ivm, quota management and permanent mounting, Raid, Luks, Basic job control or cron use of helping command scp or ssh, filter command, Understand run levels. I0 III Package installation with rpm, package installation with y	Class:M	CA(AI &M	IL)	Semester: II			
Course Code: MCA-129 Title:LINUX ADMINISTRATION WITH SCRIPTING Course Objectives: CO1: To understand and make effective use of Linux utilities and shell scripting language to so problems Scourse Objectives: CO2: To implement in C some standard Linux utilities like mv.cp.ls, etc. CO3: To Develop the skills the necessary for systems programming including file system programming, process and signal management and interposes communication CO4: To develop the basic skills required to write network programs using sockets Nature of Paper: Core Minimum Passing Marks/Credits: 40% Marks L::3 Til P:0(In Hours/Week) Theory - 1 Hr. = 1 Credit Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits) Unit Contents I Linux History, overview, Principles, Getting started with GNOME and edit textfiles with gedit, Manage files graphically and access remote system with Nautilus, Getting help in graphical environment, Installation overview, directory structure, Installation Graphical, Configuring Local Services, date and time, Configuration of printer, Basic commands vieditor, manage users and groups. 10 III Partition, Swap Creation Ivm, quota management and permanent mounting, Raid, Luks, Basic job control or cron use of helping command scp or ssh, filter command, Understand run levels. 10 III Package installation with rpm, package installation with yum, usehard links, soft links, archives, Regular Expressions, Pipelines, and I/O Redirection, nfs, cifs and aut	Credits		Subject: LINUX AD	MINISTRATION WITH SCRIPTING			
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problems CO2: To implement in C some standard Linux utilities like mv,cp,ls, etc. CO3: To Develop the skills the necessary for systems programming including file system programming, process and signal management and interposes communication CO4: To develop the basic skills required to write network programs using sockets Nature of Paper: Core Minimum Passing Marks/Credits: 40% Marks L:3 T:1 P:0(In Hours/Week) Theory - 1 Hr. = 1 Credit Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits) Unit Contents I Linux History, overview, Principles, Getting started with GNOME and edit textfiles with gedit, Manage files graphically and access remote system with Nautilus, Getting help in graphical environment, Installation overview, directory structure, Installation Graphical, Configuring Local Services, date and time, Configuration of printer, Basic commands vieditor, manage users and groups. II Partition, Swap Creation Ivm, quota management and permanent mounting, Raid, Luks, Basic job control or cron use of helping command scp or ssh, filter command, Understand run levels. III Package installation with rym, package installation with yum, usehard links, soft links, archives, Regular Expressions, Pipelines, and I/O Redirection, nfs, cifs and autofs, Ldap, Controlling Access to files, Analyzing and Storing Logs,	Course ()bjectives:					
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CO3: To Develop the skills the necessary for systems programming including file system programming, process and signal management and interposes communication CO4: To develop the basic skills required to write network programs using sockets Nature of Paper: Core Minimum Passing Marks/Credits: 40% Marks L:3 Ti:1 P:0(In Hours/Week) Theory - 1 Hr. = 1 Credit Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits) Vinit Contents No. Lectu Allot I Linux History, overview, Principles, Getting started with GNOME and edit textfiles with gedit, Manage files graphically and access remote system with Nautilus, Getting help in graphical environment, Installation overview, directory structure, Installation Graphical, Configuring Local Services, date and time, Configuration of printer, Basic commands vieditor, manage users and groups. II Partition, Swap Creation Ivm, quota management and permanent mounting, Raid, Luks, Basic job control or cron use of helping command scp or ssh, filter command, Understand run levels. III Package installation with rpm, package installation with yum, usehard links, soft links, archives, Regular Expressions, Pipelines, and I/O Redirection, nfs, cifs and autofs, Ldap, Controlling Access to files, Analyzing and Storing Logs,	problems						
programming, process and signal management and interposes communication CO4: To develop the basic skills required to write network programs using sockets Nature of Paper: Core Minimum Passing Marks/Credits: 40% Marks L:3 T:1 P:0(In Hours/Week) Theory - 1 Hr. = 1 Credit Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits) Unit Contents No. Lectu Allot I Linux History, overview, Principles, Getting started with GNOME and edit textfiles with gedit, Manage files graphically and access remote system with Nautilus, Getting help in graphical environment, Installation overview, directory structure, Installation Graphical, Configuring Local Services, date and time, Configuration of printer, Basic commands vieditor, manage users and groups. II Partition, Swap Creation Ivm, quota management and permanent mounting, Raid, Luks, Basic job control or cron use of helping command scp or ssh, filter command, Understand run levels. III Package installation with rpm, package installation with yum, usehard links, soft links, archives, Regular Expressions, Pipelines, and I/O Redirection, nfs, cifs and autofs, Ldap, Controlling Access to files, Analyzing and Storing Logs,	CO2: To	implement	in C some standard Li	nux utilities like mv,cp,ls, etc.			
CO4: To develop the basic skills required to write network programs using sockets Nature of Paper: Core Minimum Passing Marks/Credits: 40% Marks L:3 T:1 P:0(In Hours/Week) Theory - 1 Hr. = 1 Credit Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits) Unit Contents No. List I Linux History, overview, Principles, Getting started with GNOME and edit textfiles with gedit, Manage files graphically and access remote system with Nautilus, Getting help in graphical environment, Installation overview, directory structure, Installation Graphical, Configuring Local Services, date and time, Configuration of printer, Basic commands vieditor, manage users and groups. II Partition, Swap Creation Ivm, quota management and permanent mounting, Raid, Luks, Basic job control or cron use of helping command scp or ssh, filter command, Understand run levels. 10 III Package installation with rpm, package installation with yum, usehard links, soft links, archives, Regular Expressions, Pipelines, and I/O Redirection, nfs, cifs and autofs, Ldap, Controlling Access to files, Analyzing and Storing Logs, 10	CO3: To	Develop th	e skills the necessary f	for systems programming including file system			
Nature of Paper: Core Minimum Passing Marks/Credits: 40% Marks L:3 T:1 P:0(In Hours/Week) Theory - 1 Hr. = 1 Credit Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits) No. Unit Contents No. I Linux History, overview, Principles, Getting started with GNOME and edit textfiles with gedit, Manage files graphically and access remote system with Nautilus, Getting help in graphical environment, Installation overview, directory structure, Installation Graphical, Configuring Local Services, date and time, Configuration of printer, Basic commands vieditor, manage users and groups. 10 II Partition, Swap Creation Ivm, quota management and permanent mounting, Raid, Luks, Basic job control or cron use of helping command scp or ssh, filter command, Understand run levels. 10 III Package installation with rpm, package installation with yum, usehard links, soft links, archives, Regular Expressions, Pipelines, and I/O Redirection, nfs, cifs and autofs, Ldap, Controlling Access to files, Analyzing and Storing Logs,	programm	ning, proce	ss and signal managen	nent and interposes communication			
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cifs and autofs, Ldap, Controlling Access to files, Analyzing and Storing Logs,	III	Package i	nstallation with rpm,	package installation with yum, usehard links,	10		
cifs and autofs, Ldap, Controlling Access to files, Analyzing and Storing Logs,		soft links.	, archives, Regular Ex	pressions, Pipelines, and I/O Redirection, nfs,			
			-				
with a system receivery			-	nd Maintaining the Kernel, System Recovery			
Techniques, Enchance User Security, Apache Server.		00					
	IV	1			10		
Server Configuration, Web Server Additional Configuration, Basic SMTP							
Configuration, Caching-Only DNS Server, FTP, Squid, samba, dhcp, nis, pam,			6	e			
iptables, TCP Wrappers, Bash Scripting and tools, basic Shell Scripting,		0					
Graphical tools of Scripting(Zenity and dialogs)		-	11	1 0 1 0			



	Evaluation/Assessment Methodology	
		Max. Marks 100
1) Cla	ss tasks/ Sessional Examination	20
2) Pre	sentations /Seminar	
3) Ass	signments	
4) Res	search Project Report	10
Ser	ninar On Research Project Report	
5) ES	E	70
	Total:	100
Prerequ	usites for the course: NIL	
Course	e Learning Outcomes:	
CO1:	Students will be able to understand the basic commands of Linux o write shell scripts.	perating system and can
CO2:	Students will be able to create file systems and directories and opera	te them.
CO3:	Students will be able to create processes background and fore grou	nd etc. by fork() system
	calls	

CO4: Students will be creating shared memory segments, pipes, message queues and can exercise inter-process communication.



IIMT UNIVERSITY Year – I /Semester – II

Progr	amme: Degree	Year: I	
0	MCA(AI & ML)	Semester: II	
Credit		bject oriented programming	
Theory	•	J. T. G. G. G	
		ct oriented programming	
MCA	5	F	
	e Objectives:		
	0	ented Programming techniques.	
	•	rogramming techniques using Java.	
	1100	blems using of Packages, Interfaces, and apply Exceptions han	dling and
	Threading concepts in Jav		0
	Develop I/O and GUI ap		
	1 1	tions and swing programming in Java.	
	e of Paper: CORE		
	num Passing Marks/Cr	edits:40% Marks	
L:3	0		
T:1			
P:0(In]	Hours/Week)		
	r - 1 Hr. = 1 Credit		
•	al- 2 Hrs.=1Credit(4Hrs.	/Week=4Credits)	
Unit	Contents		No. of
			Lectures
			Allotted
Ι	Introduction: Object	Oriented Programming: objects, classes, Abstraction,	8
	Encapsulation, Inherita	nce, Polymorphism, OOP in Java, Characteristics of Java,	
	The Java Environment	, Java Source File Structure, and Compilation. Fundamental	
	Programming Structure	es in Java: Defining classes in Java, constructors, methods,	
	access specifies, static	members, Comments, Data Types, Variables, Operators,	
	Control Flow, Arrays.		
II	Inheritance, Interface	es, and Packages: Inheritance: Super classes, sub classes,	8
	Protected members, co	nstructors in sub classes, Object class, abstract classes and	
	methods. Interfaces: d	lefining an interface, implementing interface, differences	
	between classes and i	nterfaces and extending interfaces, Object cloning, inner	
	classes. Packages: Defi	ning Package, CLASS PATH Setting for Packages, Making	
	JAR Files for Library l	Packages, Import and Static Import Naming Convention For	
	Packages, Networking	java.net package.	
III	Exception Handling,	I/O : Exceptions: exception hierarchy, throwing and catching	8
		ceptions, creating own exceptions, Stack Trace Elements.	
	Input /Output Basics:	Byte streams and Character streams, Reading and Writing,	
	Console Reading and V		
IV	Multithreading and	Generic Programming: Differences between multi-	8
	41	asking, thread life cycle, creating threads, synchronizing	
	threading and multi t	asking, uncad me cycle, creating uncads, synemonizing	
	-	communication, daemon threads, thread groups. Generic	
	threads, Inter-thread of		



V Event Driven Programming: Graphics programming: Fra working with 2D shapes, Using colors, fonts, and images. Basics event handlers, adapter classes, actions, mouse events, AW Introduction to Swing: layout management, Swing Components Areas, Buttons, Check Boxes, Radio Buttons, Lists, choices, Se Menus and Dialog Boxes.	s of event handling: T event hierarchy. s: Text Fields, Text
Text Books:	
1. Patrick Naughton and Herbertz Schildt, "Java-2 The Complete Refer	ence", McGraw Hill.
2. Ivor Horton, "Beginning Java-2", Wiley Publishing.	W IVII Education
3. Bala guru swamy, "Programming with Java: A Primer", Tata McGra Reference	W HIII Education
1. Horetmann Cay and Cornell Gary, "Core Java Volume – I", Pearson	Education
Evaluation/Assessment Methodology	
Evaluation/Assessment Methodology	Max. Marks100
1) Class tasks/ Sessional Examination	20
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
Seminar On Research Project Report	
5) ESE	70
Total:	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO1: Able to understand the use of OOPs concepts.	
CO2: Able to solve real world problems using OOP techniques.	
CO3: Able to understand the use of Packages, Interfaces, abstractio	n, Exceptions and threading
concepts in Java	
CO4: Able to understand the use of I/O and GUI programming in java.	
CO5: Able to develop and understand database applications and Swing	programming in Java



Drogrom	me: Degree		Year: I	
0	CA(AI &ML)		Semester: II	
Credits			nced Microsoft Excel with Tableau	
Theory:4	Cr	Subject. Auva	need wherosoft Excer with Tableau	
Course C		Title. Advance	ed Microsoft Excel with Tableau	
MCA-12		The: Auvance	eu Microsoft Excer with Tableau	
	Objectives:	1 1 0	1, 1,	
		ed and use of ex		
			ing and displaying large amounts of data.	
		g pivot tables an		
			mulas on Excel spreadsheet.	
		data sources usi	ng tableau.	
	f Paper: DSE			
	n Passing Ma	rks/Credits:409	//o_IVIARKS	
L:4				
T:0				
	ours/Week)			
•	Hr.=1Credit	/ ATT (TTT 1 4)		
-	2Hrs.=1Credit	(4Hrs./Week=40	,	
Unit			Contents	No. of
				Lectures
			-	Allotted
Ι		ions and Formu		10
			erators, Inserting and Editing a Function, Auto	
			ulation, Defining Names, Using and Managing	
			and Tracing Formulas, Understanding Formulas	
			ion(IF),Using Financial Functions (PMT), Using	
			I), Using Lookup Functions (VLOOKUP),User	
		1 •	Functions, Financial Functions, Date& Time	
			ctions, Statistical Functions, Lookup & Reference	
			ons, Text Functions, text Functions, Logical	
	Elinctions in			
TT			ions, Engineering and Cube Functions.	10
II	Working wit	th Data Ranges	:-	10
II	Working with Sorting by C	t h Data Ranges Dne Column, Se	:- orting by Colors or Icons, Sorting by Multiple	10
II	Working with Sorting by C Columns, So	t h Data Ranges One Column, So orting by a Cust	:- orting by Colors or Icons, Sorting by Multiple com List, Filtering Data, creatinga Custom Auto	10
II	Working with Sorting by C Columns, So Filter, Usinga	th Data Ranges One Column, So orting by a Cust an Advanced Fil	:- orting by Colors or Icons, Sorting by Multiple com List, Filtering Data, creatinga Custom Auto ter.	10
Π	Working with Sorting by C Columns, So Filter, Usinga Working with	th Data Ranges One Column, So orting by a Cust an Advanced Fil th Pivot Tables	:- orting by Colors or Icons, Sorting by Multiple from List, Filtering Data, creatinga Custom Auto ter.	10
II	Working with Sorting by C Columns, So Filter, Usinga Working with Creatinga Piv	th Data Ranges One Column, So orting by a Cust an Advanced Fil th Pivot Tables vot Table, Speci	:- orting by Colors or Icons, Sorting by Multiple om List, Filtering Data, creatinga Custom Auto ter. :- ifying Pivot Table data, changinga Pivot Table's	10
II	Working with Sorting by C Columns, So Filter, Usinga Working with Creatinga Piv Calculation,	th Data Ranges One Column, So orting by a Cust an Advanced Fil th Pivot Tables vot Table, Speci Filtering and So	:- orting by Colors or Icons, Sorting by Multiple tom List, Filtering Data, creatinga Custom Auto ter. :- ifying Pivot Table data, changinga Pivot Table's orting a Pivot Table, Working with Pivot Table	10
Π	Working with Sorting by C Columns, So Filter, Usinga Working with Creatinga Pin Calculation, Layout, Grou	th Data Ranges One Column, So orting by a Cust an Advanced Fil th Pivot Tables vot Table, Speci Filtering and So uping Pivot Table	:- orting by Colors or Icons, Sorting by Multiple from List, Filtering Data, creatinga Custom Auto ter. :- ifying Pivot Table data, changinga Pivot Table's orting a Pivot Table, Working with Pivot Table e Items, updatinga Pivot Table, formatting a Pivot	10
Π	Working with Sorting by C Columns, So Filter, Usinga Working with Creatinga Piv Calculation, Layout, Grout Table, creating	th Data Ranges One Column, So orting by a Cust an Advanced Fil th Pivot Tables vot Table, Speci Filtering and So uping Pivot Table ng a Pivot Table	:- orting by Colors or Icons, Sorting by Multiple om List, Filtering Data, creatinga Custom Auto ter. :- ifying Pivot Table data, changinga Pivot Table's orting a Pivot Table, Working with Pivot Table e Items, updatinga Pivot Table, formatting a Pivot le, creatinga Pivot Chart, Using Slicers, Sharing	10
	Working with Sorting by C Columns, So Filter, Usinga Working with Creatinga Pive Calculation, Layout, Grout Table, creating Slicers Betwee	th Data Ranges One Column, So orting by a Cust an Advanced Filt th Pivot Tables vot Table, Speci Filtering and So uping Pivot Table ng a Pivot Tables	:- orting by Colors or Icons, Sorting by Multiple tom List, Filtering Data, creatinga Custom Auto ter. :- ifying Pivot Table data, changinga Pivot Table's orting a Pivot Table, Working with Pivot Table e Items, updatinga Pivot Table, formatting a Pivot le, creatinga Pivot Chart, Using Slicers, Sharing	
II	Working with Sorting by C Columns, So Filter, Usinga Working with Creatinga Pio Calculation, Layout, Grout Table, creatin Slicers Betwee Analyzing an	th Data Ranges One Column, Se orting by a Cust an Advanced Filt th Pivot Tables vot Table, Speci Filtering and Se uping Pivot Table ng a Pivot Tables een Pivot Tables nd Organizing I	:- orting by Colors or Icons, Sorting by Multiple tom List, Filtering Data, creatinga Custom Auto ter. :- ifying Pivot Table data, changinga Pivot Table's orting a Pivot Table, Working with Pivot Table e Items, updatinga Pivot Table, formatting a Pivot le, creatinga Pivot Chart, Using Slicers, Sharing	10



	Using Goal Seek, Using Solver, Using Text to Columns, C	Grouping and	
	Outlining Data, Using Subtotals, Consolidating Data by Position	or Category,	
	Consolidating Data Using Formulas.		
	Working with the Web and External Data: -		
	Inserting a Hyperlink, importing data from an Access database	or Text File,	
	Importing data from the Web and other Sources, Working with I	Existing Data	
	Connections.	-	
IV	Customizing Excel:-		10
	Customizing the ribbon, Customizing the Quick Access tool ba	ar, Using and	
	Customizing Auto Correct, Changing Excel's Default Option	-	
	Custom AutoFill List, Creating a Custom Num be Format.	, 0	
	Workingon Live Data and Dash boards: -		
	Creating dashboards on company specific data, working o	n live data.	
	Dashboards with the help of Developer Ribbon, Working with		
	Complex formulas.		
V	Tableau: -		10
	Understand how Tableau Desktop fits within the Tableau family	v of products	
	Combine data sources for use by Tableau, Connect to a varie	-	
	including flat files and databases, Understand data types and re	•	
	operations in Tableau-filtering, sorting, grouping and creating se	•	
	extracts (file formats used by Tableau), Build and format data v		
	Work with maps and location-based data, Create interactive d	•	
	using parameters, calculations and actions, Working with bins	s, groups and	
Torrt Do	parameters, Working with folders, Creating story.		
Text Bo	ok: crosoft Excel 2019 Data Analysis and Business Modeling" by Way.	neWinston	
Referen	· · · · · · · · · · · · · · · · · · ·		
	crosoft Excel Data Analysis and Business Modelling "by Wayne W	instan	
1. 1011	Evaluation/Assessment Methodology	insion	
	Evaluation/Assessment Methodology	Max. Marl	ze 100
1) Class	ss tasks/Sessional Examination	<u>20</u>	15 100
/	sentations /Seminar	20	
	ignments		
	earch Project Report	10	
	ninar On Research Project Report	10	
	v 1	70	
0) LSL	6) ESE 70 Total: 100		
Prerequ	isites for the course: NIL	100	
-	Learning Outcomes:		
	le to use excel templates.		
	le to organize large amount of data.		
	le to analyze data using pivot tables and pivot charts.		
	le to use functions and formulas on Excel spreadsheet		
	le to combine data sources using tableau.		
COJ. AU	ne to comonic uata sources using tableau.		



-	nme:Degre		Year: I	
	ICA(AI &	, , , , , , , , , , , , , , , , , , ,	Semester:II	
Credits		Subject: Data Base	e Management System Lab	
Practical				
Course		Title: Data Base M	anagement System Lab	
MCA-12				
	Objectives			
		t should be made to:		
		ē	se concepts, technology and practice to groom	students into
		base application deve	-	
		ed with a query langu	6	
		on experience on DDL		
	•	ē	L Commands and DCL commands	
			and exposed to different applications	
	of Paper: (
	m Passing	Marks/Credits: 50%	% Marks	
L:0				
T:0				
	Hours/Week			
•	-1 Hr. = 1 (
		Credit(4Hrs./Week=4	Credits)	
Unit	Contents			No. of Lectures
				Allotted
Ι	Creation of the databa		iting SQL queries to retrieve information from	2
II		ng Insertion, Deletion ased on conditions.	n, Modifying, Altering, Updating and Viewing	2
III	Perform th	he following:		2
	Databa Inserti	ase, Creating Taling/Updating/Deleting	reating a Database, viewing all Tables in a bles (With and Without Constraints), g (Commit) and Undoing (rollback).	
IV		he following:		2
		U	g/Truncating/Renaming Tables, backing up /	
		ing a Database.		
V			emes, create tables and perform the following	2
	Aggregate Functions	e functions (group by , String Functions, M	ries with Aggregate functions, Queries with y and having clause), Queries involving- Date fath Functions Join Queries- Inner Join, Outer	
			e, With EXISTS clause.	
VI	a. Creatin		es perform the following ad without check option), Dropping views,	2
	501000			



VII	Write a Pl/SQL program using FOR loop to insert ten rows into a database table.	2
VIII	Given the table EMPLOYEE (EmpNo, Name, Salary, Designation, DeptID) write a cursor to select the five highest paid employees from the table.	2

Reference / Text Books:

- 1. Fundamentals of Database System by Elmasari & Navathe, 7th Edition, 2018, Pearson Education.
- 2. Database System Concepts by Silberschatz, Korth & Sudarshan, 6th Edition, 2019, McGraw-Hill Education.

Evaluation/Assessment Methodology

	Max. Marks:50
1) Class tasks/ Sessional Examination	20
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	
Seminar On Research Project Report	
5) ESE	30
Total:	50
Course Learning Outcomes:	
Student will be able to:	
CO1: Design and implement a database schema for a given problem-domain	
CO2: Populate and query a database	
CO3: Create and maintain tables using PL/SOL	

CO3: Create and maintain tables using PL/SQL.



IIMT UNIVERSITY

Class: MCA(AI &ML) Semester: II Credits: Subject: OOPS USING JAVA LAB Practical: 2 Title:OOPS USING JAVA LAB Course Code: Title:OOPS USING JAVA LAB MCA-126P Title:OOPS USING JAVA LAB Course Objectives: CO1: To write GUI programs using swing in java. CO2: To write programs implementing OOPS concepts. CO3: To write programs based on real world problems using java collection frame work. Nature of Paper: Core Minimum Passing Marks/Credits: 50% Marks L:0 Marks/Credits: 50% Marks P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit Practical- 2 Hrs.=1Credit(4Hrs./Week=4Credits)	
Practical: 2 Title:OOPS USING JAVA LAB MCA-126P Title:OOPS USING JAVA LAB Course Objectives: CO1: To write GUI programs using swing in java. CO2: To write programs implementing OOPS concepts. CO3: To write programs based on real world problems using java collection frame work. Nature of Paper: Core Minimum Passing Marks/Credits: 50% Marks L:0 Title: Credit P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit	
Course Code: MCA-126PTitle:OOPS USING JAVA LABCourse Objectives: CO1: To write GUI programs using swing in java. CO2: To write programs implementing OOPS concepts. CO3: To write programs based on real world problems using java collection frame work.Nature of Paper: CoreMinimum Passing Marks/Credits: 50% MarksL:0 T:0P:4(In Hours/Week)Theory - 1 Hr. = 1 Credit	
MCA-126P Course Objectives: CO1: To write GUI programs using swing in java. CO2: To write programs implementing OOPS concepts. CO3: To write programs based on real world problems using java collection frame work. Nature of Paper: Core Minimum Passing Marks/Credits: 50% Marks L:0 T:0 P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit	
Course Objectives: CO1: To write GUI programs using swing in java. CO2: To write programs implementing OOPS concepts. CO3: To write programs based on real world problems using java collection frame work. Nature of Paper: Core Minimum Passing Marks/Credits: 50% Marks L:0 T:0 P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit	
CO1: To write GUI programs using swing in java. CO2: To write programs implementing OOPS concepts. CO3: To write programs based on real world problems using java collection frame work. Nature of Paper: Core Minimum Passing Marks/Credits: 50% Marks L:0 T:0 P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit	
CO2: To write programs implementing OOPS concepts. CO3: To write programs based on real world problems using java collection frame work. Nature of Paper: Core Minimum Passing Marks/Credits: 50% Marks L:0 T:0 P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit	
CO3: To write programs based on real world problems using java collection frame work. Nature of Paper: Core Minimum Passing Marks/Credits: 50% Marks L:0 T:0 P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit	
Nature of Paper: Core Minimum Passing Marks/Credits: 50% Marks L:0 T:0 P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit	
Minimum Passing Marks/Credits: 50% Marks L:0 T:0 P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit	
L:0 T:0 P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit	
T:0 P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit	
P:4(In Hours/Week) Theory - 1 Hr. = 1 Credit	
Theory - 1 Hr. = 1 Credit	
Unit Contents No Lec	o. of tures otted
I Write a program to enter a number from user and print the odd numbers	2
between 1 to that number.	
II Write a Program to find perimeter of square if area is entered by user.	2
III Write a program to handle Array indexOutofBounds exception.	2
	2
	2
VI Write a Java program to get the character at the given index within the String.	2
	2
	2
Reference / Text Books:	
1. Patrick Naughton and Herbertz Schildt, "Java-2 The Complete Reference", Mc. Graw Hill.	
2. Balaguruswamy, "Programming with Java: A Primer", Tata McGraw Hill Education. Evaluation/Assessment Methodology	
Max. Ma	rks.50
1) Class tasks/ Sessional Examination 20	1 N3.3V
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report/Seminar on Research Project Report	
5) ESE 30	
Total: 50	
Course Learning Outcomes: Student will be able to:	
CO1: Write programs based on real world problems using java collection frame work	
CO2:Write GUI programs using swing in java.	
CO3: Implement OOPS concepts.	



Program	nme:Degree	Year: II	
0	ICA(AIML)	Semester: III	
Credits		ny & Network Security	
Theory:	• • • • •	<u> </u>	
Course		& Network Security	
MCA-0			
	Objectives:		
CO1:	Understand various security at	tacks and their protection mechanism.	
	Apply and analyze various enc	1	
		rithms to authenticate messages and study and appl	y different
	ligital signature techniques.		-
	Analyze different types of key	distributions.	
		and system security mechanism.	
	of Paper: DSE		
	m Passing Marks/Credits:4	0% Marks (ISE+ESE)	
L:4			
T:0			
	lours/Week)		
```	1Hr.=1Credit		
	l-2Hrs.=1Credit(4Hrs./Week=	4Credits)	
Unit		Contents	No. of
			Lectures
			Allotted
Ι	Introduction to security attac	ks, Services and mechanism, Classical encryption	08
		hers and transposition ciphers, Cryptanalysis,	
	Steganography, Stream and I		
		Block ciphers principles, Shannon's theory of	
		stel structure, Data encryption standard(DES),	
		ifferential cryptanalysis, Block cipher modes of	
	operations, Triple DES		
II	* *	ld, finite field of the form GF(p), Modular	08
1			00
1			00
		e prime numbers, Extended Euclidean Algorithm,	00
	arithmetic, Prime and relativ Advanced Encryption Standa	e prime numbers, Extended Euclidean Algorithm, ard (AES).	00
	arithmetic, Prime and relativ Advanced Encryption Standa Fermat's and Euler's theorem	e prime numbers, Extended Euclidean Algorithm, ard (AES). m, Primality testing, Chinese Remainder theorem,	00
	arithmetic, Prime and relativ Advanced Encryption Standa Fermat's and Euler's theorem	e prime numbers, Extended Euclidean Algorithm, ard (AES).	00
III	arithmetic, Prime and relativ Advanced Encryption Standa Fermat's and Euler's theoren Discrete Logarithmic Proble algorithm, Security of RSA	e prime numbers, Extended Euclidean Algorithm, ard (AES). n, Primality testing, Chinese Remainder theorem, m, Principals of public key crypto systems, RSA	08
	arithmetic, Prime and relativ Advanced Encryption Standa Fermat's and Euler's theorer Discrete Logarithmic Proble algorithm, Security of RSA Message Authentication	e prime numbers, Extended Euclidean Algorithm, ard (AES). m, Primality testing, Chinese Remainder theorem, m, Principals of public key crypto systems, RSA <b>n Codes:</b> Authentication requirements,	
III	arithmetic, Prime and relativ Advanced Encryption Standa Fermat's and Euler's theoren Discrete Logarithmic Proble algorithm, Security of RSA Message Authentication Authentication functions,	e prime numbers, Extended Euclidean Algorithm, ard (AES). m, Primality testing, Chinese Remainder theorem, m, Principals of public key crypto systems, RSA <b>n Codes:</b> Authentication requirements, Message authentication code, Hash functions,	
III	arithmetic, Prime and relativ Advanced Encryption Standa Fermat's and Euler's theoren Discrete Logarithmic Proble algorithm, Security of RSA <b>Message Authentication</b> Authentication functions, Birthday attacks, Security of	e prime numbers, Extended Euclidean Algorithm, ard (AES). n, Primality testing, Chinese Remainder theorem, m, Principals of public key crypto systems, RSA <b>n Codes:</b> Authentication requirements, Message authentication code, Hash functions, hash functions, Secure hash algorithm (SHA).	
III	arithmetic, Prime and relativ Advanced Encryption Standa Fermat's and Euler's theoren Discrete Logarithmic Proble algorithm, Security of RSA <b>Message Authentication</b> Authentication functions, I Birthday attacks, Security of <b>Digital Signatures:</b> Dig	e prime numbers, Extended Euclidean Algorithm, ard (AES). m, Primality testing, Chinese Remainder theorem, m, Principals of public key crypto systems, RSA <b>n Codes:</b> Authentication requirements, Message authentication code, Hash functions, hash functions, Secure hash algorithm (SHA). ital Signatures, Elgamal Digital Signature	
III	arithmetic, Prime and relativ Advanced Encryption Standa Fermat's and Euler's theoren Discrete Logarithmic Proble algorithm, Security of RSA Message Authentication Authentication functions, I Birthday attacks, Security of Digital Signatures: Dig Techniques, Digital signatu	e prime numbers, Extended Euclidean Algorithm, ard (AES). n, Primality testing, Chinese Remainder theorem, m, Principals of public key crypto systems, RSA <b>n Codes:</b> Authentication requirements, Message authentication code, Hash functions, hash functions, Secure hash algorithm (SHA).	
III	arithmetic, Prime and relativ Advanced Encryption Standa Fermat's and Euler's theoren Discrete Logarithmic Proble algorithm, Security of RSA <b>Message Authentication</b> Authentication functions, I Birthday attacks, Security of <b>Digital Signatures:</b> Dig Techniques, Digital signature algorithm.	e prime numbers, Extended Euclidean Algorithm, ard (AES). m, Primality testing, Chinese Remainder theorem, m, Principals of public key crypto systems, RSA <b>n Codes:</b> Authentication requirements, Message authentication code, Hash functions, hash functions, Secure hash algorithm (SHA). ital Signatures, Elgamal Digital Signature	



key Infrastructure.				
Authentication Applications: Kerberos Electronic mail security: prett	ty good			
privacy (PGP), S/MIME.				
V <b>IP Security:</b> Architecture, Authentication header, Encapsulating security				
payloads, Combining security associations, Key management.				
Introduction to Secure Socket Layer, Secure electronic transaction (SET	Г).			
System Security: Introductory idea of Intrusion, Intrusion detection, V	iruses			
and related threats, firewalls.				
Text Book:				
1. Stallings W., "Cryptography and Network Security: Principals and Practice",	Pearson E	Education.		
2. Frouzan B. A., "Cryptography and Network Security", McGraw Hill.				
Reference Book:				
1. Kahate A., "Cryptography and Network Security", Tata McGraw Hill.				
Evaluation/Assessment Methodology	1			
	Max. N	Aarks 100		
1) Classtasks/Sessional Examination		15		
2) Presentations /Seminar				
3) Assignments				
4) Research Project Report		10		
5) Seminar On Research Project Report				
6) ESE		75		
Total:		100		
Prerequisites for the course: NIL				
Course Learning Outcomes:				
CO1: Provide security of the data over the network.				
CO2: Do research in the emerging areas of cryptography and network security.	•			
CO3: Implement various networking protocols.				
CO4: Protect any network from the threats in the world	. ·			
CO5: Understand various protocols for network security to protect again	st the thr	reats in the		
networks.				



Program	nmo.Degree	Year: II	
Programme:Degree Class:MCA(AIML)		Semester: III	
Credits		housing & Data Mining	
Theory:	0	nousing & Data Winning	
Course		using & Data Mining	
MCA-01			
	Objectives:		
	·	ata Warehouse and its components.	
	e	buse Planning and Implementation.	
	1	s supervised and non-supervised learning algorithms	s on data
		² Data Mining and decide best according to type of d	
		discovery in database (KDD). Design Datan Mining	
	of Paper: DSE		5 1110 4011
	m Passing Marks/Credits:4	0% Marks (ISE+ESE)	
L:4			
T:0			
	lours/Week)		
	1Hr.=1Credit		
-	l-2Hrs.=1Credit(4Hrs./Week=	-4Credits)	
Unit	, , , , , , , , , , , , , , , , , , ,	Contents	No. of
			Lectures
			Allotted
Ι	Data Warehousing: Overv	view, Definition, Data Warehousing Components,	08
	building a Data Wareho	use, Warehouse Database, Mapping the Data	
	Warehouse to a Multiproc	essor Architecture, Difference between Database	
	System and Data Warehous	e, Multi-Dimensional Data Model,	
		akes, Fact Constellations, Concept.	
II	Data Warehouse Proce		08
		and Support Processes, Warehouse Planning and	
		and Operating Systems for Data Warehousing,	
	I C	odel & Data Warehousing. Parallel Processors	
	•	tributed DBMS implementations, Warehousing	
	Software, Warehouse Schen		0.0
III		Motivation, Definition & Functionalities, Data	08
	-	Pre-processing, Data Cleaning: Missing Values,	
		Clustering, Regression, Computer and Human	
	-	Data, Data Integration and Transformation. Data	
		Aggregation, Dimensionality reduction, Data	
		Reduction, Discretization and Concept hierarchy	
137	generation, Decision Tree	Data Cananalization Analatical Cl. ( )	0
IV		Data Generalization, Analytical Characterization,	08
	-	evance, Mining Class comparisons, Statistical	
	-	es, Statistical-Based Algorithms, Distance-Based	
	Algorithms, Decision Tree-	Dastu Aigonunns.	



	Clustering: Introduction, Similarity and Distance Measures, Hierarchi			
	Partitional Algorithms. Hierarchical Clustering- CURE and Char	neleon.		
	Density Based Methods DBSCAN, OPTICS. Grid Based Methods- S	STING,		
	CLIQUE. Model Based Method - Statistical Approach, Association	n rules:		
	Introduction, Large Item sets, Basic Algorithms, Parallel and Dist	tributed		
	Algorithms, Neural Network approach.			
V				
	information, Query Facility, OLAP function and Tools. OLAP			
	ROLAP, MOLAP, HOLAP, Data Mininginter face, Security, Back	up and		
	Recovery, Tuning Data Warehouse, Testing Data Warehouse. Ware	-		
	applications and Recent Trends: Types of Warehousing Application			
	Mining, Spatial Mining and Temporal Mining	,		
Text Bo				
1. Alex	Berson, Stephen J. Smith "Data Warehousing, Data-Mining & OLAP", T	MH.		
	k Humphries, Michael W. Hawkins, Michelle C. Dy, "Data Warehousin		tecture and	
	ementation", Pearson.	0		
-	gh, "Data Mining and Warehousing", Khanna Publishing House.			
	ce Book:			
	garet H. Dunham, S. Sridhar," Data Mining: Introductory and Advance	ed Topic	s" Pearson	
	cation 5. Arun K. Pujari, "Data Mining Techniques" Universities Press.			
	er Adriaans, Dolf Zantinge, "Data-Mining", Pearson Education			
	Evaluation/Assessment Methodology			
		Max.	Marks 100	
1) Cla	ss tasks/SessionalExamination		15	
	sentations /Seminar		10	
· · · · · · · · · · · · · · · · · · ·	ignments			
	earch Project Report		10	
· ·	ninar On Research Project Report		10	
6) ESI	5 1		75	
	Total:		100	
Preregi	lisites for the course: NIL		100	
-	Learning Outcomes:			
	Understand warehousing architectures and tools for systematically organ	nizina lar	ae data hase	
001.	and use their data to make strategic decisions.	nzing iai	ge uata base	
CO2	Understand KDD process for finding interesting pattern from warehouse.			
	Remove redundancy and incomplete data from the dataset using data pre-		a mathada	
	Characterize the binds of nottenne that can be discovered by several by		0	

- CO4: Characterize the kinds of patterns that can be discovered by association rule mining.
- CO5: Develop a data mining application for data analysis using various tools.



Program	mme:Degree Year: II				
-	MCA(AIML) Semester: III				
Credits					
Theory:	5 5				
	Course Code: Title:Software Project Management				
	MCA-013				
Course	Objectives:				
	Identify project planning objectives, along with various cost/effort estimation	models.			
	Organize & schedule project activities to compute critical path for risk analys				
	Monitor and control project activities.				
CO4:	Formulate testing objectives and test plan to ensure good software quality und	ler SEI-			
	СММ				
CO5: 0	Configure changes and manage risks using project management tools.				
Nature	of Paper: DSE				
-	um Passing Marks/Credits:40% Marks (ISE+ESE)				
L:4					
T:0					
	Hours/Week)				
	·1Hr.=1Credit				
Practica	ll-2Hrs.=1Credit(4Hrs./Week=4Credits)	1			
Unit	Contents	No. of			
		Lectures			
		Allotted			
Ι	Project Evaluation and Project Planning: Importance of Software Pro	oject <b>08</b>			
	Monogement Activities Mathedelegies Cotegorization of Softy				
	Management – Activities – Methodologies – Categorization of Softw	vare			
	Projects – Setting objectives – Management Principles – Management Cor	vare ntrol			
	Projects – Setting objectives – Management Principles – Management Cor – Project portfolio Management – Cost-benefit evaluation technology – I	vare ntrol			
	Projects – Setting objectives – Management Principles – Management Cor – Project portfolio Management – Cost-benefit evaluation technology – I evaluation–Strategic program Management – Stepwise Project Planning.	vare htrol Risk			
II	<ul> <li>Projects – Setting objectives – Management Principles – Management Cor</li> <li>Project portfolio Management – Cost-benefit evaluation technology – I</li> <li>evaluation–Strategic program Management – Stepwise Project Planning.</li> <li>Project Life Cycle and Effort Estimation: Software process and Pro-</li> </ul>	vare htrol Risk cess 08			
II	<ul> <li>Projects – Setting objectives – Management Principles – Management Cor</li> <li>Project portfolio Management – Cost-benefit evaluation technology – I</li> <li>evaluation–Strategic program Management – Stepwise Project Planning.</li> <li>Project Life Cycle and Effort Estimation: Software process and Pro-</li> <li>Models – Choice of Process models – Rapid Application development – A</li> </ul>	vare ttrol Risk cess 08 gile			
 	<ul> <li>Projects – Setting objectives – Management Principles – Management Cor</li> <li>Project portfolio Management – Cost-benefit evaluation technology – I</li> <li>evaluation–Strategic program Management – Stepwise Project Planning.</li> <li>Project Life Cycle and Effort Estimation: Software process and Pro-</li> <li>Models – Choice of Process models – Rapid Application development – A</li> <li>methods – Dynamic System Development Method – Extreme Programming</li> </ul>	vare ttrol Risk cess 08 gile ng–			
II	<ul> <li>Projects – Setting objectives – Management Principles – Management Cor</li> <li>Project portfolio Management – Cost-benefit evaluation technology – I</li> <li>evaluation–Strategic program Management – Stepwise Project Planning.</li> <li>Project Life Cycle and Effort Estimation: Software process and Pro-</li> <li>Models – Choice of Process models – Rapid Application development – A</li> <li>methods – Dynamic System Development Method – Extreme Programmi</li> <li>Managing interactive processes – Basics of Software estimation – Effort</li> </ul>	vare htrol Risk cess 08 gile ng- and			
II	<ul> <li>Projects – Setting objectives – Management Principles – Management Cor</li> <li>Project portfolio Management – Cost-benefit evaluation technology – I</li> <li>evaluation–Strategic program Management – Stepwise Project Planning.</li> <li>Project Life Cycle and Effort Estimation: Software process and Pro-</li> <li>Models – Choice of Process models – Rapid Application development – A</li> <li>methods – Dynamic System Development Method – Extreme Programmi</li> <li>Managing interactive processes – Basics of Software estimation – Effort</li> <li>Cost estimation techniques–COSMIC Full function points–COCOMO</li> </ul>	vare htrol Risk cess 08 gile ng- and			
	<ul> <li>Projects – Setting objectives – Management Principles – Management Cor</li> <li>Project portfolio Management – Cost-benefit evaluation technology – I</li> <li>evaluation–Strategic program Management – Stepwise Project Planning.</li> <li>Project Life Cycle and Effort Estimation: Software process and Pro-</li> <li>Models – Choice of Process models – Rapid Application development – A</li> <li>methods – Dynamic System Development Method – Extreme Programmi</li> <li>Managing interactive processes – Basics of Software estimation – Effort</li> <li>Cost estimation techniques–COSMIC Full function points–COCOMO</li> <li>Parametric Productivity Model.</li> </ul>	vare htrol Risk cess 08 gile ng- and II-a			
II	<ul> <li>Projects – Setting objectives – Management Principles – Management Cor</li> <li>Project portfolio Management – Cost-benefit evaluation technology – I</li> <li>evaluation–Strategic program Management – Stepwise Project Planning.</li> <li>Project Life Cycle and Effort Estimation: Software process and Pro-</li> <li>Models – Choice of Process models – Rapid Application development – A</li> <li>methods – Dynamic System Development Method – Extreme Programmi</li> <li>Managing interactive processes – Basics of Software estimation – Effort</li> <li>Cost estimation techniques–COSMIC Full function points–COCOMO</li> <li>Parametric Productivity Model.</li> <li>Activity Planning and Risk Management: Objectives of Activity planning</li> </ul>	vare htrol Risk cess gile ng- and II-a ng - 08			
	<ul> <li>Projects – Setting objectives – Management Principles – Management Cor – Project portfolio Management – Cost-benefit evaluation technology – I evaluation–Strategic program Management – Stepwise Project Planning.</li> <li>Project Life Cycle and Effort Estimation: Software process and Pro- Models – Choice of Process models – Rapid Application development – A methods – Dynamic System Development Method – Extreme Programmi Managing interactive processes – Basics of Software estimation – Effort Cost estimation techniques–COSMIC Full function points–COCOMO Parametric Productivity Model.</li> <li>Activity Planning and Risk Management: Objectives of Activity plannin Project schedules – Activities – Sequencing and scheduling – Network</li> </ul>	vare ttrol Risk cess $08$ gile ng- and II-a ng - $08$ vork			
	<ul> <li>Projects – Setting objectives – Management Principles – Management Cor</li> <li>Project portfolio Management – Cost-benefit evaluation technology – I</li> <li>evaluation–Strategic program Management – Stepwise Project Planning.</li> <li>Project Life Cycle and Effort Estimation: Software process and Provide Models – Choice of Process models – Rapid Application development – A</li> <li>methods – Dynamic System Development Method – Extreme Programmi Managing interactive processes – Basics of Software estimation – Effort Cost estimation techniques–COSMIC Full function points–COCOMO Parametric Productivity Model.</li> <li>Activity Planning and Risk Management: Objectives of Activity planning Project schedules – Activities – Sequencing and scheduling – Netw Planning models – Formulating Network Model – Forward Pass &amp; Backy</li> </ul>	vare htrol Risk cess 08 gile ng- and II-a ng - 08 vork vard			
	<ul> <li>Projects – Setting objectives – Management Principles – Management Cor</li> <li>Project portfolio Management – Cost-benefit evaluation technology – I</li> <li>evaluation–Strategic program Management – Stepwise Project Planning.</li> <li>Project Life Cycle and Effort Estimation: Software process and Provide Models – Choice of Process models – Rapid Application development – A</li> <li>methods – Dynamic System Development Method – Extreme Programmi Managing interactive processes – Basics of Software estimation – Effort Cost estimation techniques–COSMIC Full function points–COCOMO Parametric Productivity Model.</li> <li>Activity Planning and Risk Management: Objectives of Activity planning Project schedules – Activities – Sequencing and scheduling – Netw Planning models – Formulating Network Model – Forward Pass &amp; Backy Pass techniques – Critical path (CRM) method – Risk identification</li> </ul>	vare htrol Risk cess gile ng- and II-a ng - 08 vork vard n - 08			
	<ul> <li>Projects – Setting objectives – Management Principles – Management Corr – Project portfolio Management – Cost-benefit evaluation technology – I evaluation–Strategic program Management – Stepwise Project Planning.</li> <li>Project Life Cycle and Effort Estimation: Software process and Pro- Models – Choice of Process models – Rapid Application development – A methods – Dynamic System Development Method – Extreme Programmi Managing interactive processes – Basics of Software estimation – Effort Cost estimation techniques–COSMIC Full function points–COCOMO Parametric Productivity Model.</li> <li>Activity Planning and Risk Management: Objectives of Activity plannin Project schedules – Activities – Sequencing and scheduling – Netw Planning models – Formulating Network Model – Forward Pass &amp; Backy Pass techniques – Critical path (CRM) method – Risk identificatio Assessment – Risk Planning –Risk Management – PERT technique – Method Assessment – Risk Planning –Risk Management – PERT technique – Method</li> </ul>	vare htrol Riskcess $08$ gile ng- and II-ang - vork vard n - onte $08$			
	<ul> <li>Projects – Setting objectives – Management Principles – Management Cor – Project portfolio Management – Cost-benefit evaluation technology – I evaluation–Strategic program Management – Stepwise Project Planning.</li> <li>Project Life Cycle and Effort Estimation: Software process and Pro- Models – Choice of Process models – Rapid Application development – A methods – Dynamic System Development Method – Extreme Programmi Managing interactive processes – Basics of Software estimation – Effort Cost estimation techniques–COSMIC Full function points–COCOMO Parametric Productivity Model.</li> <li>Activity Planning and Risk Management: Objectives of Activity plannin Project schedules – Activities – Sequencing and scheduling – Netw Planning models – Formulating Network Model – Forward Pass &amp; Backy Pass techniques – Critical path (CRM) method – Risk identificatio Assessment – Risk Planning –Risk Management – PERT technique – Me Carlo simulation – Resource Allocation– Creation of Critical paths – O</li> </ul>	vare htrol Riskcess $08$ gile ng- and II-ang - vork vard n - onte $08$			
III	<ul> <li>Projects – Setting objectives – Management Principles – Management Cor – Project portfolio Management – Cost-benefit evaluation technology – I evaluation–Strategic program Management – Stepwise Project Planning.</li> <li>Project Life Cycle and Effort Estimation: Software process and Pro- Models – Choice of Process models – Rapid Application development – A methods – Dynamic System Development Method – Extreme Programmi Managing interactive processes – Basics of Software estimation – Effort Cost estimation techniques–COSMIC Full function points–COCOMO Parametric Productivity Model.</li> <li>Activity Planning and Risk Management: Objectives of Activity plannin Project schedules – Activities – Sequencing and scheduling – Netw Planning models – Formulating Network Model – Forward Pass &amp; Backy Pass techniques – Critical path (CRM) method – Risk identificatio Assessment – Risk Planning –Risk Management – PERT technique – Me Carlo simulation – Resource Allocation– Creation of Critical paths – O schedules.</li> </ul>	vare htrol Risk cess 08 gile ng- and II-a ng - 08 vork vard n - onte Cost			
	<ul> <li>Projects – Setting objectives – Management Principles – Management Corr – Project portfolio Management – Cost-benefit evaluation technology – I evaluation–Strategic program Management – Stepwise Project Planning.</li> <li>Project Life Cycle and Effort Estimation: Software process and Pro- Models – Choice of Process models – Rapid Application development – A methods – Dynamic System Development Method – Extreme Programmi Managing interactive processes – Basics of Software estimation – Effort Cost estimation techniques–COSMIC Full function points–COCOMO Parametric Productivity Model.</li> <li>Activity Planning and Risk Management: Objectives of Activity planning Project schedules – Activities – Sequencing and scheduling – Netw Planning models – Formulating Network Model – Forward Pass &amp; Backy Pass techniques – Critical path (CRM) method – Risk identificatio Assessment – Risk Planning –Risk Management – PERT technique – Me Carlo simulation – Resource Allocation– Creation of Critical paths – O schedules.</li> <li>Project Management and Control: Framework for Management and corr</li> </ul>	vare htrol Riskcess $08$ gile ng- and II-ang - vork vard n - onte Cost08			
III	<ul> <li>Projects – Setting objectives – Management Principles – Management Cor – Project portfolio Management – Cost-benefit evaluation technology – I evaluation–Strategic program Management – Stepwise Project Planning.</li> <li>Project Life Cycle and Effort Estimation: Software process and Pro- Models – Choice of Process models – Rapid Application development – A methods – Dynamic System Development Method – Extreme Programmi Managing interactive processes – Basics of Software estimation – Effort Cost estimation techniques–COSMIC Full function points–COCOMO Parametric Productivity Model.</li> <li>Activity Planning and Risk Management: Objectives of Activity plannin Project schedules – Activities – Sequencing and scheduling – Netw Planning models – Formulating Network Model – Forward Pass &amp; Backy Pass techniques – Critical path (CRM) method – Risk identificatio Assessment – Risk Planning –Risk Management – PERT technique – Me Carlo simulation – Resource Allocation– Creation of Critical paths – O schedules.</li> </ul>	vare htrolRiskcess $08$ gile ng_ andII-a $1g - 08$ $vork$ vard n - onteCostttrol $08$			



Configuration Management – Managing contracts – Contract Managem	ient.
V Staffing in Software Projects: Managing people – Organizational bel	havior – <b>08</b>
Best methods of staff selection – Motivation – The Oldham – Hacki	man job
characteristic model - Stress - Health and Safety - Ethical and Prof	essional
concerns – Working in teams – Decision making – Organizational stru	ctures –
DispersedandVirtualteams-Communicationsgenres-Communicationpla	ans–
Leadership.	
Text Book:	
1. Bob Hughes, Mike Cotterell and Rajib Mall: "Software Project Managem	nent" - Fifth Edition
McGraw Hill, New Delhi,2012.	
2. Robert K. Wysocki — "Effective Software Project Management" – Wiley Pu	blication, 2011.
3. Walker Royce: — "Software Project Management" - Addison-Wesley, 1998.	
4. Gopalaswamy Ramesh, — "Managing Global Software Projects" – Mc	Graw Hill Education
(India), Fourteenth Reprint 2013.	
Reference Book:	
1. Koontz Harold & Weihrich Heinz, "Essentials of Management", McGraw Hil	ll 5 th Edition 2008.
2. Robbins and Coulter, "Management", Prentice Hall of India, 9 th edition.	
3. James A. F., Stoner, "Management", Pearson Education Delhi.	
4. P. D. Chaturvedi, "Business Communication", Pearson Education.	
Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
5) Seminar On Research Project Report	
6) ESE	75
Total:	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO1: Identify the different project contexts and suggest an appropriate manage	ement strategy.
CO2: Practice the role of professional ethics in successful software developme	
CO3: Identify and describe the key phases of project management.	
CO4: Determine an appropriate project management approach.	
CO5: Evaluation of the business context and scope of the project.	

CO5: Evaluation of the business context and scope of the project.



Program	nme:Degree		Year: II	
Class:MCA(AIML)			Semester: III	
Credits		t:Cloud Comp		
Theory:4	_	I	C	
Course (		loud Computir	ng	
MCA-01		Ĩ		
Course (	Objectives:			
CO1: U	Jnderstand the co	oncepts of Clo	oud Computing, key technologies, strengths and l	imitations of
c	loud computing.	1		
CO2 D	Develop the abili	ity to understa	and and use the architecture to compute and st	orage cloud,
S	ervice and model	ls.		
CO3: U	Inderstand the ap	plication in cl	oud computing.	
CO4: L	earn the key and	enabling tech	nologies that help in the development of cloud.	
		ssues of cloud	computing such as resource management and secu	ırity.
	of Paper: DSE			
-	m Passing Mark	xs/Credits:409	% Marks (ISE+ESE)	
L:4				
T:0				
	ours/Week)			
-	Hr.=1Credit			
	-2Hrs.=1Credit(4	Hrs./Week=4		
Unit			Contents	No. of
				Lectures
Ŧ	<b>T</b> ( <b>1</b> ( <b>1</b>			Allotted
Ι			ing – Definition of Cloud – Evolution of Cloud	08
	1 0		inciples of Parallel and Distributed, History of	
			chitecture - Types of Clouds - Business models	
			yers in Cloud Computing-issues in Clouds -	
п			Nebula, Cloud Sim.	00
II			oud services: Software as a Service- Platform as a	08
			ervice - Database as a Service - Monitoring as a	
	Microsoft Azure		services. Service providers- Google, Amazon,	
III			Services: Email Communication over the Cloud	08
- 111	0	0	bject Management-Event Management - Task	Vo
		-	Schedules - Word Processing – Presentation –	
	U		sktop - Social Networks and	
	Groupware.		skiep sooiai networks and	
IV		for Cloud	Need for Virtualization – Pros and cons of	08
1			rtualization – System VM, Process VM, Virtual	00
		• •	machine properties - Interpretation and binary	
			ervisors – Xen, KVM, VMware, Virtual Box,	
	Hyper-V.	_ , 5up		
V	**	dards and Ar	oplications: Security in Clouds: Cloud security	08
V	**	dards and A	oplications: Security in Clouds: Cloud security	08



challenges - Software as a Service Security, Common Standards: The Open
Cloud Consortium – The Distributed management Task Force – Standards for
application Developers – Standards for Messaging – Standards for Security,
End user access to cloud computing, Mobile Internet devices and the cloud.
Hadoop – Map Reduce – Virtual Box — Google App Engine – Programming
Environment for Google App Engine

#### **Text Book:**

- 1. David E.Y. Sarna, "Implementing and Developing Cloud Application", CRC press2011.
- Lee Badger, Tim Grance, Robert Patt-Corner, Jeff Voas, NIST, Draft cloud computing synopsis and recommendation, May2011.
- 3. Anthony T Velte, Toby J Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach", Tata McGraw-Hill2010.

#### **Reference Book:**

 Haley Beard, "Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs", Emereo Pty Limited, July2008.
 Evaluation/Assessment Methodology

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
5) Seminar On Research Project Report	
6) ESE	75
Total:	100
Prerequisites for the course: NIL	•

#### **Course Learning Outcomes:**

- CO1: Understand the fundamental principles of distributed computing.
- CO2: Understand how the distributed computing environments known as Grids can be built from lower-level services.
- CO3: Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing.
- CO4: Analyze the performance of Cloud Computing.
- CO5: Understand the concept of Cloud Security.



Progra	mme: Degree		Year: II	
Class: MCA(AIML)			Semester: III	
Credits	5	Subject: C	ompiler Design	
Theory:	:4Cr			
	Code:MCA-015	Title:Com	piler Design	
Course	Objectives:			
	1 0		phases and passes of the compiler and also able to	
			C, etc. Students will also be able to design different	rent types of
	-	-	rements of the realistic constraints of compilers.	
	-	•	ypes i.e. Top-Down and Bottom-up parsers and co	nstruction of
	LL, SLR, CLR, and	-	6	
CO3:			syntax-directed translation method and get knowled	lge about the
601	synthesized and inh			1 1.00
	1 0		ime data structure like symbol table organization	and different
	techniques used in t		a mun time anyting mant its instruction set for and	la concretion
CO3.	and techniques used		's run time environment, its instruction set for coc	le generation
Natura	of Paper: DSE			
	<b>A</b>	/Crodits.10	% Marks (ISE+ESE)	
L:4		/C1 cuits. 40	// WAIKS (ISETESE)	
T:0				
	Hours/Week)			
	-1Hr.=1Credit			
-	al-2Hrs.=1Credit(4H	Irs./Week=4	Credits)	
Unit				
			Contents	No. of
1			Contents	No. of Lectures
			Contents	
I		-	Phases and passes, Bootstrapping, Finite state	Lectures
I	machines and re	gular expres	Phases and passes, Bootstrapping, Finite state ssions and their applications to lexical analysis,	Lectures Allotted
Ι	machines and re Optimization of	gular expres DFA-Based	Phases and passes, Bootstrapping, Finite state ssions and their applications to lexical analysis, d Pattern Matchers implementation of lexical	Lectures Allotted
I	machines and re Optimization of analyzers, lexica	gular expres DFA-Based l-analyzer g	Phases and passes, Bootstrapping, Finite state ssions and their applications to lexical analysis, d Pattern Matchers implementation of lexical enerator, LEX compiler, Formal grammars and	Lectures Allotted
I	machines and re Optimization of analyzers, lexica their application	gular expres DFA-Based l-analyzer g to syntax a	Phases and passes, Bootstrapping, Finite state ssions and their applications to lexical analysis, d Pattern Matchers implementation of lexical enerator, LEX compiler, Formal grammars and analysis, BNF notation, ambiguity, YACC. The	Lectures Allotted
I	machines and re Optimization of analyzers, lexica their application syntactic specific	gular expres DFA-Based l-analyzer g to syntax a cation of pr	Phases and passes, Bootstrapping, Finite state ssions and their applications to lexical analysis, d Pattern Matchers implementation of lexical enerator, LEX compiler, Formal grammars and analysis, BNF notation, ambiguity, YACC. The ogramming languages: Context free grammars,	Lectures Allotted
	machines and re Optimization of analyzers, lexica their application syntactic specific derivation and pa	gular express DFA-Based l-analyzer g to syntax a cation of pr rse trees, cap	Phases and passes, Bootstrapping, Finite state ssions and their applications to lexical analysis, d Pattern Matchers implementation of lexical enerator, LEX compiler, Formal grammars and analysis, BNF notation, ambiguity, YACC. The ogramming languages: Context free grammars, pabilities of CFG.	Lectures Allotted 08
I	machines and re Optimization of analyzers, lexica their application syntactic specific derivation and pa Basic Parsing To	gular expres DFA-Based l-analyzer g to syntax a cation of pr rse trees, cap echniques: I	Phases and passes, Bootstrapping, Finite state ssions and their applications to lexical analysis, d Pattern Matchers implementation of lexical enerator, LEX compiler, Formal grammars and analysis, BNF notation, ambiguity, YACC. The ogramming languages: Context free grammars, pabilities of CFG. Parsers, Shift reduce parsing, operator precedence	Lectures Allotted
	<ul> <li>machines and re</li> <li>Optimization of</li> <li>analyzers, lexica</li> <li>their application</li> <li>syntactic specific</li> <li>derivation and pa</li> <li>Basic Parsing Te</li> <li>parsing, top dow</li> </ul>	gular express DFA-Based l-analyzer g to syntax a cation of pr rse trees, cap echniques: I wn parsing,	Phases and passes, Bootstrapping, Finite state ssions and their applications to lexical analysis, d Pattern Matchers implementation of lexical enerator, LEX compiler, Formal grammars and analysis, BNF notation, ambiguity, YACC. The ogramming languages: Context free grammars, pabilities of CFG. Parsers, Shift reduce parsing, operator precedence predictive parsers Automatic Construction of	Lectures Allotted 08
	machines and re Optimization of analyzers, lexica their application syntactic specific derivation and pa <b>Basic Parsing Te</b> parsing, top dow efficient Parsers	gular express DFA-Based l-analyzer g to syntax a cation of pr rse trees, cap echniques: I wn parsing, : LR parse	Phases and passes, Bootstrapping, Finite state ssions and their applications to lexical analysis, d Pattern Matchers implementation of lexical enerator, LEX compiler, Formal grammars and analysis, BNF notation, ambiguity, YACC. The ogramming languages: Context free grammars, pabilities of CFG. Parsers, Shift reduce parsing, operator precedence predictive parsers Automatic Construction of rrs, the canonical Collection of LR(0) items,	Lectures Allotted 08
	<ul> <li>machines and re</li> <li>Optimization of</li> <li>analyzers, lexica</li> <li>their application</li> <li>syntactic specific</li> <li>derivation and pa</li> <li>Basic Parsing To</li> <li>parsing, top dov</li> <li>efficient Parsers</li> <li>constructing SLF</li> </ul>	gular express DFA-Based l-analyzer g to syntax a cation of pr rse trees, cap echniques: I wn parsing, E LR parse R parsing ta	Phases and passes, Bootstrapping, Finite state ssions and their applications to lexical analysis, d Pattern Matchers implementation of lexical enerator, LEX compiler, Formal grammars and analysis, BNF notation, ambiguity, YACC. The ogramming languages: Context free grammars, pabilities of CFG. Parsers, Shift reduce parsing, operator precedence predictive parsers Automatic Construction of rs, the canonical Collection of LR(0) items, bles, constructing Canonical LR parsing tables,	Lectures Allotted 08
	<ul> <li>machines and re</li> <li>Optimization of</li> <li>analyzers, lexica</li> <li>their application</li> <li>syntactic specific</li> <li>derivation and pa</li> <li>Basic Parsing Te</li> <li>parsing, top dow</li> <li>efficient Parsers</li> <li>constructing SLF</li> <li>Constructing LA</li> </ul>	gular express DFA-Based l-analyzer g to syntax a cation of pr rse trees, cap echniques: I wn parsing, : LR parse R parsing ta LR parsing ta	Phases and passes, Bootstrapping, Finite state ssions and their applications to lexical analysis, d Pattern Matchers implementation of lexical enerator, LEX compiler, Formal grammars and analysis, BNF notation, ambiguity, YACC. The ogramming languages: Context free grammars, pabilities of CFG. Parsers, Shift reduce parsing, operator precedence predictive parsers Automatic Construction of rs, the canonical Collection of LR(0) items, bles, constructing Canonical LR parsing tables, tables, using ambiguous grammars, an automatic	Lectures Allotted 08
II	machines and re Optimization of analyzers, lexica their application syntactic specific derivation and pa <b>Basic Parsing To</b> parsing, top dow efficient Parsers constructing SLF Constructing LA parser generator,	gular express DFA-Based l-analyzer g to syntax a cation of pr rse trees, cap echniques: I wn parsing, : LR parse R parsing ta LR parsing ta implementat	Phases and passes, Bootstrapping, Finite state assions and their applications to lexical analysis, d Pattern Matchers implementation of lexical enerator, LEX compiler, Formal grammars and analysis, BNF notation, ambiguity, YACC. The ogramming languages: Context free grammars, pabilities of CFG. Parsers, Shift reduce parsing, operator precedence predictive parsers Automatic Construction of rrs, the canonical Collection of LR(0) items, bles, constructing Canonical LR parsing tables, tables, using ambiguous grammars, an automatic tion of LR parsing tables.	Lectures Allotted 08 08
	<ul> <li>machines and re</li> <li>Optimization of</li> <li>analyzers, lexica</li> <li>their application</li> <li>syntactic specific</li> <li>derivation and pa</li> <li>Basic Parsing To</li> <li>parsing, top dow</li> <li>efficient Parsers</li> <li>constructing SLF</li> <li>Constructing LA</li> <li>parser generator,</li> <li>Syntax-directed</li> </ul>	gular express DFA-Based l-analyzer g to syntax a cation of pr rse trees, cap echniques: I wn parsing, ER parse a parsing ta LR parsing ta implementat	Phases and passes, Bootstrapping, Finite state ssions and their applications to lexical analysis, d Pattern Matchers implementation of lexical enerator, LEX compiler, Formal grammars and malysis, BNF notation, ambiguity, YACC. The ogramming languages: Context free grammars, pabilities of CFG. Parsers, Shift reduce parsing, operator precedence predictive parsers Automatic Construction of rs, the canonical Collection of LR(0) items, bles, constructing Canonical LR parsing tables, tables, using ambiguous grammars, an automatic tion of LR parsing tables.	Lectures Allotted 08
II	<ul> <li>machines and re</li> <li>Optimization of</li> <li>analyzers, lexica</li> <li>their application</li> <li>syntactic specific</li> <li>derivation and pa</li> <li>Basic Parsing To</li> <li>parsing, top dow</li> <li>efficient Parsers</li> <li>constructing SLF</li> <li>Constructing LA</li> <li>parser generator,</li> <li>Syntax-directed</li> <li>Implementation</li> </ul>	gular express DFA-Based l-analyzer g to syntax a cation of pr rse trees, cap echniques: I wn parsing, : LR parse R parsing ta LR parsing ta implementat Translati of Syntax-d	Phases and passes, Bootstrapping, Finite state assions and their applications to lexical analysis, d Pattern Matchers implementation of lexical enerator, LEX compiler, Formal grammars and analysis, BNF notation, ambiguity, YACC. The ogramming languages: Context free grammars, pabilities of CFG. Parsers, Shift reduce parsing, operator precedence predictive parsers Automatic Construction of rrs, the canonical Collection of LR(0) items, bles, constructing Canonical LR parsing tables, tables, using ambiguous grammars, an automatic tion of LR parsing tables.	Lectures Allotted 08 08
II	<ul> <li>machines and re</li> <li>Optimization of</li> <li>analyzers, lexica</li> <li>their application</li> <li>syntactic specific</li> <li>derivation and pa</li> </ul> Basic Parsing To <ul> <li>parsing, top dow</li> <li>efficient Parsers</li> <li>constructing SLF</li> <li>Constructing LA</li> <li>parser generator,</li> </ul> Syntax-directed Implementation <ul> <li>notation, Parse tr</li> </ul>	gular express DFA-Based l-analyzer g to syntax a cation of pr rse trees, cap echniques: I wn parsing, : LR parse R parsing ta LR parsing ta implementat of Syntax-d rees & synta	Phases and passes, Bootstrapping, Finite state ssions and their applications to lexical analysis, d Pattern Matchers implementation of lexical enerator, LEX compiler, Formal grammars and analysis, BNF notation, ambiguity, YACC. The ogramming languages: Context free grammars, pabilities of CFG. Parsers, Shift reduce parsing, operator precedence predictive parsers Automatic Construction of rrs, the canonical Collection of LR(0) items, bles, constructing Canonical LR parsing tables, tables, using ambiguous grammars, an automatic tion of LR parsing tables. ion: Syntax-directed Translation schemes, lirected Translators, Intermediate code, postfix	Lectures Allotted 08 08
II	<ul> <li>machines and re</li> <li>Optimization of analyzers, lexica</li> <li>their application</li> <li>syntactic specific</li> <li>derivation and pa</li> </ul> Basic Parsing To parsing, top down efficient Parsers <ul> <li>constructing SLF</li> <li>Constructing LA</li> <li>parser generator,</li> <li>Syntax-directed</li> <li>Implementation</li> <li>notation, Parse trianslation of as</li> </ul>	gular express DFA-Based l-analyzer g to syntax a cation of pr rse trees, cap echniques: I wn parsing, : LR parse R parsing ta LR parsing ta implementat Translati of Syntax-d ees & synta signment st	Phases and passes, Bootstrapping, Finite state assions and their applications to lexical analysis, d Pattern Matchers implementation of lexical enerator, LEX compiler, Formal grammars and analysis, BNF notation, ambiguity, YACC. The ogramming languages: Context free grammars, pabilities of CFG. Parsers, Shift reduce parsing, operator precedence predictive parsers Automatic Construction of rrs, the canonical Collection of LR(0) items, bles, constructing Canonical LR parsing tables, tables, using ambiguous grammars, an automatic tion of LR parsing tables. ion: Syntax-directed Translation schemes, lirected Translators, Intermediate code, postfix ax trees, three address code, quadruple & triples,	Lectures Allotted 08 08



	•
parser. More about translation: Array references in arithmetic expre	essions,
procedures call, declarations and case statements.IVSymbol Tables: Data structure for symbols tables, representing	00
information. Run- Time Administration: Implementation of simple allocation scheme, storage allocation in block structured language	
Detection & Recovery: Lexical Phase errors, syntactic	
phase errors semantic errors.	
V         Code Generation: Design Issues, the Target Language. Addresses	in the <b>08</b>
Target Code, Basic Blocks and Flow Graphs, Optimization of Basic	
Code Generator. Code optimization: Machine-Independent Optimiz	
Loop optimization, DAG representation of basic blocks, value numb	
algebraic laws, Global Data-Flow analysis.	
Text Book:	
1. K. Muneeswaran, Compiler Design, First Edition, Oxford University Press.	
2. J.P. Bennet, "Introduction to Compiler Techniques", Second Edition, Tata Mc	Graw-Hill, 2003.
3. HenkAlblas and Albert Nymeyer, "Practice and Principles of Compiler	
PHI,2001.	e ,
Reference Book:	
1. Aho, Sethi & Ullman, "Compilers: Principles, Techniques and Tools", Pearso	n Education
2. V Raghvan, "Principles of Compiler Design", TMH	
3. Kenneth Louden," Compiler Construction", Cengage Learning.	
4. Charles Fischer and Ricard Le Blanc," Crafting a Compiler	
Evaluation/Assessment Methodology	ſ
	Max. Marks 100
1) Classtasks/Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
5) Seminar On Research Project Report	7.5
6) ESE	75
Total:	100
Prerequisites for the course: NIL	
<b>Course Learning Outcomes:</b>	ma aman handlina
CO1: Explain the concepts and different phases of compilation with compile tin CO2: Represent language tokens using regular expressions, context free	
automata and design lexical analyzer for a language.	grammar and mille
CO3: Compare top down with bottom-up parsers, and develop appropriate pa	rser to produce parse
tree representation of the input.	iser to produce parse
CO4: Generate intermediate code for statements in high level language.	
CO5: Design syntax directed translation schemes for a given context free gran	umar. Generation and
techniques used for code optimization.	innur. Generation and
wominques used for code optimization.	



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	Tag Libraries.		
I	V Spring: Spring Core Basics-Spring Dependency Injection	-	08
	Introduction to Design patterns, Factory Design Pattern, Strateg		
	pattern, Spring Inversion of Control, AOP, Bean Scopes- Singleton,		
	Request, Session, Application, Web Socket, Auto wiring, Annotat	lons, Life	
	Cycle Call backs, Bean Configuration styles		
	V Spring Boot: Spring Boot- Spring Boot Configuration, Spr	0	08
	Annotations, Spring Boot Actuator, Spring Boot Build Systems, Sp		
	Code Structure, Spring Boot Runners, Logger, BUILDING RESTF	UL WEB	
	SERVICES, Rest		
	Controller, Request Mapping, Request Body, Path Variable,	Request	
	Parameter, GET, POST, PUT, DELETE APIs, Build Web Applicatio	ns	
	t Book:		
	Burdman, Jessica, "Collaborative Web Development" Addison Wesley		
2.	Xavier, C, "Web Technology and Design", New Age International		
3.	Ivan Bayross," HTML, DHTML, Java Script, Perl & CGI", BPBPublication	1	
-	erence Book:		
	Bhave, "Programming with Java", Pearson Education		
	Hans Bergsten, "Java Server Pages", SPD O'Reilly		
3.	Naughton, Schildt, "The Complete Reference JAVA2", TMH		
	Evaluation/Assessment Methodology		
		Max.	Marks 100
	Classtasks/Sessional Examination		15
2)	Presentations /Seminar		
3)	Assignments		
4)	Research Project Report		10
	Seminar On Research Project Report		
6)	ESE		75
	Total		100
	erequisites for the course: NIL		
Coi	Irse Learning Outcomes:		
	D1: Students are able to develop a dynamic webpage by the use of java scr	pt and DH	TML.
	D2: Students will be able to write a well-formed / valid XML document.		
C	D3: Students will be able to connect a java program to a DBMS and per	form insert	, update and
	delete operations on DBMS table.		
C	D4: Students will be able to write a server side java application called Se	cvlet to cate	ch form data
	sent from client, process it and store it on database.		
C	D5: Students will be able to write a server-side java application called JSF	to catch fo	orm data sent
1	from client and store it on database		

from client and store it on database.



Program	mme: Degree		Year: II	
0	MCA(AIML)		Semester: III	
Credits	· /	Rig Data	Semester. m	
Theory:	-	ng Data		
Course		Data		
MCA-02	Ū	Data		
	Objectives:			
	· ·	edge of Big	Data Analytics concepts and its applications in bu	siness
		0 0	ponents of Map Reduce Framework and HDFS.	5111055.
	Develop queries in			
			Map Reduce based distributed processing application	ons
			applications using HBASE, Hive, Pig etc.	0115.
	of Paper: DSE	ae veroping (		
	<b>A</b>	/Credits:40	0% Marks (ISE+ESE)	
L:3			(	
T:1				
	Hours/Week)			
	1Hr.=1Credit			
-	l-2Hrs.=1Credit(4H	Irs./Week=4	4Credits)	
Unit			Contents	No. of
				Lectures
				Allotted
Ι	Introduction to	Big Data:	Types of digital data, history of Big Data	08
	innovation, introd	luction to B	ig Data platform, drivers for Big Data, Big Data	
	architecture and	characterist	tics, 5 Vs of Big Data, Big Data technology	
	components, Big	Data impo	ortance and applications, Big Data features -	
			g and protection, Big Data privacy and ethics,	
			nges of conventional systems, intelligent data	
	analysis, nature of	· · · ·	1	
			ng, modern data analytic tools.	
II	· · ·	-	o, Apache Hadoop, the Hadoop Distributed File	08
	• • •		oop, data format, analyzing data with Hadoop,	
	-	-	g, Hadoop pipes, Hadoop Echo System.	
	-	-	framework and basics, how Map Reduce works,	
		· •	oplication, unit tests with MR unit, test data and	
		• •	Reduce job run, failures, job scheduling, shuffle	
		ecution, Ma	p Reduce types, input formats, output formats,	
	Map Reduce		1	
111	features, Real-wo	-		
III			ed File System): Design of HDFS, HDFS	08
	concepts, benefits	and challer	nges, file sizes, block sizes and block abstraction	
	_	1. /. 1		
	in HDFS, data re	L ·	ow does HDFS store, read, and write files, Java	
	in HDFS, data re interfaces to HDI	FS, commar	ow does HDFS store, read, and write files, Java and line interface, Hadoop file system interfaces, lume and Scoop, Hadoop archives, Hadoop I/O:	



	Compression, serialization, Avro and file-based data structures. H	-	
	Environment: Setting up a Hadoop cluster, cluster specification, cluster and installation, Hadoop configuration, security inHadoop, administ	_	
	Hadoop, HDFS monitoring & maintenance, Hadoop benchmarks, Had	-	
	the cloud		
	IV         Hadoop         Eco         System         and         YARN:         Hadoop         ecosystem         component	onents, <b>08</b>	
	schedulers, fair and capacity, Hadoop 2.0 New Features – Name Nod		
	availability, HDFS federation, MRv2, YARN, Running MRv1 in YARN	e	
	<b>No SQL</b> Databases: Introduction to No SQL Mongo DB: Introduction		
	types, creating, updating and deleing documents, querying, introduct		
	indexing, capped collections		
	Spark: Installing spark, spark applications, jobs, stages and tasks, Re	esilient	
	Distributed Databases, anatomy of a Spark job run, Spark on YARN		
	SCALA: Introduction, classes and objects, basic types and operators, b	ouilt-in	
	control structures, functions and closures, inheritance.		
	V Hadoop Eco System Frameworks: Applications on Big Data using Pig	g, Hive <b>08</b>	
	and HBase		
	Pig: Introduction to PIG, Execution Modes of Pig, Comparison of Pi	0	
	Databases, Grunt, Pig Latin, User Defined Functions, Data Proc		
	operators, <b>Hive</b> - Apache Hive architecture and installation, Hive shell		
	services, Hive metastore, comparison with traditional databases, Hi		
	tables, querying data and user defined functions, sorting and aggreg	gating,	
	Map Reduce scripts, joins &s ubqueries.	unnord	
	<b>HBase</b> – Hbase concepts, clients, example, H basevs RDBMS, adv usage, schema design, advance indexing, Zookeeper – how it he		
	monitoring a cluster, how to build applications with Zookeeper. IBI	-	
	Data strategy, introduction to Infosphere, BigInsights and Big S	-	
	introduction to Big SQL.	Jileets,	
Те	xt Book:	I	
1. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging			
	Business Intelligence and Analytic Trends for Today's Businesses", Wiley.		
2.	2. Big-Data Black Book, DT Editorial Services, Wiley.		
3.	Dirk de Roos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch,	"Understanding Big	
Data Analytics for Enterprise Class Hadoop and Streaming Data", McGrawHill.			
Reference Book:			
1.			
	Techniques", Prentice Hall.		
2.	. Bart Baesens "Analytics in a Big Data World: The Essential Guide to Data Science and its		
	Applications (WILEY Big Data Series)", John Wiley & Sons		
3.	3. Arshdeep Bahga, Vijay Madisetti, "Big Data Science & Analytics: A Hands On Approach ",VPT		
	Evaluation/Assessment Methodology Max. Marks 100		
1)	Class tasks/Sessional Examination tasks	15	
$\frac{1}{2}$	Presentations /Seminar	15	
3)	Assignments		
4)	Research Project Report	10	
5)	Seminar On Research Project Report		
6)	ESE	75	
	Total:	100	



Prerequisites for the course: NIL

# Course Learning Outcomes:

CO1: Identify Big Data and its Business Implications.

CO2: List the components of Hadoop and Hadoop Eco-System

CO3: Access and Process Data on Distributed File System

CO4: Manage Job Execution in Hadoop Environment

CO5: Develop Big Data Solutions using Hadoop Eco System



#### **IIMT UNIVERSITY** Year-II/Semester-III

Program	nme: Degree	Year: II	
0	ICA(AIML)	Semester: III	
Credits	Subject: Simulati		
Theory:4	-		
		and Madalling	
Course MCA-02		and modelling	
	Objectives:	· · · · · ·	
	Study the concept of system		
	•	re and techniques of major simulation models.	
		ze the idea of continuous and discrete system	
		tem dynamics and system dynamics diagrams.	
		ation and understanding PERT networks	
	of Paper: DSE		
	m Passing Marks/Credits	:40% Marks (ISE+ESE)	
L:3			
T:1			
P:0(In H	ours/Week)		
Theory-1	1Hr.=1Credit		
Practical	-2Hrs.=1Credit(4Hrs./Weel	x=4Credits)	
Unit		Contents	No. of
			Lectures
			Allotted
Ι	System definition and o	components, stochastic activities, continuous and	08
		modeling, Types of models, static and dynamic	
		and dynamic mathematical models, full corporate	
	model, types of system stu		
II		of simulation, Basic nature of simulation, techniques	08
		n of simulation and analytical methods, types of	
		time simulation, hybrid simulation, simulation of	
	•	erver queuing system and an inventory problem,	
		Distributed Lag model, Cobweb model.	
III		Systems, analog vs digital simulation, simulation of	08
		mulation of a servo system, simulation of an auto-	00
	•	nulation, fixed time step vs. event-to-event model,	
	- ·	bers, test of randomness, Monte-Carlo computation	
	vs. stochastic simulation.	icers, wer or randomness, monte carlo computation	
IV		ential growth models, exponential decay models,	08
		namics diagrams, world model.	vo
V		tworks, critical path computation, uncertainties in	08
<b>v</b>		e allocation and consideration, Simulation languages,	vo
	object-oriented simulation		
Torrt D			
Text Bo		lation? DIH	
	frey Gordon, "System Simulat		
2. Nars	ingn Deo, "System Simulat	ion with digital computer", PHI.	



#### **Reference Book:** 1. Averill M. Law and W. David Kelton, "Simulation Modelling and Analysis", TMH. **Evaluation/Assessment Methodology** Max. Marks 100 1) Class tasks/Sessional Examination 15 2) Presentations /Seminar 3) Assignments 4) Research Project Report 10 5) Seminar On Research Project Report 6) ESE 75 Total: 100 Prerequisites for the course: NIL **Course Learning Outcomes:** CO1: Describe the role of important elements of discrete event simulation and modeling paradigm. CO2: Conceptualize real world situations related to systems development decisions, originating from source requirements and goals. CO3: Interpret the model and apply the results to resolve critical issues in a real world environment. CO4: Apply random number variates to develop simulation models CO5: Analyze output data produced by a model and test validity of the model



Program	mme: De	oree	Year: II	
0	MCA(AII	•	Semester: III	
Credits		, , , , , , , , , , , , , , , , , , , ,	esting & Quality Assurance	
Theory:		Subject Soltmate re		
Course		Title: Software Testi	ng & Quality Assurance	
MCA-02				
	Objectiv	es:		
	U		esting techniques to deliver a product free from bug	IS.
			ect the proper testing technique.	
	0		oncepts and tools and estimation of cost, schedu	ule based on
	standard		1	
CO4: 1	Understa	nd how to detect, class	ify, prevent and remove defects.	
CO5: 0	Choose a	ppropriate quality ass	urance models and develop quality. Ability to co	nduct formal
i	inspection	ns, record and evaluate	e results of inspections.	
Nature	of Paper	: DSE		
Minimu	ım Passi	ng Marks/Credits:40	% Marks (ISE+ESE)	
L:3				
T:1				
P:0(In H	lours/We	ek)		
•	1Hr.=1C			
Practica	1-2Hrs.=1	Credit(4Hrs./Week=4	Credits)	
Unit			Contents	No. of
				Lectures
	~ ~			Allotted
Ι		U	esting as an engineering activity, Role of process	08
			as a process, Basic definitions, Software testing	
			a software development organization, Origins of	
			ne defect repository and test design, Defect	
TT	-	-	support for developing a defect repository.	00
II			evels of Testing: Using White Box Approach to	08
			Vs. Structural Testing, Code Functional Testing,	
		-	Graphs, Using Black Box Approaches to Test	
			ng, Requirements based testing, Decision tables, effect graphing, Error guessing, Compatibility	
		-	Unit Testing, Integration Testing, Defect Bash	
	-		ing - Usability and Accessibility Testing,	
		uration Testing, Comp	• • • • •	
III	_	re Test Automation		08
			or Automation, Scope of Automation, Design and	00
			, Requirements for a Test Tool, Challenges in	
			g, Debugging. Testing Software System Security -	
		U U	xity Metrics and Models, Quality Management	
	Metrics		and models, Quality management	
			Removal Effectiveness, FMEA, Quality Function	
		-	/ Loss Function, Cost of Quality.	
L	p. 0 j		·····, ·····, ·····, ·	BOS



I IV I FUNDAMENTAIS OF SOLIWARE UNAINV ASSURANCE' SUA DASICS COMDO	a a star of	00
IV <b>Fundamentals of Software Quality Assurance:</b> SQA basics, Compose the Software Quality Assurance System activate quality in husiness.		08
the Software Quality Assurance System, software quality in business of a software gradient and process		
planning for software quality assurance, product quality and process	quality,	
software process models, 7 QC Tools and Modern Tools.	0.0000	00
V Software Assurance Models: Models for Quality Assurance, IS		08
series, CMM, CMMI, Test Maturity Models, SPICE, Malcolm E	saldrige	
Model- P- CMM.		
Software Quality Assurance Trends: Software Process- PSP and T		
Methodology, Clean room software engineering, Defect Injection		
prevention, Internal Auditing and Assessments, Inspections & Walkthro	bugns,	
Case Tools and their effect on Software Quality.		
Text Book:		
1. Aditya P. Mathur, "Foundations of Software Testing", Pearson.	-i	
2. Paul Ammann, Jeff Offutt, "Introduction to Software Testing", Cambridge Un		SS.
3. Paul C. Jorgensen, "Software Testing: A Craftsman's Approach", Auerbach P		
4. William Perry, "Effective Methods of Software Testing", Wiley Publishing, 7	I nira Edition	•
Reference Book:	1	<b>11</b> m
1. Renu Rajani, Pradeep Oak, "Software Testing – Effective Methods, Tools a	nd Techniqu	es", Tata
McGraw Hill.	C I T I''	
2. Stephen Kan, "Metrics and Models in Software Quality", Addison – Wesley,	Second Editi	lon.
3. S. A. Kelkar, "Software quality and Testing", PHI Learning Pvt, Ltd. Evaluation/Assessment Methodology		
F.vaiiiation/Assessment_vietnodology		
	May Ma	when 100
	Max. Ma	
1) Class tasks/SessionalExamination	<b>Max. Ma</b> 15	
<ol> <li>Class tasks/SessionalExamination</li> <li>Presentations /Seminar</li> </ol>		
<ol> <li>Class tasks/SessionalExamination</li> <li>Presentations /Seminar</li> <li>Assignments</li> </ol>	15	
<ol> <li>Class tasks/SessionalExamination</li> <li>Presentations /Seminar</li> <li>Assignments</li> <li>Research Project Report</li> </ol>		
<ol> <li>Class tasks/SessionalExamination</li> <li>Presentations /Seminar</li> <li>Assignments</li> <li>Research Project Report</li> <li>Seminar On Research Project Report</li> </ol>	15	)
<ol> <li>Class tasks/SessionalExamination</li> <li>Presentations /Seminar</li> <li>Assignments</li> <li>Research Project Report</li> <li>Seminar On Research Project Report</li> <li>ESE</li> </ol>	15 10 75	)
<ol> <li>Class tasks/SessionalExamination</li> <li>Presentations /Seminar</li> <li>Assignments</li> <li>Research Project Report</li> <li>Seminar On Research Project Report</li> <li>ESE</li> </ol> Total:	15	)
<ol> <li>Class tasks/SessionalExamination</li> <li>Presentations /Seminar</li> <li>Assignments</li> <li>Research Project Report</li> <li>Seminar On Research Project Report</li> <li>ESE</li> </ol> Total:	15 10 75	)
<ol> <li>Class tasks/SessionalExamination</li> <li>Presentations /Seminar</li> <li>Assignments</li> <li>Research Project Report</li> <li>Seminar On Research Project Report</li> <li>ESE</li> </ol> Total: Prerequisites for the course: NIL Course Learning Outcomes:	15 10 75 10	)
<ol> <li>Class tasks/SessionalExamination</li> <li>Presentations /Seminar</li> <li>Assignments</li> <li>Research Project Report</li> <li>Seminar On Research Project Report</li> <li>ESE</li> </ol> Total: Prerequisites for the course: NIL Course Learning Outcomes: CO1: Students learn to apply software testing knowledge and engineering meth	15 10 75 100 nods	)
<ol> <li>Class tasks/SessionalExamination</li> <li>Presentations /Seminar</li> <li>Assignments</li> <li>Research Project Report</li> <li>Seminar On Research Project Report</li> <li>ESE         Total:     </li> <li>Prerequisites for the course: NIL     </li> <li>Course Learning Outcomes:         CO1: Students learn to apply software testing knowledge and engineering meth     </li> <li>CO2: Students understand and identify various software testing problems, and</li> </ol>	15 10 75 100 nods solve these p	)
<ol> <li>Class tasks/SessionalExamination</li> <li>Presentations /Seminar</li> <li>Assignments</li> <li>Research Project Report</li> <li>Seminar On Research Project Report</li> <li>ESE         Total:     </li> <li>Prerequisites for the course: NIL     </li> <li>Course Learning Outcomes:         CO1: Students learn to apply software testing knowledge and engineering meth     </li> <li>CO2: Students understand and identify various software testing problems, and by designing and selecting software test models, criteria, strategies, and provide the statement of the second sec</li></ol>	15 10 75 100 nods solve these p methods	) problems
<ol> <li>Class tasks/SessionalExamination</li> <li>Presentations /Seminar</li> <li>Assignments</li> <li>Research Project Report</li> <li>Seminar On Research Project Report</li> <li>ESE         Total:     </li> <li>Prerequisites for the course: NIL     </li> <li>Course Learning Outcomes:         CO1: Students learn to apply software testing knowledge and engineering meth     </li> <li>CO2: Students understand and identify various software testing problems, and by designing and selecting software test models, criteria, strategies, and r     </li> <li>CO3: Students analyze and understand the use of software testing methods and</li> </ol>	15 10 75 100 nods solve these p methods	) ) problems
<ol> <li>Class tasks/SessionalExamination</li> <li>Presentations /Seminar</li> <li>Assignments</li> <li>Research Project Report</li> <li>Seminar On Research Project Report</li> <li>ESE         Total:     </li> <li>Prerequisites for the course: NIL     </li> <li>Course Learning Outcomes:         CO1: Students learn to apply software testing knowledge and engineering meth     </li> <li>CO2: Students understand and identify various software testing problems, and by designing and selecting software test models, criteria, strategies, and resting tools for their testing projects     </li> </ol>	15 10 75 10 nods solve these p methods modern soft	) problems ware
<ol> <li>Class tasks/SessionalExamination</li> <li>Presentations /Seminar</li> <li>Assignments</li> <li>Research Project Report</li> <li>Seminar On Research Project Report</li> <li>ESE         Total:     </li> <li>Prerequisites for the course: NIL     </li> <li>Course Learning Outcomes:         CO1: Students learn to apply software testing knowledge and engineering meth     </li> <li>CO2: Students understand and identify various software testing problems, and by designing and selecting software test models, criteria, strategies, and testing tools for their testing projects     </li> <li>CO4: Students identify defects and manage those defects for improvement in quantum sectors.</li> </ol>	15 10 75 100 nods solve these p methods modern soft uality for giv	oroblems ware ven
<ol> <li>Class tasks/SessionalExamination</li> <li>Presentations /Seminar</li> <li>Assignments</li> <li>Research Project Report</li> <li>Seminar On Research Project Report</li> <li>ESE         Total:     </li> <li>Prerequisites for the course: NIL     </li> <li>Course Learning Outcomes:         CO1: Students learn to apply software testing knowledge and engineering meth     </li> <li>CO2: Students understand and identify various software testing problems, and by designing and selecting software test models, criteria, strategies, and resting tools for their testing projects     </li> </ol>	15 10 75 100 nods solve these p methods modern soft uality for giv	oroblems ware ven



Progran	nme:Degre	ee	Year: II	
0	ICA(AIML		Semester: III	
Credits		ubject:Digital Imag		
Theory:4		<b>..</b>	6	
Course		Title:Digital Image P	rocessing	
MCA-02		0 0	C	
Course	Objectives	5:		
CO1: E	Explain the	basic concepts of t	wo-dimensional signal acquisition, sampling, qua	ntization and
c	color mode	l.		
CO2 A	Apply imag	ge processing technic	ques for image enhancement in both the spatial and	nd frequency
	lomains.			
		1 0	ration techniques in both spatial and frequency dor	
	-	6	-based segmentation algorithms for ROI extraction	1.
	-	<u> </u>	and descriptors for image processing.	
-	of Paper: 1			
-	m Passing	g Marks/Credits:40	% (ISE+ESE)	
L:3				
T:1				
	lours/Week	,		
-	1Hr.=1Cre			
Practical	1-2Hrs.=1C	Credit(4Hrs./Week=4	Credits)	
Unit			Contents	No. of
				Lectures
				Allotted
Ι	0	e	tals: Steps in Digital Image Processing-	08
			sual Perception-Image Sensing and Acquisition-	
			ation-Relationships between pixels-Color image	
		ntals – RGB, H	·	
	-	ries, 2D transforms -		
II	0	1	atial Domain: Gray level transformations-	08
			s of Spatial Filtering–Smoothing and Sharpening	
	-		Domain: Introduction to Fourier Transform-	
			equency domain filters – Ideal, Butterworth and	
			ic filtering, Color image enhancement.	
III	0	6	estoration – degradation model, Properties, Noise	08
			r Statistics – Adaptive filters – Band reject Filters	
			n Filters – Optimum Notch Filtering – Inverse	
	U	– Wiener filtering		
IV	-		detection, Edge linking via Hough transform -	08
			ed segmentation – Region growing – Region	
			orphological processing- erosion and dilation,	
	-	• •	gical watersheds – basic concepts – Dam	
V		¥	nentation algorithm.	
	I Imaga C	omprossion and Ro	cognition: Need for data compression, Huffman,	08



Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG.
Boundary representation, Boundary description, Fourier Descriptor, Regional
Descriptors – Topological feature, Texture – Patterns and Pattern classes –
Recognition based on matching.

#### Text Book:

- 1. Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", Pearson, Third Edition, 2010.
- 2. Anil K. Jain, "Fundamentals of Digital Image Processing", Pearson, 2002.
- 3. Kenneth R. Castleman, "Digital Image Processing" Pears on, 2006.

#### **Reference Book:**

- 1. D, E. Dudgeon and R M. Mersereau, "Multidimensional Digital Signal Processing", Prentice Hall Professional Technical Reference, 1990.
- 2. William K. Pratt, "Digital Image Processing" John Wiley, New York, 2002.
- 3. Milan Sonka et al, "Image processing, analysis and machine vision Brookes/Cole", Vikas Publishing House, 2nd edition,1999.

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/SessionalExamination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
5) Seminar On Research Project Report	
6) ESE	75
Total:	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO1: Review the fundamental concepts of a digital image processing system.	
CO2: Analyze images in the frequency domain using various transforms.	
CO3: Evaluate the techniques for image enhancement and image restoration.	
CO4: Categorize various compression techniques.	
CO5: Interpret Image compression standards.	



r vorun	nme: Degree	Year: II	
Class: M	ACA(AIML)	Semester: III	
Credits	Sub	oject: Computer Networks	
Theory:4	4Cr		
Course	Code: Titl	e: Computer Networks	
MCA-23	33	-	
	<b>Objectives:</b>		
CO1: I	Describe com	munication models TCP/IP, ISO-OSI model, network topologies	along with
		ng devices and connecting media.	
CO2: A	Apply knowle	edge of error detection, correction and learn concepts of flow control	ol along with
	error control.		
CO3: 0	Classify varie	ous IP addressing techniques, subnetting along with network routi	ng protocols
a	and algorithm	S.	
CO4: U	Jnderstand v	various transport layer protocols and their design considerations	along with
	U	ntrol to maintain Quality of Service.	
		applications-layer protocols and elementary standards of crypto	ography and
	network secur		
Nature	of Paper: Co	re Course	
Minimu	m Passing N	Iarks/Credits:40% Marks (ISE+ESE)	
L:4			
T:0			
P:0(In H	ours/Week)		
Theory-1	1Hr.=1Credit		
Practical	-2Hrs.=1Cre	dit(4Hrs./Week=4Credits)	
Unit		Contents	
			No. of
			No. of Lectures
т			
Ι	Data Co	mmunications: Introduction: Data communication	Lectures
		<b>ommunications</b> : Introduction: Data communication s and characteristics, Data representation and Dataflow.	Lectures Allotted
	Component		Lectures Allotted
	Component Networks:	s and characteristics, Data representation and Dataflow.	Lectures Allotted
	Component Networks: Protocols a	s and characteristics, Data representation and Dataflow. LAN, WAN, MAN, Topologies.	Lectures Allotted
	Component Networks: Protocols a Connecting	s and characteristics, Data representation and Dataflow. LAN, WAN, MAN, Topologies. and Standards: ISO-OSI model and TCP-IP Model. Network	Lectures Allotted
	Component Networks: Protocols a Connecting Transmissi	s and characteristics, Data representation and Dataflow. LAN, WAN, MAN, Topologies. and Standards: ISO-OSI model and TCP-IP Model. Network g Devices: HUB, Bridge, Switch, Router and Gateways.	Lectures Allotted
I	Component Networks: Protocols a Connecting Transmissi	s and characteristics, Data representation and Dataflow. LAN, WAN, MAN, Topologies. and Standards: ISO-OSI model and TCP-IP Model. Network g Devices: HUB, Bridge, Switch, Router and Gateways. on Media: Guided and unguided Media on and Arrangement: Wired LANs and Wireless LANs	Lectures Allotted
	Component Networks: Protocols a Connecting Transmissi Classificati Data Link Error Det	s and characteristics, Data representation and Dataflow. LAN, WAN, MAN, Topologies. and Standards: ISO-OSI model and TCP-IP Model. Network g Devices: HUB, Bridge, Switch, Router and Gateways. on Media: Guided and unguided Media on and Arrangement: Wired LANs and Wireless LANs Layer: ection and Error Correction: Types of errors, LRC, VRC,	Lectures Allotted 08
	Component Networks: Protocols a Connecting Transmissi Classificati Data Link Error Det Checksum,	s and characteristics, Data representation and Dataflow. LAN, WAN, MAN, Topologies. and Standards: ISO-OSI model and TCP-IP Model. Network g Devices: HUB, Bridge, Switch, Router and Gateways. on Media: Guided and unguided Media on and Arrangement: Wired LANs and Wireless LANs Layer: ection and Error Correction: Types of errors, LRC, VRC, CRC, and Hamming Code.	Lectures Allotted 08
	Component Networks: Protocols a Connecting Transmissi Classificati Data Link Error Det Checksum, Flow Cont	s and characteristics, Data representation and Dataflow. LAN, WAN, MAN, Topologies. and Standards: ISO-OSI model and TCP-IP Model. Network g Devices: HUB, Bridge, Switch, Router and Gateways. on Media: Guided and unguided Media on and Arrangement: Wired LANs and Wireless LANs Layer: ection and Error Correction: Types of errors, LRC, VRC, CRC, and Hamming Code. rol and Error Control: Stop and Wait Protocol, Sliding Window,	Lectures Allotted 08
	Component Networks: Protocols a Connecting Transmissi Classificati Data Link Error Det Checksum, Flow Contr Go-back-N-	s and characteristics, Data representation and Dataflow. LAN, WAN, MAN, Topologies. and Standards: ISO-OSI model and TCP-IP Model. Network g Devices: HUB, Bridge, Switch, Router and Gateways. on Media: Guided and unguided Media on and Arrangement: Wired LANs and Wireless LANs Layer: ection and Error Correction: Types of errors, LRC, VRC, CRC, and Hamming Code. rol and Error Control: Stop and Wait Protocol, Sliding Window, ARQ Protocol and Selective-Repeat ARQ Protocol.	Lectures Allotted 08
	Component Networks: Protocols a Connecting Transmissi Classificati Data Link Error Det Checksum, Flow Contr Go-back-N-	s and characteristics, Data representation and Dataflow. LAN, WAN, MAN, Topologies. and Standards: ISO-OSI model and TCP-IP Model. Network g Devices: HUB, Bridge, Switch, Router and Gateways. on Media: Guided and unguided Media on and Arrangement: Wired LANs and Wireless LANs Layer: ection and Error Correction: Types of errors, LRC, VRC, CRC, and Hamming Code. rol and Error Control: Stop and Wait Protocol, Sliding Window,	Lectures Allotted 08
	Component Networks: Protocols a Connecting Transmissi Classificati Data Link Error Det Checksum, Flow Contr Go-back-N- Channel	s and characteristics, Data representation and Dataflow. LAN, WAN, MAN, Topologies. and Standards: ISO-OSI model and TCP-IP Model. Network g Devices: HUB, Bridge, Switch, Router and Gateways. on Media: Guided and unguided Media on and Arrangement: Wired LANs and Wireless LANs Layer: ection and Error Correction: Types of errors, LRC, VRC, CRC, and Hamming Code. rol and Error Control: Stop and Wait Protocol, Sliding Window, ARQ Protocol and Selective-Repeat ARQ Protocol.	Lectures Allotted 08
	Component Networks: Protocols a Connecting Transmissi Classificati Data Link Error Dete Checksum, Flow Contr Go-back-N- Channel Channelizat	s and characteristics, Data representation and Dataflow. LAN, WAN, MAN, Topologies. and Standards: ISO-OSI model and TCP-IP Model. Network g Devices: HUB, Bridge, Switch, Router and Gateways. on Media: Guided and unguided Media on and Arrangement: Wired LANs and Wireless LANs Layer: ection and Error Correction: Types of errors, LRC, VRC, CRC, and Hamming Code. rol and Error Control: Stop and Wait Protocol, Sliding Window, ARQ Protocol and Selective-Repeat ARQ Protocol. Allocation Protocols: Random Access, Controlled and	Lectures Allotted 08
	Component Networks: Protocols a Connecting Transmissi Classificati Data Link Error Dete Checksum, Flow Contr Go-back-N- Channel Channelizat	s and characteristics, Data representation and Dataflow. LAN, WAN, MAN, Topologies. and Standards: ISO-OSI model and TCP-IP Model. Network g Devices: HUB, Bridge, Switch, Router and Gateways. on Media: Guided and unguided Media on and Arrangement: Wired LANs and Wireless LANs Layer: ection and Error Correction: Types of errors, LRC, VRC, CRC, and Hamming Code. rol and Error Control: Stop and Wait Protocol, Sliding Window, ARQ Protocol and Selective-Repeat ARQ Protocol. Allocation Protocols: Random Access, Controlled and ion techniques such as ALOHA, CSMA, CSMA/CD, CDMA/CA, MA, Token Passing, etc.	Lectures Allotted 08



Message Switching.	
Logical addressing: IPv4 and IPv6 Address schemes, Classe	es and
subnetting	
Network Layer Protocols: ARP, RARP, BOOTP and DHCP	
Routing Techniques: Interdomain and Intradomain routing with examp	ples.
IV Transport Layer:	08
Introduction to Transport Layer: Process-to-Process I	Delivery:
Reliable and unreliable Connection, Port and Socket Addressing	
Transport Layer Protocols with packet formats: User Datagram	Protocol
(UDP), Transmission Control Protocol (TCP), Stream Control Tran	
Protocol (SCTP).	
<b>Congestion Control:</b> Techniques for handling the Congestion Control.	
Quality of Service (QoS): Flow Characteristics and techniques to	
QoS.	1
V Application Layer:	08
Basic Concept of Application Layer: Domain Name System, Worl	d Wide
Web, Hyper Text Transfer Protocol, Electronic mail, File Transfer P	
Remote login.	,
Introduction to Cryptography: Definition, Goal, Applications, A	Attacks,
Encryption, decryption, public-key and private key cryptography.	
Text Book:	
1. BehrouzForouzan, "Data Communication and Networking", McGraw Hill	
2. Andrew Tanenbaum "Computer Networks", PrenticeHall.	
3. William Stallings, "Data and Computer Communication", Pearson.	
Reference Book:	
1. Kurose and Ross, "Computer Networking- A Top-Down Approach", Pearson	
2. Peterson and Davie, "Computer Networks: A Systems Approach", Morgan K	
3. W. A. Shay, "Understanding Communications and Networks", Cengage Lear	
4. D. Comer, "Computer Networks and Internets", Pearson.	e
5. BehrouzForouzan, "TCP/IP Protocol Suite", McGraw Hill.	
Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/Sessional Examination	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
5) Seminar On Research Project Report	
6) ESE	75
Total:	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO1: Understand Basics of Computer Networks and different Transmission M	edia.
CO2: Differentiate Protocols which play a major role in providing internet effe	
CO3: Understand various protocol layers and inner operations.	2
CO4: Understand architectures of network protocols.	
CO5: Understand security issues in network protocols.	
The second s	



Progra	mme: De	gree	Year: II	
0	MCA(AII	•	Semester: III	
Credit		Subject: Machine Le	earning	
Theory				
	e Code:	Title: Machine Learn	ing	
MCA-2				
	e Objectiv			
			hine learning for various problem solving	
		•	f learning algorithms and how to evaluate models g	enerated
	from data			
		stand the latest trends i		
	-	appropriate machine	learning algorithms and apply the algorithms to a re	eal-world
	problem		1	
CO5:	-		and report on the expected accuracy that can be ac	hieved by
NT - 4		the models		
	<u> </u>	Core Course		
	um Passi	ng Marks/Credits:40	% Marks (ISE+ESE)	
L:3				
T:1	[]	a1.		
<b>`</b>	Hours/We	,		
•	-1Hr.=1C	rean Credit(4Hrs./Week=4	Credita	
Unit	$a_1 - 2\pi_1 s =$	$1 Clean(4 \Pi S.) week=4$	Contents	No. o
Unit			Contents	fLectures
				Allotted
Ι	Python	for Machine Learnin	g:	08
	Why py	thon? Python Syntax,	Data types in python – integers, floats, complex,	
	strings,	bools, Type casting	and I/O operations, Introduction to lists, Flow	
	control	statements - if, elif,	, else, for, while, break, continue, pass, Data	
	Structur	es – list, set, tuples,	dictionaries., Loops with iterables, Functions -	
	with/wit	hout arguments, with/	/without return, Reading and writing files - text	
	and pick			
		cal Python for Machi	5	
			arrays – data types, shape, size., Indexing and	
	0	•	. Operation on 1-dimensional arrays – sum, mean,	
			2-dimensonal arrays., 2-dimensonal arrays –	
	-	-	ndexing, custom indexing., Reshaping arrays.,	
			rrays (rowise, column wise and overall) – sum,	
		•	rgmin., Mathematical operations and universal	
		· · ·	rays – ones, zeros, empty, diagonal. Saving and	
тт	-	numpy arrays.	tion Introduction to norder Deader and C	00
II		_	ation: Introduction to pandas. Pandas series from ation on numpy series., Pandas data frame-	08
1			allon on numpy series Pandas data trame	
	multidin	nensional list, numpy.	nd array, dictionary. Data and time series., Data , iat., Data frame – info, describe, mean, median,	



	mode, apply,. Matplotlib and seaborn – linear plot and scatter plot., Histogram, bar and count plots., Seaborn scatter and joint plot., Strip plot, box and whisker	
	plot, violin plot., Plots with pandas – line and scatter plots, Imputation of	
	missing values manually with pandas.	
	<b>Exploratory Data Analysis (EDA):</b> What is EDA? And why? Population and	
	Sample (sampling), Central Limit Theorem., One sample test – t-test, z-test.,	
	Two sample test – z-test, t-test (paired and independent), Multiple sample test –	
	Analysis of Variance (ANOVA), Goodness of Fitness.	
III	Introduction to Machine Learning: What is machine learning? Evaluation and	08
	Application., Types – supervised, unsupervised, semi- supervised, and	
	reinforcement, Supervised – regression and classification, Unsupervised –	
	Clustering and Outlier detection, Use of machine learning in Google, Facebook,	
	Amazon, LinkedIn, Machine learning in Agriculture and Healthcare	
	Industry,Weather forecasting with Machine Learning.	
IV	Supervised Machine Learning: Linear Regression – Sample data, Split dataset	08
	- Train and Test, Underfitting and Overfitting, Linear Regression on scikit-learn	
	toy dataset, Feature selection (for regression) with correlation, f-regression	
	score, mutual info regression score, Logistic Regression on iris dataset (and	
	pairplot), Feature selection (for classification) with correlation, chi2 score, f	
	classif score, mutual info classif score, K-Nearest Neighbor (KNN) on Bank	
	Marketing Dataset, Decision trees – telecom churn dataset, Naive bayes	
	classifier and Support Vector Machine (SVM), Ensemble Methods - Gradient	
	Boosting and Ada Boost. Cross-validation and Grid Search CV, Saving ML	
	model with pickle, Data imputation with machine learning algorithm.	
	Unsupervised Machine Learning: Clustering with K-Means, Elbow Method,	
	Silhouette score, K-Means vs K-Mini Batch, K-Means vs C-Means.,	
	Hierarchical Clustering., Outlier detection – Local Outlier Factor (LOF).	
	Density-Based Spatial Clustering of Applications with Noise (DBSCAN),	
17	Introduction to Market Basket Analysis.	00
V	<b>Time Series Analysis (TSA):</b> Introduction to TSA, Autoregression (AR).	08
	Moving Average (MA), Autoregressive Moving Average (ARMA), Autoregressive Integrated Moving Average (ARIMA).	
	(AKIVIA), AUTOREGRESSIVE INTEGRATED WITCHING AVERAGE (AKIVIA).	

1. Tom M. Mitchell, —Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.

2. Ethem Alpaydin, —Introduction to Machine Learning (Adaptive Computation and Machine Learning), MIT Press 2004.

3. Stephen Marsland, —Machine Learning: An Algorithmic Perspective, CRC Press,2009.

# **Reference Book:**

- 1. Bishop, C., Pattern Recognition and Machine Learning. Berlin: Springer- Verlag.5.
- 2. M. Gopal, "Applied Machine Learning", McGraw Hill Education

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/Sessional Examination tasks	15
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
5) Seminar On Research Project Report	
6) ESE	75



Total:100Prerequisites for the course: NILImage: Course Learning Outcomes:<br/>CO1: Recognize the characteristics of machine learning strategies.<br/>CO2: Apply various supervised learning methods to appropriate problems.Image: Course Learning Strategies.

CO3: Identify and integrate more than one technique to enhance the performance of learning.

CO4: Create probabilistic and unsupervised learning models for handling unknown pattern.

CO5: Analyze the co-occurrence of data to find interesting frequent patterns.



	nme: Degree Year: II	
0	MCA(AIML) Semester: III	
Credits		
Theory:		
Course		
MCA-23	e	
	Objectives:	
-	Fo understand the basic theory underlying machine learning	
	Fo understand the concept of Artificial intelligence and Natural Language Processi	ng
	Γο understand a range of machine learning algorithms along with their st	
	veaknesses.	ienguis and
	Apply machine learning algorithms to solve problems of moderate complexity	
	Fo understand the use of Neural Network in Machine learning.	
	of Paper: Core Course	
	m Passing Marks/Credits:40% Marks (ISE+ESE)	
L:3 T:1		
<b>`</b>	lours/Week)	
	1Hr.=1Credit	
	I-2Hrs.=1Credit(4Hrs./Week=4Credits)	Nas
Unit	Contents	No. of
		Lectures
T		Allotted
Ι	Introduction to Artificial Intelligence (theoretical):	08
1	Defining Artificial Intelligence, history of AI, machine learning vs artificial	
	intelligence, cloud and AI, industrial use cases and real-world applications,	
	intelligence, cloud and AI, industrial use cases and real-world applications, areas where AI lacks, the future of AI - benefits and disadvantages.	
II	intelligence, cloud and AI, industrial use cases and real-world applications, areas where AI lacks, the future of AI - benefits and disadvantages. Introduction to Natural Language Processing:	08
II	<ul> <li>intelligence, cloud and AI, industrial use cases and real-world applications, areas where AI lacks, the future of AI - benefits and disadvantages.</li> <li>Introduction to Natural Language Processing:</li> <li>What is NLP, corpus, text cleaning and pre-processing in python (re and string</li> </ul>	08
II	<ul> <li>intelligence, cloud and AI, industrial use cases and real-world applications, areas where AI lacks, the future of AI - benefits and disadvantages.</li> <li><b>Introduction to Natural Language Processing:</b></li> <li>What is NLP, corpus, text cleaning and pre-processing in python (re and string modules), bags of words, tokenization – count and TF-IDF (Term Frequency -</li> </ul>	08
II	<ul> <li>intelligence, cloud and AI, industrial use cases and real-world applications, areas where AI lacks, the future of AI - benefits and disadvantages.</li> <li><b>Introduction to Natural Language Processing:</b></li> <li>What is NLP, corpus, text cleaning and pre-processing in python (re and string modules), bags of words, tokenization – count and TF-IDF (Term Frequency - Inverse Document Frequency) to kenizer, stop words and filtering of</li> </ul>	08
II	<ul> <li>intelligence, cloud and AI, industrial use cases and real-world applications, areas where AI lacks, the future of AI - benefits and disadvantages.</li> <li><b>Introduction to Natural Language Processing:</b></li> <li>What is NLP, corpus, text cleaning and pre-processing in python (re and string modules), bags of words, tokenization – count and TF-IDF (Term Frequency - Inverse Document Frequency) to kenizer, stop words and filtering of stopwords, introduction to 20 newsgroups dataset, classification (text) on 20</li> </ul>	08
	<ul> <li>intelligence, cloud and AI, industrial use cases and real-world applications, areas where AI lacks, the future of AI - benefits and disadvantages.</li> <li><b>Introduction to Natural Language Processing:</b></li> <li>What is NLP, corpus, text cleaning and pre-processing in python (re and string modules), bags of words, tokenization – count and TF-IDF (Term Frequency - Inverse Document Frequency) to kenizer, stop words and filtering of stopwords, introduction to 20 newsgroups dataset, classification (text) on 20 newsgroups dataset.</li> </ul>	
II	<ul> <li>intelligence, cloud and AI, industrial use cases and real-world applications, areas where AI lacks, the future of AI - benefits and disadvantages.</li> <li><b>Introduction to Natural Language Processing:</b></li> <li>What is NLP, corpus, text cleaning and pre-processing in python (re and string modules), bags of words, tokenization – count and TF-IDF (Term Frequency - Inverse Document Frequency) to kenizer, stop words and filtering of stopwords, introduction to 20 newsgroups dataset, classification (text) on 20 newsgroups dataset.</li> <li><b>Advance Natural Language Processing:</b></li> </ul>	08
	<ul> <li>intelligence, cloud and AI, industrial use cases and real-world applications, areas where AI lacks, the future of AI - benefits and disadvantages.</li> <li><b>Introduction to Natural Language Processing:</b></li> <li>What is NLP, corpus, text cleaning and pre-processing in python (re and string modules), bags of words, tokenization – count and TF-IDF (Term Frequency - Inverse Document Frequency) to kenizer, stop words and filtering of stopwords, introduction to 20 newsgroups dataset, classification (text) on 20 newsgroups dataset.</li> <li><b>Advance Natural Language Processing:</b></li> <li>Natural Language Toolkit (NLTK), accessing text corpora, lexical resources in</li> </ul>	
	<ul> <li>intelligence, cloud and AI, industrial use cases and real-world applications, areas where AI lacks, the future of AI - benefits and disadvantages.</li> <li><b>Introduction to Natural Language Processing:</b></li> <li>What is NLP, corpus, text cleaning and pre-processing in python (re and string modules), bags of words, tokenization – count and TF-IDF (Term Frequency - Inverse Document Frequency) to kenizer, stop words and filtering of stopwords, introduction to 20 newsgroups dataset, classification (text) on 20 newsgroups dataset.</li> <li><b>Advance Natural Language Processing:</b></li> <li>Natural Language Toolkit (NLTK), accessing text corpora, lexical resources in NLTK, word and sentence tokenization, frequency distribution word</li> </ul>	
	<ul> <li>intelligence, cloud and AI, industrial use cases and real-world applications, areas where AI lacks, the future of AI - benefits and disadvantages.</li> <li><b>Introduction to Natural Language Processing:</b></li> <li>What is NLP, corpus, text cleaning and pre-processing in python (re and string modules), bags of words, tokenization – count and TF-IDF (Term Frequency - Inverse Document Frequency) to kenizer, stop words and filtering of stopwords, introduction to 20 newsgroups dataset, classification (text) on 20 newsgroups dataset.</li> <li><b>Advance Natural Language Processing:</b></li> <li>Natural Language Toolkit (NLTK), accessing text corpora, lexical resources in NLTK, word and sentence tokenization, frequency distribution word frequency distribution (FreqDist), word stemming and Porter Stemmer, lexical</li> </ul>	
	<ul> <li>intelligence, cloud and AI, industrial use cases and real-world applications, areas where AI lacks, the future of AI - benefits and disadvantages.</li> <li><b>Introduction to Natural Language Processing:</b></li> <li>What is NLP, corpus, text cleaning and pre-processing in python (re and string modules), bags of words, tokenization – count and TF-IDF (Term Frequency - Inverse Document Frequency) to kenizer, stop words and filtering of stopwords, introduction to 20 newsgroups dataset, classification (text) on 20 newsgroups dataset.</li> <li><b>Advance Natural Language Processing:</b></li> <li>Natural Language Toolkit (NLTK), accessing text corpora, lexical resources in NLTK, word and sentence tokenization, frequency distribution word frequency distribution (FreqDist), word stemming and Porter Stemmer, lexical database – wordnet, synsets, lemma and lemmatization, wordnet lemmatizer,</li> </ul>	
	<ul> <li>intelligence, cloud and AI, industrial use cases and real-world applications, areas where AI lacks, the future of AI - benefits and disadvantages.</li> <li><b>Introduction to Natural Language Processing:</b></li> <li>What is NLP, corpus, text cleaning and pre-processing in python (re and string modules), bags of words, tokenization – count and TF-IDF (Term Frequency - Inverse Document Frequency) to kenizer, stop words and filtering of stopwords, introduction to 20 newsgroups dataset, classification (text) on 20 newsgroups dataset.</li> <li><b>Advance Natural Language Processing:</b></li> <li>Natural Language Toolkit (NLTK), accessing text corpora, lexical resources in NLTK, word and sentence tokenization, frequency distribution word frequency distribution (FreqDist), word stemming and Porter Stemmer, lexical database – wordnet, synsets, lemma and lemmatization, wordnet lemmatizer, sentiment analysis (on twitter dataset) and subjectivity, analysing text and</li> </ul>	
III	<ul> <li>intelligence, cloud and AI, industrial use cases and real-world applications, areas where AI lacks, the future of AI - benefits and disadvantages.</li> <li><b>Introduction to Natural Language Processing:</b> What is NLP, corpus, text cleaning and pre-processing in python (re and string modules), bags of words, tokenization – count and TF-IDF (Term Frequency - Inverse Document Frequency) to kenizer, stop words and filtering of stopwords, introduction to 20 newsgroups dataset, classification (text) on 20 newsgroups dataset. </li> <li><b>Advance Natural Language Processing:</b> Natural Language Toolkit (NLTK), accessing text corpora, lexical resources in NLTK, word and sentence tokenization, frequency distribution word frequency distribution (FreqDist), word stemming and Porter Stemmer, lexical database – wordnet, synsets, lemma and lemmatization, wordnet lemmatizer, sentiment analysis (on twitter dataset) and subjectivity, analysing text and word similarity, analysing meaning of words and sentences </li> </ul>	08
	<ul> <li>intelligence, cloud and AI, industrial use cases and real-world applications, areas where AI lacks, the future of AI - benefits and disadvantages.</li> <li><b>Introduction to Natural Language Processing:</b> What is NLP, corpus, text cleaning and pre-processing in python (re and string modules), bags of words, tokenization – count and TF-IDF (Term Frequency - Inverse Document Frequency) to kenizer, stop words and filtering of stopwords, introduction to 20 newsgroups dataset, classification (text) on 20 newsgroups dataset. </li> <li><b>Advance Natural Language Processing:</b> Natural Language Toolkit (NLTK), accessing text corpora, lexical resources in NLTK, word and sentence tokenization, frequency distribution word frequency distribution (FreqDist), word stemming and Porter Stemmer, lexical database – wordnet, synsets, lemma and lemmatization, wordnet lemmatizer, sentiment analysis (on twitter dataset) and subjectivity, analysing text and word similarity, analysing meaning of words and sentences </li> </ul>	
III	<ul> <li>intelligence, cloud and AI, industrial use cases and real-world applications, areas where AI lacks, the future of AI - benefits and disadvantages.</li> <li><b>Introduction to Natural Language Processing:</b></li> <li>What is NLP, corpus, text cleaning and pre-processing in python (re and string modules), bags of words, tokenization – count and TF-IDF (Term Frequency - Inverse Document Frequency) to kenizer, stop words and filtering of stopwords, introduction to 20 newsgroups dataset, classification (text) on 20 newsgroups dataset.</li> <li><b>Advance Natural Language Processing:</b></li> <li>Natural Language Toolkit (NLTK), accessing text corpora, lexical resources in NLTK, word and sentence tokenization, frequency distribution word frequency distribution (FreqDist), word stemming and Porter Stemmer, lexical database – wordnet, synsets, lemma and lemmatization, wordnet lemmatizer, sentiment analysis (on twitter dataset) and subjectivity, analysing text and word similarity, analysing meaning of words and sentences</li> <li><b>Introduction to Neural Networks (NN):</b></li> <li>Perceptron and neural network, multi-layer perceptron classifier and regressor,</li> </ul>	08
III	<ul> <li>intelligence, cloud and AI, industrial use cases and real-world applications, areas where AI lacks, the future of AI - benefits and disadvantages.</li> <li><b>Introduction to Natural Language Processing:</b> What is NLP, corpus, text cleaning and pre-processing in python (re and string modules), bags of words, tokenization – count and TF-IDF (Term Frequency - Inverse Document Frequency) to kenizer, stop words and filtering of stopwords, introduction to 20 newsgroups dataset, classification (text) on 20 newsgroups dataset. </li> <li><b>Advance Natural Language Processing:</b> Natural Language Toolkit (NLTK), accessing text corpora, lexical resources in NLTK, word and sentence tokenization, frequency distribution word frequency distribution (FreqDist), word stemming and Porter Stemmer, lexical database – wordnet, synsets, lemma and lemmatization, wordnet lemmatizer, sentiment analysis (on twitter dataset) and subjectivity, analysing text and word similarity, analysing meaning of words and sentences </li> </ul>	08



neural network layers - dense and flatten, image classification usi	ng deep	
neural network.		
V Convolution Neural Networks (CNN):		
Understanding convolution, more deep neural network layers – convolution, dropout and batch normalization, activations – relu, softm sigmoid and activation layer, image classification using convolution network (CNN), overfitting and underfitting in CNN, pre-processing types of models (in TensorFlow) – sequential and functional, transfer leand model deployment.	ax and neural layers,	
Text Book:		
1. Tom M. Mitchell, —Machine Learning, McGraw-Hill Education (India) Priva	te Limited, 2013.	
2. Ethem Alpaydin, —Introduction to Machine Learning (Adaptive Compu		
Learning), MIT Press 2004.		
Reference Book:		
1. Stephen Marsland, Machine Learning: An Algorithmic Perspective, CRC P	ress, 2009.	
Evaluation/Assessment Methodology		
	Max. Marks 100	
1) Class tasks/Sessional Examination	15	
2) Presentations /Seminar		
3) Assignments		
4) Research Project Report	10	
5) Saminar On Pasaarah Project Panart	1	

5) Seminar On Research Project Report

6) ESE

Prerequisites for the course: NIL

#### **Course Learning Outcomes:**

CO1: Recognize the characteristics of machine learning strategies.

- CO2: Apply various supervised learning methods to appropriate problems.
- CO3: Identify and integrate more than one technique to enhance the performance of learning.
- CO4: Create probabilistic and unsupervised learning models for handling unknown pattern.

CO5: Analyze the co-occurrence of data to find interesting frequent patterns.

75

100

Total:



#### IIMT UNIVERSITY Year-II/Semester-III

Progra	amme: De	egree Year: II		
Class: MCA(AIML) Semester: III				
Credits Subject: Machine Learning Lab				
Theory	v:2Cr			
	Course Code: Title: Machine Learning Lab			
MCA-3	334P			
Course	e Objectiv	ves:		
CO1:		stand the basic theory underlying machine learning.		
CO2		To be able to formulate machine learning problems corresponding to different applications.		
CO3:		erstand a range of machine learning algorithms a long with the	neir strengths and	
	weakness			
		le to apply machine learning algorithms to solve problems of moder		
CO5:		the algorithms to a real-world problem, optimize the models learned	d and report on the	
		hat can be achieved by applying the models.		
	e of Paper			
	um Passi	ing Marks/Credits: 50% Marks (ISE+ESE)		
L:0				
T:0	/			
	Hours/We			
-	-1Hr.=1C			
		1Credit(4Hrs./Week=4Credits)	N. C	
Unit		Contents	No. of	
			Lectures Allotted	
	1 Imple	ement Decision Tree learning	02	
	-	ement Logistic Regression	02	
		ement classification using Multilayer perceptron	02	
			02	
Ι		ement classification using SVM ement Ada boost	02	
-	1			
		ement Bagging using Random Forests	02	
	-	ement k-nearest Neighbors algorithm	02 to 02	
		ement K-means, K-Modes Clustering to Find Natural Patterns in Dat		
	-	ement Hierarchical clustering	02	
	±	lement Gaussian Mixture Model Using the Expectation Maximization	on <b>02</b>	
Text B		Machine Learning A Constraint Devel Assured Mars IV	oran 2017	
		, Machine Learning: A Constraint-Based Approach, Morgan Kaufm	ann. 2017	
	<u> </u>	ydin, Machine Learning: The New AI, MIT Press-2016		
	ence Book			
Book:	azord C	Michalski, J. G. Carbonell and Tom M. Mitchell, Machine Learn	ning An Artificial	
µ. ку	szaiu, s.,	whenaiski, J. O. Carbonen and Tolli M. Mitchell, Machille Leaff	ing. An Aruncia	

Intelligence Approach, Volume 1, Elsevier. 2014

2. Stephen Marsland, Taylor & Francis 2009. Machine Learning: An Algorithmic Perspective.



Evaluation/Assessment Methodology	[
	Max. Marks 100
1) Class tasks/Sessional Examination	25
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	
5) Seminar On Research Project Report	
6) ESE	25
Total:	50
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO1: Appreciate the importance of visualization in the data analytics solution	

CO1: Appreciate the importance of visualization in the data analytics solution

CO2: Apply structured thinking to unstructured problems.

CO3: Understand a very broad collection of machine learning algorithms and problems

CO4: Learn algorithmic topics of machine learning and mathematically deep enough to introduce the required theory

CO5: Develop an appreciation for what is involved in learning from data.



#### **IIMT UNIVERSITY** Year-II/Semester-III

0	mme: D	egree Year: II			
Class: MCA(AIML) Semester: III					
Credits	Credits Subject: Advance Machine Learning Lab				
Theory:	Theory:2Cr				
Course Code: Title: Advance Machine Learning Lab					
MCA-3	35P				
Course	Objecti	ves:			
CO1: 4	O1: Apply Feature Extracting and Feature Engineering techniques.				
CO2	Implement Exploratory Data Analysis on real time datasets.				
CO3:	Apply er	semble learners to evaluate model diagnosis.			
		Association Rule Mining.			
CO5: 1	Predict c	lusters from real time data using various Clustering Algorithms.			
Nature	<u> </u>				
	ım Pass	ing Marks/Credits: 50% Marks (ISE+ESE)			
L:0					
T:0					
	lours/W				
•	1Hr.=10				
	<u>1-2Hrs.=</u>	1Credit(4Hrs./Week=4Credits)			
Unit	Unit Contents		No. of		
			Lectures		
			Allotted		
		tract data from different file formats and display the summary statistics.	02		
	2. W1	$d_{1}$			
		ite a program that extracts the words (features) used in a sentence.	02		
		ite a program that extracts the words (features) used in a sentence. ite a program for edge detection to extract edge-based features from a nple image.	02 02		
	sar 4. Wi	ite a program for edge detection to extract edge-based features from a			
	sar 4. Wi im	ite a program for edge detection to extract edge-based features from a nple image. ite a program to extract SURF/SIFT feature descriptors from a sample	02		
I	sar 4. W1 im 5. W1	ite a program for edge detection to extract edge-based features from a nple image. ite a program to extract SURF/SIFT feature descriptors from a sample age.	02 02		
Ι	4. W1 im 5. W1 wit	ite a program for edge detection to extract edge-based features from a nple image. ite a program to extract SURF/SIFT feature descriptors from a sample age. ite a program to evaluate and compare learning curves of leave-one-out	02 02		
Ι	4. Wi im 5. Wi usi	ite a program for edge detection to extract edge-based features from a nple image. ite a program to extract SURF/SIFT feature descriptors from a sample age. ite a program to evaluate and compare learning curves of leave-one-out h two-, three-, five-, and ten-fold cross-validation on a learning problem	02 02		
Ι	4. Wr im 5. Wr usi 6. Cro	ite a program for edge detection to extract edge-based features from a nple image. ite a program to extract SURF/SIFT feature descriptors from a sample age. ite a program to evaluate and compare learning curves of leave-one-out h two-, three-, five-, and ten-fold cross-validation on a learning problem ng real time dataset.	02 02 02		
Ι	4. Wr im 5. Wr usi 6. Cra pac	ite a program for edge detection to extract edge-based features from a nple image. ite a program to extract SURF/SIFT feature descriptors from a sample age. ite a program to evaluate and compare learning curves of leave-one-out h two-, three-, five-, and ten-fold cross-validation on a learning problem ng real time dataset. eate a Bayesian Graphical Model for earthquake problem (using python	02 02 02		
Ι	sar 4. Wi im 5. Wi usi 6. Cra pac 7. Wi	ite a program for edge detection to extract edge-based features from a nple image. ite a program to extract SURF/SIFT feature descriptors from a sample age. ite a program to evaluate and compare learning curves of leave-one-out h two-, three-, five-, and ten-fold cross-validation on a learning problem ng real time dataset. eate a Bayesian Graphical Model for earthquake problem (using python ekage pgmpy)	02 02 02 02 02		
Ι	4. Wr im 5. Wr usi 6. Cro pao 7. Wr stra	ite a program for edge detection to extract edge-based features from a nple image. ite a program to extract SURF/SIFT feature descriptors from a sample age. ite a program to evaluate and compare learning curves of leave-one-out h two-, three-, five-, and ten-fold cross-validation on a learning problem ng real time dataset. eate a Bayesian Graphical Model for earthquake problem (using python ekage pgmpy) ite a to evaluate classifiers using baseline methods constant, uniform,	02 02 02 02 02		
Ι	4. Wr im 5. Wr usi 6. Cro pac 7. Wr stra Ide	ite a program for edge detection to extract edge-based features from a nple image. ite a program to extract SURF/SIFT feature descriptors from a sample age. ite a program to evaluate and compare learning curves of leave-one-out h two-, three-, five-, and ten-fold cross-validation on a learning problem ng real time dataset. eate a Bayesian Graphical Model for earthquake problem (using python ekage pgmpy) ite a to evaluate classifiers using baseline methods constant, uniform, atified, prior and most frequent on wine dataset and find the accuracy. ntify the patterns using RoC, AUC	02 02 02 02 02		
Ι	<ul> <li>sar</li> <li>4. Wi</li> <li>im.</li> <li>5. Wi</li> <li>wii</li> <li>usi</li> <li>6. Cropado</li> <li>7. Wi</li> <li>stratide</li> <li>8. Wi</li> </ul>	ite a program for edge detection to extract edge-based features from a nple image. ite a program to extract SURF/SIFT feature descriptors from a sample age. ite a program to evaluate and compare learning curves of leave-one-out h two-, three-, five-, and ten-fold cross-validation on a learning problem ng real time dataset. eate a Bayesian Graphical Model for earthquake problem (using python ekage pgmpy) ite a to evaluate classifiers using baseline methods constant, uniform, atified, prior and most frequent on wine dataset and find the accuracy. ntify the patterns using RoC, AUC ite a program to generate Association Rules using the Apriori algorithm.	02 02 02 02 02 02		
Ι	<ul> <li>sar</li> <li>4. Wi</li> <li>im</li> <li>5. Wi</li> <li>wit</li> <li>usi</li> <li>6. Cropad</li> <li>7. Wi</li> <li>stratic</li> <li>Ide</li> <li>8. Wi</li> <li>9. Wi</li> </ul>	ite a program for edge detection to extract edge-based features from a nple image. ite a program to extract SURF/SIFT feature descriptors from a sample age. ite a program to evaluate and compare learning curves of leave-one-out h two-, three-, five-, and ten-fold cross-validation on a learning problem ng real time dataset. eate a Bayesian Graphical Model for earthquake problem (using python ekage pgmpy) ite a to evaluate classifiers using baseline methods constant, uniform, atified, prior and most frequent on wine dataset and find the accuracy. ntify the patterns using RoC, AUC	02 02 02 02 02 02 02		
Ι	<ul> <li>sar</li> <li>4. Wr</li> <li>im</li> <li>5. Wr</li> <li>with</li> <li>usi</li> <li>6. Cropace</li> <li>7. Wr</li> <li>stratic</li> <li>Ide</li> <li>8. Wr</li> <li>9. Wr</li> <li>alg</li> </ul>	ite a program for edge detection to extract edge-based features from a nple image. ite a program to extract SURF/SIFT feature descriptors from a sample age. ite a program to evaluate and compare learning curves of leave-one-out h two-, three-, five-, and ten-fold cross-validation on a learning problem ng real time dataset. eate a Bayesian Graphical Model for earthquake problem (using python ekage pgmpy) ite a to evaluate classifiers using baseline methods constant, uniform, atified, prior and most frequent on wine dataset and find the accuracy. ntify the patterns using RoC, AUC ite a program to generate Association Rules using the Apriori algorithm.	02 02 02 02 02 02 02		

1. Dipanjan Sarkar, Raghav Bali, Tushar Sharma, Practical Machine Learning with Python-A Problem-Solver's Guide to Building Real-World Intelligent Systems, Apress. 2018.

2. Sikar Dutt, Subramanian Chandramouli, Amit Kumar Das, Machine Learning, Ninth impression,



# Reference Book:

# Book:

1. Manohar Swamynathan, Mastering Machine Learning with Python in Six Steps – A Practical Implementation Guide to Predictive Data Analytics Using Python, Apress, 2017.

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/Sessional Examination tasks	25
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	
5) Seminar On Research Project Report	
6) ESE	25
Total:	50
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO1: Appreciate the importance of visualization in the data analytics solution	
CO2: Apply structured thinking to unstructured problems	

- CO2: Apply structured timking to unstructured problems CO3: Understand a very broad collection of machine learning algorithms and problems
- CO4: Learn algorithmic topics of machine learning and mathematically deep enough to introduce the required theory
- CO5: Develop an appreciation for what is involved in learning from data.



Drogram	nme:Degree	Year: II			
0	ICA(AIML)	Semester:IV			
Credits		Security in Online social media			
	Theory:3Cr				
<b>Course Code:</b> Title: Privacy and Security in Online social media					
MCA-03		curry in Online social media			
	Objectives:				
	0	ocial networks			
	Understand working of online social networks Describe privacy policies of online social media				
	Analyse countermeasures to control information sharing in Online social networks.				
		anagement in Online social networks			
		associated with popular social media.			
	of Paper: DSE				
	m Passing Marks/Credits:40	% Marks (ISE+ESE)			
L:3	<u> </u>				
T:0					
P:0(In H	ours/Week)				
Theory-1	Hr.=1Credit				
Practical	-2Hrs.=1Credit(4Hrs./Week=4	Credits)			
Unit		Contents	No. of		
			Lectures		
			Allotted		
Ι		ial Networks: Introduction to Social Networks,	08		
		munities, Online Social Networks, Evolution of			
		alysis and Properties, Security Issues in Online			
		agement in Online Social Networks, Controlled			
	•	ine Social Networks, Identity Management in			
		ta collection from social networks, challenges, on online social networks, APIs; Collecting data			
	from Online social media.	i onnine social networks, AFIS, Conecting data			
II		e Social Networks: Trust and Policies, Trust and	08		
11	8	in Online Social, Trust Properties, Trust	00		
	1 7	d Social Capital, Trust Evaluation Models, Trust,			
	-	in social systems; Online social media and			
	• •	y disclosure, revelation, and its effects in OSM			
		hishing in OSM & Identifying fraudulent entities			
	in online social networks				
III		haring in Online Social Networks: Access	08		
		ntrol in Online Social Networks, Relationship-			
		ivacy Settings in Commercial Online Social			
	Networks, Existing Access C				
IV	Identity Management in C	Online Social Networks: Identity Management,	08		
		nagement Models: From Identity 1.0 to Identity			
	2.0, Identity Management	in Online Social Networks, Identity as Self-			



	Presentation, Identity thefts, Open Security Issues in Online Social Network	vorks	
V	<b>Case Study:</b> Privacy and security issues associated with various social		08
	such as Facebook, Instagram, Twitter, LinkedIn etc.		
Text Bo	ok:		
	rity and Privacy-Preserving in Social Networks, Editors: Chbeir, Richard	d, Al Bo	una, Bechara
	.), Spinger, 2013.		
	rity and Trust in Online Social Networks, Barbara Carminati, Elena Fe	errari, M	arco Viviani,
	gan & Claypool publications.		
	rity and Privacy in Social Networks, Editors: Altshuler, Y., Elovici,	, Y., Cr	emers, A.B.,
	rony, N., Pentland, A. (Eds.), Springer, 2013		
	ce Book:	hair Dia	hand Chhain
	rity and privacy preserving in social networks, Elie Raad & Richard Chechara Al Bouna, 2013	dell, Kic	maru Choelr
	al Media Security: Leveraging Social Networking While Mitigating R	lisk Mid	chael Cross
2. 5001 2013		(15K, 1911)	ender C1035,
2010	Evaluation/Assessment Methodology		
		Max.	Marks 100
1) Cla	ss tasks/Sessional Examination tasks		20
2) Pre	sentations /Seminar		
· ·	ignments		
· ·	earch Project Report		10
,	ninar On Research Project Report		
6) ESI			70
D	Total:		100
	isites for the course: NIL		
	Learning Outcomes:		
	Able to understand working of online social networks		
	Describe privacy policies of online social media A palvas countermassures to control information sharing in Online social	natural	.0
	Analyse countermeasures to control information sharing in Online social Apply knowledge of identity management in Online social networks	network	.5.
	Compare various privacy and security issues associated with popular soc	ial medi	a
005.	compare various privacy and security issues associated with popular soc	iai mean	<i>.</i> .



Progra	mme:De	gree	Year: II	
Class:MCA(AIML)		ĨL)	Semester:IV	
Credits Subject:Soft Computing				
Theory:3Cr				
Course Code: Title:Soft Computing				
MCA-0	)32			
Course	e Objectiv	/es:		
	0		puting and study basic concepts and techniques of	soft
	computir			
CO2		-	of artificial neural network to analyze widely used r	neural
<b>GO2</b>	networks			
			certainty in various real-world problems.	
	-	1 0	olutionary computing and evaluate genetic algorithm	n in solving
	1	tion problems.	lighting of ooft computing	
	of Paper		lications of soft computing.	
		ng Marks/Credits:40	% Mortes (ISE   ESE)	
L:3	uiii rassi	ing marks/Creuits:40	% Marks (ISE+ESE)	
L.3 T:0				
	Hours/We	ek)		
	-1Hr.=1C	,		
			(Credits)	
I Iuctict	al-2Hrs.=1Credit(4Hrs./Week=4Credits)			
Unit			,	No. of
Unit		 	Contents	No. of Lectures
Unit		`	,	No. of Lectures Allotted
Unit	Introd	uction to Soft Con	Contents	Lectures
			,	Lectures Allotted
	compu		<b>Contents</b> <b>nputing:</b> Introduction, Comparison with hard earning and adaptation, Constituents of soft	Lectures Allotted
	compu compu	ting, Concept of le	<b>Contents</b> <b>nputing:</b> Introduction, Comparison with hard earning and adaptation, Constituents of soft	Lectures Allotted
	compu compu Artific brain,	ting, Concept of le ting, Applications of so <b>ial Neural Network</b> s Biological neural netw	<b>Contents</b> <b>nputing:</b> Introduction, Comparison with hard earning and adaptation, Constituents of soft oft computing. <b>s:</b> Basic concepts of neural networks, Human work, History of artificial neural networks, Basic	Lectures Allotted
	compu compu Artific brain, buildin	ting, Concept of le ting, Applications of so <b>ial Neural Networks</b> Biological neural netw g blocks of an art	<b>Contents</b> <b>nputing:</b> Introduction, Comparison with hard earning and adaptation, Constituents of soft oft computing. <b>s:</b> Basic concepts of neural networks, Human work, History of artificial neural networks, Basic tificial neuron, Neural network architectures,	Lectures Allotted
I	compu compu Artific brain, buildin Activa	ting, Concept of le ting, Applications of so <b>ial Neural Networks</b> Biological neural netw g blocks of an art <u>ion functions, Charact</u>	Contents mputing: Introduction, Comparison with hard earning and adaptation, Constituents of soft oft computing. s: Basic concepts of neural networks, Human work, History of artificial neural networks, Basic tificial neuron, Neural network architectures, tificial neuron, Neural network architectures, tificial neuron, of neural networks.	Lectures Allotted 08
	compu compu Artific brain, 1 buildin Activat	ting, Concept of le ting, Applications of so <b>ial Neural Networks</b> Biological neural netw g blocks of an art <u>ion functions, Charact</u> <b>ial Neural Networks</b>	Contents nputing: Introduction, Comparison with hard earning and adaptation, Constituents of soft oft computing. s: Basic concepts of neural networks, Human work, History of artificial neural networks, Basic tificial neuron, Neural network architectures, tificial neuron, Neural network architectures, teristics and limitation of neural networks. : Learning methods - Supervised, Unsupervised,	Lectures Allotted
Ι	compu compu Artific brain, buildin Activat Artific Reinfo	ting, Concept of le ting, Applications of so <b>ial Neural Networks</b> Biological neural netw g blocks of an art <u>ion functions, Charact</u> <b>ial Neural Networks</b> rcement, Hebbian, Gra	Contents nputing: Introduction, Comparison with hard earning and adaptation, Constituents of soft oft computing. s: Basic concepts of neural networks, Human work, History of artificial neural networks, Basic tificial neuron, Neural network architectures, tificial neuron, Neural network architectures, teristics and limitation of neural networks. : Learning methods - Supervised, Unsupervised, dient descent, Competitive, Stochastic.	Lectures Allotted 08
I	compu compu Artific brain, buildin Activat Artific Reinfo Major	ting, Concept of le ting, Applications of so <b>ial Neural Networks</b> Biological neural netw g blocks of an art <u>ion functions, Charact</u> <b>ial Neural Networks</b> rcement, Hebbian, Gra <b>classes of neural</b>	Contents mputing: Introduction, Comparison with hard earning and adaptation, Constituents of soft oft computing. s: Basic concepts of neural networks, Human work, History of artificial neural networks, Basic tificial neuron, Neural network architectures, tificial neuron, Neural network architectures, tificial neuron, Neural network architectures, tificial neuron, Supervised, Unsupervised, the competitive, Stochastic. networks: Perceptron networks, Multilayer	Lectures Allotted 08
I	compu compu Artific brain, buildin Activa Artific Reinfo Major percept	ting, Concept of le ting, Applications of so <b>ial Neural Networks</b> Biological neural netw g blocks of an art <u>tion functions, Charact</u> <b>ial Neural Networks</b> rcement, Hebbian, Gra <b>classes of neural</b> tron model, Back-prop	Contents mputing: Introduction, Comparison with hard earning and adaptation, Constituents of soft oft computing. s: Basic concepts of neural networks, Human work, History of artificial neural networks, Basic tificial neuron, Neural network architectures, tificial neuron, Neural network architectures, teristics and limitation of neural networks. : Learning methods - Supervised, Unsupervised, adient descent, Competitive, Stochastic. networks: Perceptron networks, Multilayer pagation network, Radial basis function network,	Lectures Allotted 08
I	compu compu Artific brain, buildin Activat Reinfo Major percept Recurr	ting, Concept of le ting, Applications of so <b>ial Neural Networks</b> Biological neural netw g blocks of an art <u>tion functions, Charact</u> <b>ial Neural Networks</b> rcement, Hebbian, Gra <b>classes of neural</b> tron model, Back-prop	Contents mputing: Introduction, Comparison with hard earning and adaptation, Constituents of soft oft computing. s: Basic concepts of neural networks, Human work, History of artificial neural networks, Basic tificial neuron, Neural network architectures, tificial neuron, Neural network architectures, tificial neuron, Neural network architectures, tificial neuron, Supervised, Unsupervised, the competitive, Stochastic. networks: Perceptron networks, Multilayer	Lectures Allotted 08
I	compu compu Artific brain, 1 buildin Activat Artific Reinfo Major percept Recurr maps.	ting, Concept of le ting, Applications of so <b>ial Neural Networks</b> Biological neural netw g blocks of an art tion functions, Charact <b>ial Neural Networks</b> rcement, Hebbian, Gra <b>classes of neural</b> tron model, Back-prop ent neural network, Ho	Contents mputing: Introduction, Comparison with hard earning and adaptation, Constituents of soft oft computing. s: Basic concepts of neural networks, Human work, History of artificial neural networks, Basic tificial neuron, Neural network architectures, tificial neuron, Neural network, architectures, tificial neuron, Neural network, Multilayer pagation network, Radial basis function network, opfield networks, Kohonen self-organizing feature	Lectures Allotted 08 08
I	compu compu Artific brain, buildin Activat Artific Reinfo Major percept Recurr maps. Fuzzy	ting, Concept of letting, Applications of so ial Neural Networks Biological neural networks g blocks of an art ion functions, Charact ial Neural Networks rcement, Hebbian, Gra classes of neural rron model, Back-prop ent neural network, Ho Logic: Introduction	Contents mputing: Introduction, Comparison with hard earning and adaptation, Constituents of soft oft computing. s: Basic concepts of neural networks, Human work, History of artificial neural networks, Basic tificial neuron, Neural network architectures, tificial neuron, Neural network architectures, teristics and limitation of neural networks. : Learning methods - Supervised, Unsupervised, adient descent, Competitive, Stochastic. networks: Perceptron networks, Multilayer bagation network, Radial basis function network, opfield networks, Kohonen self-organizing feature to Fuzzy Logic, Comparison with crisp logic,	Lectures Allotted 08
I	compu compu Artific brain, buildin Activat Artific Reinfo Major percept Recurr maps. Fuzzy Proper	ting, Concept of letting, Applications of sec ial Neural Networks Biological neural networks g blocks of an art ion functions, Charact ial Neural Networks recement, Hebbian, Gra classes of neural fron model, Back-prop ent neural network, Ho Logic: Introduction ties of classical sets, o	Contents mputing: Introduction, Comparison with hard earning and adaptation, Constituents of soft oft computing. s: Basic concepts of neural networks, Human work, History of artificial neural networks, Basic tificial neuron, Neural network architectures, tificial neuron, Neural network architectures, teristics and limitation of neural networks. : Learning methods - Supervised, Unsupervised, adient descent, Competitive, Stochastic. networks: Perceptron networks, Multilayer bagation network, Radial basis function network, opfield networks, Kohonen self-organizing feature to Fuzzy Logic, Comparison with crisp logic, Operations on classical sets, Properties of fuzzy	Lectures Allotted 08 08
I	compu compu Artific brain, 2 buildin Activa Artific Reinfo Major percept Recurr maps. Fuzzy Propert sets, C	ting, Concept of letting, Applications of so ial Neural Networks Biological neural networks g blocks of an art ion functions, Charact ial Neural Networks reement, Hebbian, Gra classes of neural tron model, Back-prop ent neural network, Ho Logic: Introduction ties of classical sets, of perations on fuzzy se	Contents mputing: Introduction, Comparison with hard earning and adaptation, Constituents of soft oft computing. s: Basic concepts of neural networks, Human work, History of artificial neural networks, Basic tificial neuron, Neural network architectures, tificial neuron, Neural network, architectures, tificial neuron, Neural network, architectures, teristics and limitation of neural networks. : Learning methods - Supervised, Unsupervised, dient descent, Competitive, Stochastic. networks: Perceptron networks, Multilayer pagation network, Radial basis function network, opfield networks, Kohonen self-organizing feature to Fuzzy Logic, Comparison with crisp logic, Operations on classical sets, Properties of fuzzy ets, Classical relations, Fuzzy relations, Features	Lectures Allotted 08 08
I	compu compu Artific brain, buildin Activat Artific Reinfo Major percept Recurr maps. Fuzzy Propert sets, C and typ	ting, Concept of letting, Applications of so ial Neural Networks Biological neural networks biological neural networks of an art ion functions, Charact ial Neural Networks reement, Hebbian, Gra classes of neural ron model, Back-propent neural network, Ho Logic: Introduction ties of classical sets, of perations on fuzzy se wes of fuzzy membersh	Contents mputing: Introduction, Comparison with hard earning and adaptation, Constituents of soft oft computing. s: Basic concepts of neural networks, Human work, History of artificial neural networks, Basic tificial neuron, Neural network architectures, tificial neuron, Neural network architectures, tificial neuron, Neural networks. : Learning methods - Supervised, Unsupervised, adient descent, Competitive, Stochastic. networks: Perceptron networks, Multilayer bagation network, Radial basis function network, opfield networks, Kohonen self-organizing feature to Fuzzy Logic, Comparison with crisp logic, Operations on classical sets, Properties of fuzzy ets, Classical relations, Fuzzy relations, Features ip functions, Fuzzy arithmetic, Fuzzymeasures.	Lectures Allotted 08 08
I	compu compu Artific brain, buildin Activat Artific Reinfo Major percept Recurr maps. Fuzzy Propert sets, C and typ	ting, Concept of letting, Applications of so ial Neural Networks Biological neural networks g blocks of an art ion functions, Charact ial Neural Networks recement, Hebbian, Gra classes of neural fron model, Back-prop ent neural network, Ho Logic: Introduction ties of classical sets, of perations on fuzzy set set of fuzzy membersh Systems: Crisp logic,	Contents mputing: Introduction, Comparison with hard earning and adaptation, Constituents of soft oft computing. s: Basic concepts of neural networks, Human work, History of artificial neural networks, Basic tificial neuron, Neural network architectures, tificial neuron, Neural network, architectures, tificial neuron, Neural network, architectures, teristics and limitation of neural networks. : Learning methods - Supervised, Unsupervised, dient descent, Competitive, Stochastic. networks: Perceptron networks, Multilayer pagation network, Radial basis function network, opfield networks, Kohonen self-organizing feature to Fuzzy Logic, Comparison with crisp logic, Operations on classical sets, Properties of fuzzy ets, Classical relations, Fuzzy relations, Features	Lectures Allotted 08 08



08
08

#### Text Book:

- 1. Sivanandam S.N. and Deepa S.N., "Principles of Soft Computing", Wiley-India.
- Rajasekaran S. and Vijaya Lakshmi Pai G.A., "Neural Networks, Fuzzy Logic and Genetic Algorithms- Synthesis and Applications", PHI Learning.
- Chakraverty S., Sahoo D.M. and Mahato N. R., "Concepts of Soft Computing- Fuzzy and ANN with Programming", Springer.

#### **Reference Book:**

- 1. Kaushik S. and Tiwari S., "Soft Computing Fundamentals, Techniques and Applications', McGrawHill Education.
- 2. Jang J.-S.R., Sun C.-T. and Mizutani E., "Neuro-Fuzzy and Soft Computing", Prentice-Hall of India.

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/Sessional Examination tasks	20
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
5) Seminar On Research Project Report	
6) ESE	70
Total:	100

Prerequisites for the course: NIL

#### **Course Learning Outcomes:**

- CO1: Recognize the need of soft computing and study basic concepts and techniques of soft computing.
- CO2: Apply neural networks, bidirectional associative memories and adaptive resonance theory for solving different engineering problems
- CO3: Identify and describe soft computing techniques and build supervised learning and unsupervised learning networks.
- CO4: Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering CO5: problems.

Evaluate and compare solutions by various soft computing approaches for a given problem.



Program	mme: Degree Y	ear: II		
Class: MCA(AIML)		emester: IV		
	Credits Subject: Pattern Recognition			
	Theory:3Cr			
Course Code: Title: Pattern Recognition				
MCA-0	e			
Course	Objectives:			
	Study of basics of Pattern recognition. Understand the designing principles and Mathematica			
	foundation used in pattern recognition.			
CO2	Analysis the Statistical Pattern Recognition.			
	Understanding the different Param			
CO4:	Understanding the different Nonpa	arametric Techniques.		
CO5:	Understand and Make use of unsu	pervised learning and Clustering in Pattern recog	gnition.	
	of Paper: DSE			
	m Passing Marks/Credits:40%	Marks (ISE+ESE)		
L:3				
T:0				
	Iours/Week)			
-	1Hr.=1Credit			
	1-2Hrs.=1Credit(4Hrs./Week=4Cr	,		
Unit		Contents	No. of	
			Lectures	
т	Later de affere De de a foreste		Allotted	
Ι	-	rn recognition, Design principles of pattern	08	
	• • •	nd adaptation, Pattern recognition approaches, near algebra, Probability Theory, Expectation,		
		stribution, multivariate normal densities, Chi		
	squared test.	stribution, multivariate normal densities, em		
II	1	<b>n:</b> Bayesian Decision Theory, Classifiers,	08	
	Normal density and discriminant		00	
III		s: Maximum-Likelihood estimation, Bayesian	08	
		on reduction methods - Principal Component	00	
		inear discriminant analysis, Expectation-		
	•	Markov Models (HMM), Gaussian mixture		
1				
	models.			
IV		Density Estimation, Parzen Windows, K-	08	
IV	Nonparametric Techniques:	Density Estimation, Parzen Windows, K- earest Neighbor Rule, Fuzzyclassification.	08	
IV V	<b>Nonparametric Techniques:</b> Nearest Neighbor Estimation, N		08	
	NonparametricTechniques:NearestNeighborEstimation, NUnsupervisedLearning & C	earest Neighbor Rule, Fuzzyclassification.		
	NonparametricTechniques:NearestNeighborEstimation, NUnsupervisedLearning & C	earest Neighbor Rule, Fuzzyclassification. <b>lustering:</b> Criterion functions for clustering, re square - error partitional clustering – K		
	Nonparametric Techniques: Nearest Neighbor Estimation, N Unsupervised Learning & C Clustering Techniques: Iterativ means, agglomerative hierarchic	earest Neighbor Rule, Fuzzyclassification. <b>lustering:</b> Criterion functions for clustering, re square - error partitional clustering – K		
V <b>Text Bo</b> 1. Dud	Nonparametric Techniques: Nearest Neighbor Estimation, N Unsupervised Learning & C Clustering Techniques: Iterativ means, agglomerative hierarchic ook: a R. O., Hart P. E. and Stork D. G	earest Neighbor Rule, Fuzzyclassification. <b>lustering:</b> Criterion functions for clustering, re square - error partitional clustering – K		



#### **Reference Book:**

- 1. Singhal R., "Pattern Recognition: Technologies & Applications", Oxford University Press.
- 2. Theodoridis S. and Koutroumbas K., "Pattern Recognition", Academic Press.

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/Sessional Examination	20
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
5) Seminar On Research Project Report	
6) ESE	70
Total:	100

Prerequisites for the course: NIL

#### **Course Learning Outcomes:**

- CO1: Study of basics of Pattern recognition. Understand the designing principles and Mathematical foundation used in pattern recognition.
- CO2: Outline basic concepts of pattern recognition.
- CO3: Classify decision-making algorithms in pattern recognition.
- CO4: Apply Hierarchical and Partition clustering techniques in pattern recognition applications.
- CO5: Analyze feature selection algorithms in pattern recognition.



Program	nma. Degree	Year: II	
Programme: Degree Class: MCA(AIML)		Semester: IV	
Credits			
Theory:	ů –	vites	
Course		8	
MCA-03	•	0	
	Objectives:		
	•	of Data Analytics through discovery, planning and b	wilding
	Understand and apply Data Ar		unung.
	Implement various Data stream	<b>y</b> 1	
		ng, frame works & Visualizations.	
		nd evaluating real time applications.	
	of Paper: DSE	in evaluating four time approactions.	
	m Passing Marks/Credits:4	0% Marks (ISE+ESE)	
L:3			
T:0			
	lours/Week)		
	1Hr.=1Credit		
	l-2Hrs.=1Credit(4Hrs./Week=	4Credits)	
Unit		Contents	No. of
			Lectures
			Allotted
Ι	Introduction to Data Anal	ytics: Sources and nature of data, classification of	08
		ictured, unstructured), characteristics of data,	
	introduction to Big Data platform, need of data analytics, evolution of analytic		
	scalability, analytic process and tools, analysis vs reporting, modern data		
	analytic tools, applications of data analytics.		
	Data Analytics Lifecycle:	Need, key roles for successful analytic projects,	
		tics lifecycle – discovery, data preparation, model	
	planning, model building, co	ommunicating results, operationalization	
II	Data Analysis: Regression	on modeling, multivariate analysis, Bayesian	08
		Bayesian networks, support vector and kernel	
	•	e series: linear systems analysis & nonlinear	
	-	Neural Networks: Learning and generalisation,	
	1 01 1	bal component analysis and neural networks, fuzzy	
	logic: extracting fuzzy mode		
	-	es, stochastic search methods.	
III		roduction to streams concepts, stream data model	08
		omputing, sampling data in a stream, filtering	
		ements in a stream, estimating moments, counting	
		ng window, Real-time Analytics Platform (RTAP)	
		Real time sentiment analysis, stockmarket	
	predictions.		
IV	Frequent Itemsets and Clu	ustering: Mining frequent itemsets, market based	08



CO5: Illustrate and implement the concepts by taking an application problem			
CO4: Analyse and implement different frame work tools by taking sample data	sets.		
CO3: Demonstrate spark programming and graph algorithms using programmir	ng language	es.	
frame work.	1	•	
CO2: Explain and Analyse the Big Data using Map-reduce programming in Bo	th Hadoop	and Spark	
CO1: Understand the concepts of visualization.			
Course Learning Outcomes:			
Prerequisites for the course: NIL			
Total:		00	
6. ESE	7	70	
5. Seminar On Research Project Report	-		
4. Research Project Report	1	0	
3. Assignments			
2. Presentations /Seminar	2	.0	
1. Class tasks/ Sessional Examination		20	
Evaluation/Assessment Methodology	May M	arks 100	
Education.			
2. John Garrett, "Data Analytics for IT Networks: Developing Innovative Use Cases", Pearson			
Advanced Analytics", John Wiley & Sons.			
1. Bill Franks, "Taming the Big Data Tidalwave: Finding Opportunities in Huge Data Streams with			
Reference Book:			
University Press.	., -	- 0	
2. An and Rajaraman and Jeffrey David Ullman, "Mining of Massive Da	tasets". C	ambridge	
1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer.			
Text Book:			
visualization before analysis, analytics for unstructured data.	lialysis,		
<b>Introduction to R</b> - R graphical user interfaces, data import and attribute and data types, descriptive statistics, exploratory data and			
and applications.			
Visualization: visual data analysis techniques, interaction techniques, s	ystems		
Map R, Sharding, No SQL Databases, S3, Hadoop Distributed File Sy			
V Frame Works and Visualization: Map Reduce, Hadoop, Pig, Hive, H	I Base,	08	
euclidean space, clustering for streams and parallelism.			
and ProCLUS, frequent pattern based clustering methods, clustering i	-		
limited pass algorithm, counting frequent itemsets in a stream, Clu techniques: hierarchical, K-means, clustering high dimensional data, Cl	-		
	stering		



Program	mme: Degree	Year: II	
Class: MCA(AIML)		Semester: IV	
Credits		tificial Intelligence	
Theory:	_		
Course		cial Intelligence	
MCA-0		C	
Course	<b>Objectives:</b>		
CO1: 1	Define the meaning of	intelligence and study various intelligent agents.	
CO2	Understand, analyze a	nd apply AI searching algorithms in different problem domain	IS.
		ous models for knowledge representation.	
		concepts of machine learning to analyze and implement w	videly used
	learning methods and	•	
		ot of pattern recognition and evaluate variousclassification and	d clustering
	techniques		
	of Paper: Core Cours		
	um Passing Marks/C	redits:40% Marks (ISE+ESE)	
L:3			
T:1			
	Hours/Week)		
	-1Hr.=1Credit		
	al-2Hrs.=1Credit(4Hrs		
Unit		Contents	No. of
			Lectures
			Allotted
Ι	-	<b>nce:</b> Introduction to artificial intelligence, Historical	08
	-	foundation areas of artificial intelligence, Tasks and	
		artificial intelligence. Introduction, types and structure of omputer Vision, Natural language processing.	
II		ques: Introduction, Problem solving by searching,	08
11		ons, Uniformed searching techniques, Informed searching	00
		search algorithms, Adversarial search methods, Search	
	techniques used	searen argonannis, naversanar searen methods, searen	
	in games, Alpha-Be	ta pruning	
III		sentation and Reasoning: Propositional logic, Predicate	08
		gic, Inference in first order logic, Clause form conversion,	00
		ng- concept, forward chaining and backward chaining,	
		Probabilistic reasoning, Hidden Markov model, Bayesian	
	networks.		
IV		: Introduction, types and application areas, Decision trees,	08
	e	methods, Learning with complete data - concept and	
		s, Learning with hidden data- concept and EM algorithm,	
V	Naïve Bayes models Reinforcement learn		08



	Linear discrimination analysis, Classification techniques - Nearest no	eighbor	
T 4 1	rule and Bayes classifier, K-means clustering, Support vectormachine.		
Text I		There is a	
	ussell S. and Norvig P., "Artificial Intelligence – A Modern Approach", Pea	rson Education.	
	ch E. and Knight K., "Artificial Intelligence", McGraw Hill Publications.		
	narnik E. and McDermott D., "Introduction to Artificial Intelligence", Pears		
	tterson D. W., "Artificial Intelligence and Expert Systems", Prentice Hall o	f India Publications.	
	ence Book:		
	nemani D., "A First Course in Artificial Intelligence", McGraw Hill.		
	inston P. H., "Artificial Intelligence", Pearson Education.		
	nornton C. and Boulay B.," Artificial Intelligence- Strategies, Applications	and Models through	
Se	arch", New Age International Publishers.		
	Evaluation/Assessment Methodology		
		Max. Marks 100	
1. Cl	ass tasks/Sessional Examination tasks	15	
2. Pr	esentations /Seminar		
3. As	ssignments		
	esearch Project Report	10	
5. Se	minar On Research Project Report		
6. ES	SE	75	
	Total:	100	
Prere	quisites for the course: NIL		
Cours	se Learning Outcomes:		
CO1:	Demonstrate fundamental understanding of the history of artificial intelli	gence.	
CO2:	Apply basic principles of AI in solutions that require problem solving, i	-	
	knowledge representation, and learning.		
CO3:			
	techniques in intelligent agents, expert systems, artificial neural networks and other machine		
	learning models.		
CO4:	Demonstrate proficiency developing applications in an 'AI language', ex	or system shell or	
	data	Pere system shen, of	
CO5:	mining tool.		
000.	Demonstrate proficiency in applying scientific method to models of mach	nine learning	
	Demonstrate proficiency in applying scientific method to models of maci	nine learning.	



Ducanos	mmar Da	<b>6112</b>	Veer II	
Programme: Degree Class: MCA(AIML)		e	Year: II	
Credits		Subject: Block chain	Semester: IV	
Theory:		Subject: DIOCK Chan	Architecture	
Course		Title: Block chain Ar	chitactura	
MCA-0		THE: DIOCK CHAIN AI	cintecture	
	Objectiv	20C+		
	<b>v</b>		agents of blockshoin anabitaature	
			cepts of blockchain architecture. or consensus protocols.	
	•	d evaluate the consens	1	
		nd the concepts of Hyp		
			se cases in financial software and supply chain.	
	of Paper		se cases in financial software and suppry chain.	
		ng Marks/Credits:40 ⁴	% Marks (ISF+FSF)	
L:4	AIII I (45)311			
L.4 Т:0				
	Iours/We	ek)		
	1Hr.=1C	,		
2		Credit(4Hrs./Week=4	Credits)	
Unit			Contents	No. of
				Lectures
				Allotted
Ι	Introd	uction to Blockchain	: Digital Money to Distributed Ledgers, Design	08
	Primitiv	ves: Protocols, Security	y, Consensus, Permissions, Privacy.	
	Blockc	hain Architecture	and Design: Basic crypto primitives: Hash,	
	Signature, Hashchain to Blockchain, Bitcoin Basic, Basic consensus			
	mechan	nisms.		
II			r the consensus protocols, Proof of Work (PoW),	08
			hain consensus protocols, distributed consensus,	
		sus in Bitcoin.		
			: Design goals, Consensus protocols for	
		sioned Blockchains		0.2
III	• •	e	posing the consensus process, Hyperledger fabric	08
	compor			
			mplementation Hyperledger Fabric: Beyond	
117			ront End, Hyperledger composer tool.	00
IV			Financial Software and Systems (FSS): (i)	08
			apital markets, (iv) Insurance.	
			trade/supply chain: (i) Provenance of goods, finance, invoice management discounting, etc.	
V			Sovernment: (i) Digital identity, land records and	08
v			between government entities, (ii) public	VO
			fare systems, Blockchain Cryptography, Privacy	
		curity on Blockchain	nare systems, bioekenam eryptography, Filvacy	



Text Book:			
	· " () D '11		
1. Andreas Antonopoulos, "Mastering Bitcoin: Unlocking Digital Cryptocurrence	cies", O' Reilly		
2. Melanie Swa, "Blockchain", O' Reilly			
Reference Book:			
1. "Hyperledger Fabric", https://www.hyperledger.org/projects/fabric			
2. Bob Dill, David Smits, "Zero to Blockchain - An IBM	Redbooks course",		
https://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/crse0401.ht	ml		
Evaluation/Assessment Methodology			
	Max. Marks 100		
1. Classtasks/Sessional Examination	20		
2. Presentations /Seminar			
3. Assignments			
4. Research Project Report	10		
5. Seminar On Research Project Report			
6. ESE	70		
Total:	100		
Prerequisites for the course: NIL			
Course Learning Outcomes:			
CO1: Describe the basic concepts and technology used for block chain.			
CO2: Describe the primitives of the distributed computing and cryptography re	elated to block chain.		
CO3: Illustrate the concepts of Bit coin and their usage.			
CO4: Implement Ethereum block chain contract.			
CO5: Apply security features in blockchain technologies.			



Theory:3CrCourse Code:TrMCA-042TrCourse Objectives:CO1:Study of basdifferent supCO2Study of basneural netwoCO3:Study and dspecified proCO4:Understand afeature map.CO5:Able to undeNature of Paper: DMinimum Passing IL:3T:0P:0(In Hours/WeekTheory-1Hr.=1CrePractical-2Hrs.=1CUnitINeuro conneural proofArtificialknowledgeapplicationLearning proofIIBasic ModeaggregatioPerceptromultilayerLeast meaproblems aIIIMultilayer	e	Year: II	
Theory:3Cr Course Code: Tr MCA-042 Course Objectives: CO1: Study of bas neural netwo CO2 Study of bas neural netwo CO3: Study and d specified pro CO4: Understand a feature map. CO5: Able to unde Nature of Paper: D Minimum Passing I L:3 T:0 P:0(In Hours/Week Theory-1Hr.=1Cre Practical-2Hrs.=1C Unit I Neuro con neural proc Artificial knowledge application Learning pro II Basic Mod aggregatio Perceptro multilayer Least mea problems a III Multilayer		Semester: IV	
Course Code: MCA-042TiMCA-042Course Objectives:CO1:Study of bas different sup CO2CO2Study of bas neural netwoCO3:Study and d specified pro CO4:CO4:Understand a feature map.CO5:Able to undeNature of Paper: DMinimum Passing IL:3 T:0P:0(In Hours/Week Theory-1Hr.=1Cre Practical-2Hrs.=1CUnitINeuro con neural proc Artificial knowledge application Learning prIIBasic Moo aggregatio Perceptro multilayer Least mea problems aIIIMultilayer Multilayer	ibject:Neural Netw	orks	
MCA-042 Course Objectives: CO1: Study of bas different sup CO2 Study of bas neural netwo CO3: Study and d specified pro CO4: Understand a feature map. CO5: Able to unde Nature of Paper: D Minimum Passing I L:3 T:0 P:0(In Hours/Week Theory-1Hr.=1Cre Practical-2Hrs.=1C Unit I Neuro con neural proc Artificial knowledge application Learning pro II Basic Moo aggregatio Perceptro multilayer Least mea problems a III Multilayer			
Course Objectives:CO1:Study of base different supCO2Study of base neural networdCO3:Study and despecified prodiceCO3:Study and despecified prodiceCO4:Understand ase feature map.CO5:Able to undeNature of Paper: DMinimum Passing IL:3 T:0P:0(In Hours/Weeler Theory-1Hr.=1Cree Practical-2Hrs.=1CUnitIINeuro con neural prodice Artificial knowledge application Learning priIIBasic Mode aggregatio Perceptro multilayer Least mea problems aIIIMultilayer Multilayer	itle: Neural Networl	ks	
CO1: Study of bas different sup CO2 Study of bas neural netwo CO3: Study and d specified pro CO4: Understand a feature map. CO5: Able to unde Nature of Paper: D Minimum Passing I L:3 T:0 P:0(In Hours/Week Theory-1Hr.=1Cre Practical-2Hrs.=1C Unit I Neuro con neural proc Artificial knowledge application Learning pro II Basic Moo aggregatio Perceptro multilayer Least mea problems a III Multilayer			
different sup CO2 Study of bas neural netwo CO3: Study and d specified pro CO4: Understand a feature map. CO5: Able to unde Nature of Paper: D Minimum Passing I L:3 T:0 P:0(In Hours/Week Theory-1Hr.=1Cre Practical-2Hrs.=1C Unit I Neuro con neural proc Artificial knowledge application Learning pi learning pi II Basic Mod aggregatio Perceptro multilayer Least mea problems a III Multilayer			
CO2 Study of bas neural netwo CO3: Study and d specified pro CO4: Understand a feature map. CO5: Able to unde Nature of Paper: D Minimum Passing I L:3 T:0 P:0(In Hours/Week Theory-1Hr.=1Cre Practical-2Hrs.=1C Unit I Neuro con neural proc Artificial knowledge application Learning pi learning pi II Basic Moo aggregatio Perceptro multilayer Least mea problems a III Multilayer	1	Neuro Computing, Neuroscience and ANN. Un	derstand the
neural netwoCO3:Study and d specified proCO4:Understand a feature map.CO5:Able to undeNature of Paper: DMinimum Passing IL:3T:0P:0(In Hours/Week Theory-1Hr.=1Cre Practical-2Hrs.=1CUnitINeuro con neural prod Artificial knowledge application Learning pri learning priIIBasic Mod aggregatio Perceptro multilayer Least mea problems aIIIMultilayer	1	rvised and neural networks performance.	
CO3: Study and d specified pro CO4: Understand a feature map. CO5: Able to unde Nature of Paper: D Minimum Passing I L:3 T:0 P:0(In Hours/Week Theory-1Hr.=1Cre Practical-2Hrs.=1C Unit I Neuro con neural proc Artificial knowledge application Learning pr Il Basic Moo aggregatio Perceptro multilayer Least mea problems a III Multilayer		al network. Understand the Perception network a	nd Compare
specified pro CO4: Understand a feature map. CO5: Able to under Nature of Paper: D Minimum Passing I L:3 T:0 P:0(In Hours/Week Theory-1Hr.=1Cre Practical-2Hrs.=1C Unit I Neuro con neural proc Artificial knowledge application Learning pi learning pi II Basic Moo aggregatio Perceptro multilayer Least mea problems a III Multilayer	e e	nt types of neural network. Make use of neural n	notworka for
CO4: Understand a feature map. CO5: Able to unde Nature of Paper: D Minimum Passing I L:3 T:0 P:0(In Hours/Week Theory-1Hr.=1Cre Practical-2Hrs.=1C Unit I Neuro con neural proc Artificial knowledge application Learning p Ilarning p II Basic Moo aggregatio Perceptro multilayer Least mea problems a III Multilayer		it types of neural network. Make use of neural n	lictworks for
feature map.CO5:Able to undeNature of Paper: DMinimum Passing IL:3DT:0P:0(In Hours/WeekTheory-1Hr.=1CrePractical-2Hrs.=1CUnitIINeuro conneural prodArtificialknowledgeapplicationLearningIBasic ModaggregatioPerceptromultilayerLeast meaproblems aIIIMultilayer		design requirements of recurrent network and Self	f- organizing
CO5:Able to underNature of Paper: DMinimum Passing IL:3T:0P:0(In Hours/WeekTheory-1Hr.=1CrePractical-2Hrs.=1CUnitINeuro conneural procArtificialknowledgeapplicationLearning pIIBasic MooaggregatioPerceptromultilayerLeast meaproblems aIIIMultilayer		design requirements of recurrent network and Sen	- organizing
Nature of Paper: DMinimum Passing IL:3T:0P:0(In Hours/WeekTheory-1Hr.=1CrePractical-2Hrs.=1CUnitINeuro conneural procArtificialknowledgeapplicationLearninglearning prIIBasic MooaggregatioPerceptromultilayerLeast meaproblems aIIIMultilayer		l network. Able to understand the concept of Soft c	computing.
Minimum Passing I         L:3         T:0         P:0(In Hours/Week         Theory-1Hr.=1Cre         Practical-2Hrs.=1C         Unit         I         Neuro con         neural proc         Artificial         knowledge         application         Learning         learning pr         II       Basic Moo         aggregatio         Perceptro         multilayer         Least mea         problems a         III			ompaning.
L:3         T:0         P:0(In Hours/Week         Theory-1Hr.=1Cre         Practical-2Hrs.=1C         Unit         I         Neuro con         neural proc         Artificial         knowledge         application         Learning         learning pr         II         Basic Moo         aggregatio         Perceptro         multilayer         Least mea         problems a		% Marks (ISE+ESE)	
T:0P:0(In Hours/WeekTheory-1Hr.=1CrePractical-2Hrs.=1CUnitINeuro conneural prodArtificialknowledgeapplicationLearninglearning prIIBasic ModaggregatioPerceptromultilayerLeast meaproblems aIIIMultilayer			
Theory-1Hr.=1Cre Practical-2Hrs.=1CUnitNeuro con neural proc Artificial knowledge application Learning price learning price IIIIBasic Mod aggregatio Perceptro multilayer Least mea problems aIIIMultilayer Multilayer			
Theory-1Hr.=1Cre Practical-2Hrs.=1CUnitNeuro con neural proc Artificial knowledge application Learning price learning price IIIIBasic Mod aggregatio Perceptro multilayer Least mea problems aIIIMultilayer Multilayer	k)		
UnitINeuro con neural prod Artificial knowledge application Learning pi learning piIIBasic Mod aggregatio Perceptro multilayer Least mea problems aIIIMultilayer	,		
INeuro con neural prod Artificial knowledge application Learning pi learning pi IIIIBasic Mod aggregatio Perceptro multilayer Least mea problems aIIIMultilayer	Credit(4Hrs./Week=	4Credits)	
neural prodArtificialknowledgeapplicationLearninglearning, oflearning prIIBasic ModaggregatioPerceptromultilayerLeast meaproblems aIIIMultilayer		Contents	No. of
neural prodArtificialknowledgeapplicationLearninglearning, oflearning prIIBasic ModaggregatioPerceptromultilayerLeast meaproblems aIIIMultilayer			Lectures
neural prodArtificialknowledgeapplicationLearninglearning, oflearning prIIBasic ModaggregatioPerceptromultilayerLeast meaproblems aIIIMultilayer			Allotted
Artificial knowledge application Learning learning prIIBasic Mode aggregatio Perceptro multilayer Least mea problems aIIIMultilayer		roscience: The human brain, biological neurons,	08
knowledge applicationLearning learning prIIBasic Mod aggregatioPerceptro multilayer Least mea problems aIIIMultilayer	cessing, biological 1		
applicationLearninglearning, orlearning prIIBasic ModaggregatioPerceptromultilayerLeast meaproblems aIIIMultilayer		: Introduction, historical notes, neuron model,	
Learninglearning, orlearning prIIBasic ModeaggregatioPerceptromultilayerLeast meaproblems aIIIMultilayer		comparison with biological neural network,	
learning, o learning prIIBasic Mod aggregatioIIBasic Mod aggregatioPerceptro multilayerLeast mea problems aIIIMultilayer		11 · · · · · /·	
Image: Image of the image of		d learning, unsupervised learning, error correction	
IIBasic Mode aggregatioPerceptro multilayer Least mea problems aIIIMultilayer	-	ng, adaptation learning, Statistical nature of the	
aggregatio Perceptro multilayer Least mea problems a III Multilayer		itts neuron model. Habb net setivation functions	08
Perceptro multilayer Least mea problems aIIIMultilayer		itts neuron model, Hebb net, activation functions,	VO
multilayerLeastproblems aIIIMultilayer		ptron learning, single layer perceptron networks,	
Least mea problems a III <b>Multilaye</b>	perceptron network		
problems aIIIMultilaye	1 1	m, gradient descent rule, nonlinearly separable	
III Multilaye			
v			08
networks.		· · · ·	
-		ns better, applications.	
	and bench mark pro r neural networl Back propagati		08



<b>Radial basis function network</b> : Architecture, training al	gorithm,
approximation properties of RBF networks, comparison of radial basis	
network and back propagation networks.	
IV <b>Recurrent network</b> : Introduction, architecture and types.	08
Self-organizing feature map: Introduction, determining winner, Koho	nen Self
Organizing feature maps (SOM) architecture, SOM algorithm, property	erties of
feature map; Learning vector quantization-architecture and algorithm.	
Principal component and independent component analysis.	
V Special networks: Cognitron, Support vector machines. Complex val	ued NN 08
and complex valued BP.	
Soft computing: Introduction, Overview of techniques, Hybrid soft co	mputing
techniques.	
Text Book:	
1. Kumar S., "Neural Networks- A Classroom Approach", McGraw Hill.	
2. Haykin S., "Neural Networks – A Comprehensive Foundation", Pearson Educ	cation.
3. Yegnanarayana B. "Artificial Neural Networks", Prentice Hall of India.	
Reference Book:	
1. Freeman J. A., "Neural Networks", Pearson Education.	
2. James F., "Neural Networks – Algorithms, Applications and Programming	Fechniques", Pearson
Education.	
Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/Sessional Examination tasks	20
2) Presentations /Seminar	
3) Assignments	10
4) Research Project Report	10
5) Seminar On Research Project Report	70
6) ESE	70
Total:	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO1: Understand the need and significance of mathematical fundamentals in	pattern recognition to
solve real-time problems.	
CO2: Explore on supervised learning algorithms and to apply them for solving	1
CO3: Apply unsupervised techniques for clustering data without prior knowled	-
CO4: Design pattern recognition models to extract interesting patterns from	structured data like
graph, syntactic description etc.	

CO5: Understand the impact of dimensionality reduction on the design of intelligent models and to apply the dimensionality reduction techniques on data.



Program	nme• Degree	Year: II	
Programme: Degree Class: MCA(AIML)		Semester: IV	
Credits		Application Development	
Theory:3	0	Application Development	
Course		plication Development	
MCA-04	1		
	Objectives:		
	U	of Kotlin Programing for Android Application Develo	opment
		architecture of Android Operating System.	opinioni.
	5	on using Jetpack Library based on MVVM Architectur	e.
		tion based on REST API using Volley and Retrofit Lib	
		nance and Security of Android Applications.	2
	of Paper: DSE	• • • • • • • • • • • • • • • • • • • •	
Minimu	m Passing Marks/Credits	:40% Marks (ISE+ESE)	
L:3			
T:0			
P:0(In	Hours/Week)		
Theory	-1Hr.=1Credit		
-	al-2Hrs.=1Credit(4Hrs./We	ek=4Credits)	
Unit		Contents	No. of
			Lectures
			Allotted
Ι		troduction to Kotlin, Basic Syntax, Idioms, Coding	08
		sic Types, Packages, Control Flow, Returns and	
	1 0	cts, Classes and Inheritance, Properties and Fields,	
		difiers, Extensions, Data Classes, Generics, Nested	
		Objects, Delegation, Delegated Properties, Functions	
		Lambdas, Inline Functions, Higher-Order Functions,	
		ctions, Ranges, Type Checks and Casts, This Operator overloading, Null Safety, Exceptions,	
	Annotations, Reflection.	operator overloading, Null Safety, Exceptions,	
II		Android Architecture: Introduction to Android,	08
		purces, Activities and Intents, Activity Lifecycle and	
	Saving State, Implicit or E		
	<b>U I</b>	tuitive Navigation: Material Design, Theme, Style	
		trols, Menus, Widgets, Screen Navigation, Recycler	
		, Drawables, Notifications.	
III		etrieving Data in Android Applications: Overview	08
		preferences, App settings, Store and query data in	
	Android's SQ Lite databas	e, Content Providers, Content Resolver, Loading data	
	using loaders.	-	
	Jetpack Components: F	Fragments, Jetpack Navigation, Lifecycle, Lifecycle	
	-	er, View Model, View Model Factory, View Model	
	Provider, Live Data, Re	oom API, Data Binding, View Binding, MVVM	



Architecture Basics	
IV Asynchronous Data Handling, Networking and Files: Asynchrono	us Task, <b>08</b>
Coroutines, API Handling, JSON Parsing, Volley Library, Retrofit Libr	ary, File
Handling, HTML and XML Parsing, Broadcast receivers, Services	
V Permissions, Performance and Security:	08
Firebase, AdMob, APK Singing, Publish App, Packaging and depl	
Google Maps, GPS and Wi-Fi, Download Manager, Work Manager,	Alarms,
Location, Map and Sensors, APK Singing, Publish App	
Text Book:	
1. Meier R., "Professionai Android 2 Application Development", Wiley.	
2. Hashimi S., KomatineniS. And MacLeanD., "Pro Android 2", Apress.	
3. Murphy M., "Beginning Android 2", Apress.	
Reference Book:	
1. Delessio C. and Darcey L., "Android Application Development", Pearson Edu	ucation.
2. DiMarzio J.F., "Android a Programming Guide", Tata McGraw Hill.	
Evaluation/Assessment Methodology	-
	Max. Marks 100
1) Class tasks/Sessional Examination tasks	20
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
5) Seminar On Research Project Report	
6) ESE	70
Total:	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO1: Describe principles, techniques and usage of modern software development	ent process.
CO2: Solve problems related to real world application development.	
CO3: Use standard practices to develop modern application.	
CO4: Implement recent devices to develop application.	
CO5: Evaluate modern trends of software development	



Program	me: Degree	Year: II	
Class:MCA(AIML)		Semester: IV	
Credits	Subject: Distribute	d Database Systems	
Theory:3	Cr	·	
Course (		Database Systems	
MCA-04		2	
Course (	Objectives:		
CO1: U	nderstand theoretical and pr	actical aspects of distributed database systems.	
CO2 S	tudy and identify various iss	ues related to the development of distributed databas	e system
CO3: U	nderstand the design aspects	s of object-oriented database system and related deve	lopment
CO4: E	quip students with principles	s and knowledge of distributed reliability.	
CO5: E	quip students with principles	s and knowledge of parallel and object-oriented datal	bases.
Nature o	f Paper: DSE		
Minimu	m Passing Marks/Credits:4	0% Marks (ISE+ESE)	
L:3	-		
T:0			
P:0(In He	ours/Week)		
Theory-1	Hr.=1Credit		
	2Hrs.=1Credit(4Hrs./Week=	=4Credits)	
Unit		Contents	No. of
			Lectures
			Allotted
Ι	Introduction: Distributed	Data Processing, Distributed Database System,	08
	Promises of DDBSs, Pr	oblem areas. Distributed DBMS Architecture:	
	Architectural Models fo	r Distributed DBMS, DDMBS Architecture.	
	Distributed		
	Database Design: Alternation	ive Design Strategies, Distribution Design issues,	
	Fragmentation, Allocation.		
II		decomposition: Query processing objectives,	08
	characterization of query	processors, layers of query processing, query	
		on of distributed data. Distributed query	
		ization, centralized query optimization, distributed	
	query optimization algorithm		
III		Definition, properties of transaction, types of	08
		concurrency control: Serializability, concurrency	
		orithms, time - stamped & optimistic concurrency	
	control Algorithms, deadloc		
IV		bility: Reliability concepts and measures, fault-	08
		ystems, failures in Distributed DBMS, local &	
	• •	cols, site failures and network partitioning. Parallel	
	•	el database system architectures, parallel data	
	placement, parallel		
	query processing, load balan	· ·	
V	Distributed object Datab	ase Management Systems: Fundamental object	08



<ul> <li>concepts and models, object distributed design, architectural issues, of management, distributed object storage, object query Processing.</li> <li>Object Oriented Data Model: Inheritance, object identity, persistent programming languages, persistence of objects, comparison OODBMS ORDBMS</li> </ul>	
<b>Object Oriented Data Model:</b> Inheritance, object identity, persistent programming languages, persistence of objects, comparison OODBMS ORDBMS	S and
programming languages, persistence of objects, comparison OODBMS ORDBMS	S and
ORDBMS	S and
Text Book:	
I. M. Tamer OZSU and Patuck Valduriez: Principles of Distributed Database	Systems, Pearson
Edn. Asia, 2001.	
2. Stefano Ceri and Giuseppe Pelagatti: Distributed Databases, McGraw Hill.	
Reference Book:	
1. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom: "Database Syste	ems: The Complete
Book", Second Edition, Pearson International Edition	
Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/Sessional Examination tasks	20
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
5) Seminar On Research Project Report	
6) ESE	70
Total:	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO1: Describe distributed database concept and architecture.	
CO2: Compare the type of distributed database systems.	
CO3: Display a knowledge of the fragmentation in distributed database systems.	
	hase systems
CO4: Understand of query processing, data and access control of distributeddatab	Sube by stering.



Programme: Degree		egree	Year: II	
Class: MCA(AII		e	Semester: IV	
Credits		Subject: Computer Graphics and Animation		
Theory:		<b>9</b> 1	1	
Course Code: Title: Computer Graphi		Title: Computer Gran	bhics and Animation	
MCA-052				
Course	Objectiv	/es:		
CO1:	Understand the graphics hardware used in field of computer graphics.			
	Understand the concept of graphics primitives such as lines and circle based on different algorithms.			
	Apply the 2D graphics transformations, composite transformation and Clipping concepts.			
	Apply the concepts and techniques used in 3D computer graphics, including viewin			
	transformations, projections, curve and hidden surfaces.			
CO5:	Perform the concept of multimedia and animation in real life.			
Nature	of Paper	: DSE		
Minimu	ım Passi	ng Marks/Credits:409	% Marks (ISE+ESE)	
L:3				
T:0				
	Iours/We	,		
-	1Hr.=1C			
	1-2Hrs.=	1Credit(4Hrs./Week=4	,	
Unit			Contents	No. of
				Lectures
				Allotted
Ι	Introduction and Line Generation: Types of computer graphics, Graphic			08
	•		ays, Raster scan displays, Frame buffer and video	
			, Line drawing algorithms, Circle generating	
	-		generating algorithm, and parallel version of these	
TT	algorith		the section Matrice and the section of the section	00
II	homoge shearin	enous coordinates, g.	transformation, Matrix representations and Composite transformations, Reflections and	08
	Clippin clippin nonrect	ng algorithms- Line cli g algorithm, Liang tangular clip window n clipping, Weiler and	<ul> <li>Viewing pipeline, Viewing transformations, 2-D</li> <li>apping algorithms such as Cohen Sutherland line</li> <li>Barsky algorithm, Line clipping against</li> <li>ys; Polygon clipping – Sutherland Hodgeman</li> <li>Atherton polygon clipping, Curve clipping, Text</li> </ul>	
III	Three Dimensional: 3-D Geometric Primitives, 3-D Object representation, 3-			08
			ng, projections, 3-D Clipping.	
			ric surfaces, Spheres, Ellipsoid, Blobby objects,	
		_	ne, Bspline and Bezier curves and surfaces.	
IV		* * *	Back Face Detection algorithm, Depth buffer	08
1 1	muuuu	I Lines and Surfaces	Back Taee Detection argonnini, Deptir burler	00



Ambient light, Diffuse reflection, Specular reflection and Phong	,	
Combined approach, Warn model, Intensity Attenuation, Color consid	eration,	
Transparency and Shadows.		
V Multimedia Systems: Design Fundamentals, Back ground of Art		
theory overview, Sketching & illustration, Storyboarding, different to	ools for	
animation.		
Animation: Principles of Animations, Elements of animation and th		
Power of Motion, Animation Techniques, Animation File Format,	-	
animation for Rolling Ball, making animation for a Bouncing Ball, An		
for the web, GIF, Plugins and Players, Animation tools for World Wide	Web.	
Text Book:		
1. Hearn D. and Baker M. P., "Computer Graphics C Version", Pearson Educati		
2. Foley, Vandam, Feiner, Hughes, "Computer Graphics principle", Pearson Edu	ication.	
3. Rogers, "Procedural Elements of Computer Graphics", McGraw Hill		
Reference Book:		
1. Newman W. M., Sproull R. F., "Principles of Interactive computer Graphics"	, McGraw Hill.	
2. Sinha A. N. and Udai A. D.," Computer Graphics", McGrawHill.		
Evaluation/Assessment Methodology		
	Max. Marks 100	
1) Class tasks/Sessional Examination tasks	20	
2) Presentations /Seminar		
3) Assignments		
4) Research Project Report10		
5) Seminar On Research Project Report		
6) ESE	70	
Total:	100	
Prerequisites for the course: NIL		
Course Learning Outcomes:		
CO1: Understand how to generate line, circle and ellipse also how to create 2	2D object and various	
transformation techniques.		
CO2: Understand various 3D Transformation techniques using OpenGL.		

- CO2: Understand various 3D Transformation techniques using OpenGL.
- CO3: Understand multimedia compression techniques and applications. Apply the concepts and
- CO4: techniques used in 3D computer graphics, including viewing transformations, projections, curve and hidden surfaces.
- CO5: Perform the concept of multimedia and animation in real life.



D		7			
Programme: Degree Class: MCA(AIML)		Year: II			
		Semester: IV			
Credits	• • • •				
	Theory:3Cr				
	Course Code: Title: Natural Language Processing				
MCA-05					
	Objectives:				
		pts, background and representations of natural la	nguage.		
	Analyze various real-world applic				
	Apply different parsing technique				
	Inderstand grammatical concepts	11 <b>·</b>	a anahi awitar		
		abilistic grammar methods to handle and evaluat	e amoiguity.		
	of Paper: DSE	Maring (ICE + ECE)			
	m Passing Marks/Credits:40%				
L:3 T:0					
	ours/Week)				
	Hr.=1Credit				
	-2Hrs.=1Credit(4Hrs./Week=4Ci	radita			
Unit	-211151C1Cutt(41115./Week=4C1	Contents	No. of		
Unit		Contents	Lectures		
			Allotted		
Ι	Introduction to Natural Lang	uage Understanding: The study of Language,	08		
1	6	g Language Understanding Systems, Different	00		
	11	ysis, Representations and Understanding,			
		nguage Understanding Systems, Linguistic			
	Background: An outline of Engl				
II		nowledge representation, some applications	08		
	like machine translation, databa				
III		mars and sentence Structure, Top-Down and	08		
		Network Grammars, Top- Down Chart Parsing.			
	1	d Grammars: Basic Feature system for English,			
		e Lexicon, Parsing with Features, Augmented			
	Transition Networks.				
IV	Grammars for Natural Lan	guage: Auxiliary Verbs and Verb Phrases,	08		
		anguage, Handling questions in Context-Free			
	Grammars. Human preferen	nces in Parsing, Encoding uncertainty,			
	Deterministic Parser.				
V		atistical Methods, Probabilistic Language	08		
	• •	bilities, Part-of Speech tagging, Obtaining			
	,	bilistic Context-Free Grammars, Best First			
		Form, Word senses and Ambiguity, Encoding			
	Ambiguity in Logical Form.				
Text Bo	ok:				



- 1. AksharBharti, VineetChaitanya and Rajeev Sangal, "NLP: A Paninian Perspective", Prentice Hall, New Delhi.
- 2. James Allen, "Natural Language Understanding", PearsonEducation.
- 3. D. Jurafsky, J. H. Martin, "Speech and Language Processing", PearsonEducation.

#### **Reference Book:**

- 1. L. M. Ivansca, S. C. Shapiro, "Natural Language Processing and Language Representation", AAAI Press, 2000.
- 2. T. Winograd, Language as a Cognitive Process, Addison-Wesley.

Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/Sessional Examination tasks	20
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
5) Seminar On Research Project Report	
6) ESE	70
Total:	100

Prerequisites for the course: NIL

#### Course Learning Outcomes:

- CO1: Apply the principles and Process of Human Languages such as English and other Indian Languages using computers.
- CO2: Realize semantics and pragmatics of English language for text processing
- CO3: Create CORPUS linguistics based on digestive approach (Text Corpus method)
- CO4: Check a current method for statistical approaches to machine translation.
- CO5: Perform POS tagging for a given natural language and select a suitable language modelling technique based on the structure of the language.



Programme: Degree		gree	Year: II		
Class: MCA(AIML)		0	Semester: IV		
Credits Subject: Machine Learning		Subject: Machine Le	arning		
Theory:3Cr					
	Course Code: Title: Machine Learning				
MCA-0	54				
Course	Objectiv	'es:			
CO1:	To under	stand the need for mach	hine learning for various problem solving		
			of learning algorithms and how to evaluate mode	els generated	
	from data				
		stand the latest trends i	•		
	-	n appropriate machine	learning algorithms and apply the algorithms to	a real-world	
1 P	problems				
	-		and report on the expected accuracy that can be	achieved by	
		the models			
-	of Paper				
-	im Passi	ng Marks/Credits:409	% Marks (ISE+ESE)		
L:3					
T:0		alr)			
	Iours/We				
	1Hr.=1C				
			('radita)		
-	1-21113	Credit(4Hrs./Week=4		No. of	
Unit	<u>1-21113.–</u>	Credit(4Hrs./week=4	Credits) Contents	No. of	
-		Credit(4Hrs./week=4		Lectures	
Unit			Contents	Lectures Allotted	
-	INTRO	DUCTION – Learn	Contents ing, Types of Learning, Well defined learning	Lectures	
Unit	<b>INTRO</b> problem	DUCTION – Learn ns, Designing a Lear	Contents ing, Types of Learning, Well defined learning rning System, History of ML, Introduction of	Lectures Allotted	
Unit	INTRO probler Machir	DUCTION – Learni ns, Designing a Lear le Learning Approac	Contents ing, Types of Learning, Well defined learning rning System, History of ML, Introduction of hes – (Artificial Neural Network, Clustering,	Lectures Allotted	
Unit	INTRO probler Machir Reinfor	<b>DUCTION</b> – Learn ns, Designing a Lear le Learning Approact reement Learning, Dec	<b>Contents</b> ing, Types of Learning, Well defined learning rning System, History of ML, Introduction of hes – (Artificial Neural Network, Clustering, ision Tree Learning, Bayesian networks, Support	Lectures Allotted	
Unit	INTRO problem Machim Reinfor Vector	<b>DUCTION</b> – Learnins, Designing a Learning Approach recement Learning, Dec Machine, Genetic Alg	<b>Contents</b> ing, Types of Learning, Well defined learning rning System, History of ML, Introduction of hes – (Artificial Neural Network, Clustering, ision Tree Learning, Bayesian networks, Support gorithm), Issues in Machine Learning and Data	Lectures Allotted	
Unit	INTRO problem Machin Reinfor Vector Science	<b>DUCTION</b> – Learnins, Designing a Learning Approach reement Learning, Dec Machine, Genetic Algerty S Machine Learning	<b>Contents</b> ing, Types of Learning, Well defined learning rning System, History of ML, Introduction of hes – (Artificial Neural Network, Clustering, ision Tree Learning, Bayesian networks, Support gorithm), Issues in Machine Learning and Data	Lectures Allotted	
Unit	INTRO problem Machim Reinfon Vector Science <b>REGR</b>	DUCTION – Learn ns, Designing a Lear le Learning Approach rcement Learning, Dec Machine, Genetic Al Vs Machine Learning ESSION: Linear Regr	<b>Contents</b> ing, Types of Learning, Well defined learning rning System, History of ML, Introduction of hes – (Artificial Neural Network, Clustering, ision Tree Learning, Bayesian networks, Support gorithm), Issues in Machine Learning and Data g; ression and Logistic Regression	Lectures Allotted 08 08	
Unit	INTRO problem Machim Reinfor Vector Science REGR BAYE	DUCTION – Learnins, Designing a Learning Approach ree Learning Approach reement Learning, Dec Machine, Genetic Alg Vs Machine Learning ESSION: Linear Regr SIAN LEARNING -	<b>Contents</b> ing, Types of Learning, Well defined learning rning System, History of ML, Introduction of hes – (Artificial Neural Network, Clustering, ision Tree Learning, Bayesian networks, Support gorithm), Issues in Machine Learning and Data	Lectures Allotted 08 08	
Unit	INTRO problem Machim Reinfon Vector Science <b>REGR</b> <b>BAYE</b> Classif	DUCTION – Learnins, Designing a Learning Approach ree Learning Approach reement Learning, Dec Machine, Genetic Alg Vs Machine Learning ESSION: Linear Regr SIAN LEARNING - ier, Naïve Bayes classi	Contents ing, Types of Learning, Well defined learning rning System, History of ML, Introduction of hes – (Artificial Neural Network, Clustering, sision Tree Learning, Bayesian networks, Support gorithm), Issues in Machine Learning and Data g; ression and Logistic Regression Bayes theorem, Concept learning, Bayes Optimal	Lectures Allotted 08 08	
Unit	INTRO problem Machim Reinfon Vector Science <b>REGR</b> <b>BAYE</b> Classiff <b>SUPPO</b>	DUCTION – Learn ns, Designing a Lear le Learning Approach rcement Learning, Dec Machine, Genetic Al Vs Machine Learning ESSION: Linear Regr SIAN LEARNING - ler, Naïve Bayes classi DRT VECTOR MAC	Contents ing, Types of Learning, Well defined learning rning System, History of ML, Introduction of hes – (Artificial Neural Network, Clustering, rision Tree Learning, Bayesian networks, Support gorithm), Issues in Machine Learning and Data g; ression and Logistic Regression Bayes theorem, Concept learning, Bayes Optimal fier, Bayesian belief networks, EM algorithm.	Lectures Allotted 08 08	
Unit	INTRO problem Machim Reinfor Vector Science <b>REGR</b> <b>BAYE</b> Classiff <b>SUPPO</b> kernel-	DUCTION – Learn ns, Designing a Lear ne Learning Approach cement Learning, Dec Machine, Genetic Al Vs Machine Learning ESSION: Linear Regr SIAN LEARNING - ner, Naïve Bayes classi DRT VECTOR MAC (Linear kernel, polyno	Contents ing, Types of Learning, Well defined learning rning System, History of ML, Introduction of hes – (Artificial Neural Network, Clustering, ision Tree Learning, Bayesian networks, Support gorithm), Issues in Machine Learning and Data g; ression and Logistic Regression Bayes theorem, Concept learning, Bayes Optimal fier, Bayesian belief networks, EM algorithm. CHINE: Introduction, Types of support vector	Lectures Allotted 08 08	
Unit	INTRO problem Machin Reinfor Vector Science REGR BAYE Classiff SUPPO kernel- (Decisi DECIS	DUCTION – Learnins, Designing a Learning Approach recement Learning, Dec Machine, Genetic Alge Vs Machine Learning ESSION: Linear Regr SIAN LEARNING - der, Naïve Bayes classi DRT VECTOR MAC (Linear kernel, polyno on surface), Properties EION TREE LEARNI	Contents ing, Types of Learning, Well defined learning rning System, History of ML, Introduction of hes – (Artificial Neural Network, Clustering, ision Tree Learning, Bayesian networks, Support gorithm), Issues in Machine Learning and Data g; ression and Logistic Regression Bayes theorem, Concept learning, Bayes Optimal fier, Bayesian belief networks, EM algorithm. CHINE: Introduction, Types of support vector omial kernel, and Gaussian kernel), Hyper plane – of SVM, and Issues in SVM. ING - Decision tree learning algorithm, Inductive	Lectures Allotted 08 08	
Unit I II	INTRO problem Machim Reinfor Vector Science <b>REGR</b> <b>BAYE</b> Classiff <b>SUPPO</b> kernel- (Decisi <b>DECIS</b> bias, In	DUCTION – Learn ns, Designing a Lear ne Learning Approach reement Learning, Dec Machine, Genetic Al Vs Machine Learning ESSION: Linear Regr SIAN LEARNING - ner, Naïve Bayes classi ORT VECTOR MAC (Linear kernel, polyno on surface), Properties ION TREE LEARNI ductive inference with	Contents ing, Types of Learning, Well defined learning rning System, History of ML, Introduction of hes – (Artificial Neural Network, Clustering, ision Tree Learning, Bayesian networks, Support gorithm), Issues in Machine Learning and Data g; ression and Logistic Regression Bayes theorem, Concept learning, Bayes Optimal fier, Bayesian belief networks, EM algorithm. CHINE: Introduction, Types of support vector omial kernel, and Gaussian kernel), Hyper plane – of SVM, and Issues in SVM. ING - Decision tree learning algorithm, Inductive n decision trees, Entropy and information theory,	Lectures Allotted 08 08	
Unit I II	INTRO problem Machim Reinfon Vector Science <b>REGR</b> <b>BAYE</b> Classiff <b>SUPPO</b> kernel- (Decisi <b>DECIS</b> bias, In Informa	DUCTION – Learnins, Designing a Learning Approach ice Learning Approach icement Learning, Dec Machine, Genetic Alg Vs Machine Learning ESSION: Linear Regr SIAN LEARNING - ier, Naïve Bayes classi DRT VECTOR MAC (Linear kernel, polyno on surface), Properties ION TREE LEARNI ductive inference with ation gain, ID-3 Algori	Contents ing, Types of Learning, Well defined learning rning System, History of ML, Introduction of hes – (Artificial Neural Network, Clustering, ision Tree Learning, Bayesian networks, Support gorithm), Issues in Machine Learning and Data g; ression and Logistic Regression Bayes theorem, Concept learning, Bayes Optimal fier, Bayesian belief networks, EM algorithm. CHINE: Introduction, Types of support vector omial kernel, and Gaussian kernel), Hyper plane – of SVM, and Issues in SVM. ING - Decision tree learning algorithm, Inductive n decision trees, Entropy and information theory, ithm, Issues in Decision tree learning.	Lectures Allotted 08 08	
Unit I II	INTRO problem Machin Reinfor Vector Science REGR BAYE Classiff SUPPO kernel- (Decisi DECIS bias, In Informa	DUCTION – Learnins, Designing a Learning Approach recement Learning, Dec Machine, Genetic Alge Vs Machine Learning ESSION: Linear Regr SIAN LEARNING - der, Naïve Bayes classi ORT VECTOR MAC (Linear kernel, polyno on surface), Properties ION TREE LEARNI ductive inference with ation gain, ID-3 Algori NCE-BASED LEAR	Contents ing, Types of Learning, Well defined learning rning System, History of ML, Introduction of hes – (Artificial Neural Network, Clustering, ision Tree Learning, Bayesian networks, Support gorithm), Issues in Machine Learning and Data g; ression and Logistic Regression Bayes theorem, Concept learning, Bayes Optimal fier, Bayesian belief networks, EM algorithm. CHINE: Introduction, Types of support vector omial kernel, and Gaussian kernel), Hyper plane – of SVM, and Issues in SVM. ING - Decision tree learning algorithm, Inductive n decision trees, Entropy and information theory, ithm, Issues in Decision tree learning. NING – k-Nearest Neighbour Learning, Locally	Lectures Allotted 08 08	
Unit I II III	INTRO problem Machim Reinfor Vector Science <b>REGR</b> <b>BAYE</b> Classiff <b>SUPPO</b> kernel- (Decisi <b>DECIS</b> bias, In Informa <b>INSTA</b> Weight	DUCTION – Learn ns, Designing a Lear ne Learning Approach reement Learning, Dec Machine, Genetic Al VS Machine Learning ESSION: Linear Regr SIAN LEARNING - ier, Naïve Bayes classi ORT VECTOR MAC (Linear kernel, polyno on surface), Properties ION TREE LEARNI ductive inference with ation gain, ID-3 Algori NCE-BASED LEAR ed Regression, Radial	Contents ing, Types of Learning, Well defined learning rning System, History of ML, Introduction of hes – (Artificial Neural Network, Clustering, ision Tree Learning, Bayesian networks, Support gorithm), Issues in Machine Learning and Data g; ression and Logistic Regression Bayes theorem, Concept learning, Bayes Optimal fier, Bayesian belief networks, EM algorithm. CHINE: Introduction, Types of support vector omial kernel, and Gaussian kernel), Hyper plane – of SVM, and Issues in SVM. ING - Decision tree learning algorithm, Inductive n decision trees, Entropy and information theory, ithm, Issues in Decision tree learning. NING – k-Nearest Neighbour Learning, Locally basis function networks, Case-based learning.	Lectures Allotted 08 08 08	
Unit I II	INTRO problem Machim Reinfor Vector Science REGR BAYE Classiff SUPPO kernel- (Decisi DECIS bias, In Informa INSTA Weight	DUCTION – Learnins, Designing a Learning Approach reement Learning, Dec Machine, Genetic Alge Vs Machine Learning ESSION: Linear Regr SIAN LEARNING - der, Naïve Bayes classif ORT VECTOR MAC (Linear kernel, polyno on surface), Properties FION TREE LEARNING ductive inference with ation gain, ID-3 Algori NCE-BASED LEAR ed Regression, Radial TCIAL NEURAL	Contents ing, Types of Learning, Well defined learning rning System, History of ML, Introduction of hes – (Artificial Neural Network, Clustering, ision Tree Learning, Bayesian networks, Support gorithm), Issues in Machine Learning and Data g; ression and Logistic Regression Bayes theorem, Concept learning, Bayes Optimal fier, Bayesian belief networks, EM algorithm. CHINE: Introduction, Types of support vector omial kernel, and Gaussian kernel), Hyper plane – of SVM, and Issues in SVM. ING - Decision tree learning algorithm, Inductive n decision trees, Entropy and information theory, ithm, Issues in Decision tree learning. NING – k-Nearest Neighbour Learning, Locally	Lectures Allotted 08 08	



		• 1	
	Derivation of Backpropagation Algorithm, Generalization, Unsup	ervised	
	Learning – SOM Algorithm and its variant;	. 1	
	<b>DEEP LEARNING</b> - Introduction, concept of convolutional neural n	-	
	Types of layers – (Convolutional Layers, Activation function, poolin		
	connected), Concept of Convolution (1D and 2D) layers, Training of r		
	Case study of CNN for e.g. on Diabetic Retinopathy, Building a smart	speaker,	
	Self-deriving car etc.		
V	<b>REINFORCEMENT LEARNING</b> –Introduction to Reinforcement Lea	-	08
	Learning Task, Example of Reinforcement Learning in Practice, L	0	
	Models for Reinforcement - (Markov Decision process, Q Learning	<b>U</b>	
	Learning function, Q Learning Algorithm), Application of Reinfor	cement	
	Learning, Introduction to Deep Q Learning.		
	GENETIC ALGORITHMS: Introduction, Components, GA cy	cle of	
	reproduction, Crossover, Mutation, Genetic Programming, Mod	els of	
	Evolution and Learning, Applications		
Text Bo	ok:		
1. Tom	M. Mitchell, -Machine Learning, McGraw-Hill Education (India) Priva	ate Limite	ed, 2013.
2. Ethe	m Alpaydin, -Introduction to Machine Learning (Adaptive Computat	tion and	Machine
Lear	ning), MIT Press2004.		
3. Step	hen Marsland, —Machine Learning: An Algorithmic Perspective, CRC P	ress, 200	9.
Referen	ce Book:		
1. Bish	op, C., Pattern Recognition and Machine Learning. Berlin: Springer-Verl	ag.	
2. M. C	Sopal, "Applied Machine Learning", McGraw Hill Education		
	<b>Evaluation/Assessment Methodology</b>		
		Max.	Marks 100
1) Clas	ss tasks/Sessional Examination tasks		20
2) Pres	sentations /Seminar		
3) Ass	ignments		
4) Res	earch Project Report		10
5) Sen	ninar On Research Project Report		
6) ESE	3		70
	Total:		100
Prerequ	isites for the course: NIL		
-	Learning Outcomes:		
	Learn the basics of learning problems with hypothesis and version spaces		
CO2:	Understand the features of machine learning to apply on real world proble	ems	
	Characterize the machine learning algorithms as supervised learning		insupervised
	learning and Apply and analyze the various algorithms of supervise		
	learning		*
	Analyze the concept of neural networks for learning linear and non-linear	r activatio	on functions
	Learn the concepts in Bayesian analysis from probability models and met		



se Code: Title: Quantum Computing				
complexity and explain why certain problems				
on with reference to the relevant concepts in				
computing algorithm by simulating it on a				
al challenges in building a quantum computer.				
am as part of a co-operative team, making use				
such as version control systems).				
ehensible to a group of different programmers				
ts of a project in written and verbal form.				
in executing a defined project of research,				
and implementing relevant outcomes.				
SE)				
No. of				
Lectures				
Allotted				
ives, Quantum Bits, Quantum <b>08</b>				
tum Information, Postulates of				
tum information, rostulates of				
– Quantum algorithms, Single <b>08</b>				
asurement, Universal Quantum				
antum Fourier transform, Phase				
gorithms – Quantum counting –				
oblems – Quantum Search for an				
es, Conditions for Quantum 08				
Im Computer, Optical Photon				
tum electrodynamics, Ion traps,				
Quantum Operations – Classical 08				
perations, Examples of Quantum				
ations of Quantum operations,				



		C	
	Limitations of the Quantum operations formalism, Distance Meas	ures for	
	Quantum information.		
V			
	Error – Correction, Constructing Quantum Codes, Stabilizer codes,		
	Tolerant Quantum Computation, Entropy and information – Shannon E		
	Basic properties of Entropy, Von Neumann, Strong Sub Additivity	y, Data	
	Compression, Entanglement as a physical resource.		
Text	Book:		
1. N	licheal A. Nielsen. & Issac L. Chiang, "Quantum Computation and Qua	antum Information",	
C	ambridge University Press, Fint South Asian edition, 2002.		
2. E	leanor G. Rieffel, Wolfgang H. Polak, "Quantum Computing - A C	Gentle Introduction"	
(5	Scientific and Engineering Computation) Paperback –Import,3 Oct 2014		
3. C	omputing since Democritus by Scott Aaronson		
Refe	rence Book:		
1. C	omputer Science: An Introduction by N. David Mermin		
	anofsky's and Mannucci, Quantum Computing for Computer Scientists.		
	Evaluation/Assessment Methodology		
		Max. Marks 100	
1) (	Classtasks/Sessional Examination	20	
2) 1	Presentations /Seminar		
3)	Assignments		
	Research Project Report	10	
	ESE	70	
,	Total:	100	
Prer	equisites for the course:NIL	<u> </u>	
-	se Learning Outcomes:		
	1: Able to access the quantum computing services provided by IBM,	and other quantum	
	computing services Simulators.	1	

- CO2: Able to think independently of quantum circuits, algorithm and applications for real-time stochastic problems in QC.
- CO3: Trained to design QC circuits and reversible logics for real world problems. Produce code and documentation that is comprehensible to a group of different programmers and present the CO4: theoretical background and results of a project in written and verbal form.
- Apply knowledge, skills, and understanding in executing a defined project of research, CO5: development, or investigation and in identifying and implementing relevant outcomes.



Ducanor	mmar Da	<b>242</b> 2	Year: II	
Programme: Degree Class: MCA(AIML)		0		
Class: MCA(AIML)Semester: IVCreditsSubject: Internet of Things				
	Theory:3Cr			
-		Title. Internet of Thir		
Course Code: Title: Internet of Things MCA-056				
	Objectiv	001		
	<u>v</u>		noinlas and shallonges in IoT	
			nciples and challenges in IoT. re devices and sensors used for IoT.	
		e	in aspects and protocols used in IoT.	
			fe applications using Arduino programming.	
		1 0	or popular applications	
	of Paper	*		
	A	ng Marks/Credits:409	% Marks (ISE+ESE)	
L:3	111 I GOOI			
L.5 Т:0				
	lours/We	ek)		
	1Hr.=1Ci			
2		Credit(4Hrs./Week=4	Credits)	
Unit			Contents	No. of
				Lectures
				Allotted
Ι	Interne	et of Things (IoT):	Vision, Definition, Conceptual Framework,	08
	Archite	ctural view, technolo	ogy behind IoT, Sources of the IoT, M2M	
	Commu	inication, IoT Examp	les. Design Principles for Connected Devices:	
	IoT/M2	M systems layers	and design standardization, communication	
		•	ent and consolidation, ease of designing and	
	afforda	•		
II			rs, Digital sensors, actuators, radio frequency	08
			ology, wireless sensor networks, participatory	
	-		ded Platforms for IoT: Embedded computing	
			apported Hardware platforms such as Arduino,	
		uino, Raspberry pi,	Beagle Bone, Intel Galileo boards and ARM	
	cortex.			0.2
III			aspects in IoT: Wireless Medium access issues,	08
			y routing protocols, Sensor deployment & Node	
TX 7		ry, Data aggregation &		00
IV			Arduino Platform Boards Anatomy, Arduino	08
			ator, using libraries, additions in Arduino,	
<b>X</b> 7		nming the Arduino for		00
V		0 0	challenges: Development Challenges, Security	08
			IoT Applications: Smart Metering, E-health, City	
			Applications, home automation, smart cards,	
	commu	meaning data with H	/W units, mobiles, tablets, Designing of smart	



	9997729999776333333399999999999999999999
street lights in smart city.	
Text Book:	
1. Olivier Hersent, David Boswarthick, Omar Elloumi "The Internet of Things protocols", willey	key applications and
2. Jeeva Jose, Internet of Things, Khanna Publishing House	
3. Michael Miller "The Internet of Things" by Pearson	
Reference Book:	
1. Raj Kamal "INTERNET OF THINGS", McGraw-Hill, 1ST Edition, 2016	
<ol> <li>ArshdeepBahga, Vijay Madisetti "Internet of Things (A hands on approach publications, 2014</li> </ol>	)" 1ST edition, VPI
3. Adrian McEwen, Hakin Cassimally "Designing the Internet of Things" Wiley	⁷ India
Evaluation/Assessment Methodology	
	Max. Marks 100
1) Class tasks/Sessional Examination tasks	20
2) Presentations /Seminar	
3) Assignments	
4) Research Project Report	10
5) Seminar On Research Project Report	
6) ESE	70
Total:	100
Prerequisites for the course: NIL	
Course Learning Outcomes:	
CO1: Able to understand the application areas of IOT	
CO2: Able to realize the revolution of Internet in Mobile Devices, Cloud & Ser	nsor Networks
CO3: Able to understand building blocks of Internet of Things and characterist	ics.
CO4: Apply IoT for developing real life applications using Arduino programm	ing.

CO5: To develop IoT infrastructure for popular applications



# School of Computer Science & Applications ACADEMIC HAND BOOK



**Ph.D. Program (Computer Science and Applications)** 

Academic Hand Book (School of Computer Sciences & Applications)



#### Vision

To be a world - class university imparting knowledge and values and providing students, an excellent learning experience through research & innovation in the field of Science, Technology, Management and other areas that will meet the aspirations of world community.

#### Mission

University stands for academic, professional and ethical empowerment of the youths by using the state-of-the-art technology, time-tested and innovative concepts, excellent infrastructure and internationally acclaimed facilitators.



## **IMPORTANT NOTES**

## Ph.D. Manual download

https://iimtu.edu.in/uploads/images/16704069111.pdf (Eligibility criteria, Minimum Standards and Procedures for Award of Ph.D. Degree)

## Ph.D. Forms download

https://iimtu.edu.in/page/phd-forms

## **PH.D. Admission Guidelines**

https://iimtu.edu.in/page/phd-admission-guidelines-iimtu



## **Evaluation Scheme**

**Ph.D.** (Computer Science and Applications)

Academic Hand Book (School of Computer Sciences & Applications)



## **EVALUATION SCHEME**

S.No.	Code	Subject Name	P	eriods	Evaluat	ion Scheme	Total	Credits
			L	T/P	Internal	External		
1.	PHDCS-101		4		30	70	100	4
	(Core Theory)	Advanced Research Methodology						
2.	PHDCS-102		4		30	70	100	4
	(Core Theory)	Review of Literature						
		(Area of Research)						
		PHDCS-103(I)						
		Network Security & Cryptography						
		PHDCS-103(II)						
	PHDCS-103	Cloud Computing						
3.	(E-Elective)	PHDCS-103(III)	4		30	70	100	4
	(Discipline Specific)	Soft Computing						
		PHDCS-103(IV)						
		Machine Learning						
		PHDCS-103(V)						
		Internet of Things						
4.	CPE-RPE -104	Research and Publication Ethics	2		20	30	50	2
	(Core Theory)							
5.	PHDCS-105	Seminar / Presentation	2		50	0	50	2
	(Discipline Specific)							
	Total		16		160	240	400	16

Note: - At Sr. No.3 Scholar has to select any one subject as per her/his area ofresearch.



Course Detail	PAPER-I: AdvancedResearch Methodology
	PHDCS-101
Core Theory	Detail Syllabus

Sessional Marks: 30 Exam Marks: 70

#### **OBJCTIVES OF THE COURSE:**

- To learn the art of Literature Review and to focus on a research problem using scientific methods.
- To inculcate analytical thinking and data interpretation capability.
- To enable to apply the fundamental laws of performance analysis to establish the relationships between workload parameters and system performance for a given system.
- To learn how to synthesize and communicate research findings to a wide range of audiences.

#### UNIT-I

Formulating Research Problem and Conceptualizing a Research Design:

Meaning of research problem, Sources of research problem, Criteria/Characteristics of a good research problem, Scope and objectives of research problem. Reviewing the literature, formulating a research problem, identifying variables, constructing hypotheses, Errors in selecting a research problem. Research design: Objectives, Strategies, Guidelines for design of experiments. Selecting a study design.

#### **UNIT-II**

Research Modeling: Types of Models, Model building and stages, Data consideration and

testing Heuristic and Simulation modeling. Mathematical Modeling and Simulation: Important of modeling and simulation, Continuous and discrete models and simulation, Model validation, verification and credibility. Modeling Principles: Fundamental laws, Monte Carlo simulation, stochastic state transition systems.

#### **UNIT-III**

Research Tools: Tools needed for Editing, Presentation, Data Analysis and visualization, Simulation and Modeling. Analysis, Design and Simulation tools related to specialization. Searching: Using advanced search technique for searching research materials in online repositories/consortium, like inflibnet, Indest, Scopus, etc.

#### UNIT-IV

Developing a Research Proposal: Format of research proposal, Individual research proposal. Institutional proposal, Proposal of a student – a presentation and assessment by a review committee consisting of Guide and external expert only. Report writing and Publishing Research Findings: Prewriting considerations, Formats of report writing, Formats of publications in Research journals. Writing a research report/thesis.

Plagiarism: Introduction of Plagiarism, Dimension of Plagiarism, Detect Plagiarism, Strategies to Minimize Plagiarism



#### **Recommended Textbooks:**

- 1. "Research Methodology-Methods and Techniques", by C.K. Kothari (2004), NewAge International, New Delhi.
- 2. "Research Methodology: A Step-by-Step Guide for Beginners", by Ranjit Kumar(2005), Pearson India
- 3. "Elements of Research Writing", by Dr. S.K. Yadav (2015), UDH Publishers & Distributors, Pvt. Ltd. New Delhi
- 4. "Applied Statistics & Probability for Engineers", by Douglas C. Montgomery and George C. Runger (2007), Wiley India.
- 5. "Theory of modeling and simulation integration discrete event and continuous complex dynamic systems", by Bernard P. Zeigher, Herbert Praehofer, Tag Gon Kim (2000), Academic Press.



Course Detail	PAPER-II: REVIEW OF LITERATURE
	PHDCS-102

#### DetailSyllabus

#### Sessional Marks: 30 Exam Marks: 70

**Core Theory** 

#### **OBJCTIVES OF THE COURSE:**

- To learn the art of Literature Review and to focus on a research problem using scientific methods.
- To inculcate old methodologies and developing capacity of understand already work done.
- To enable to apply the fundamental laws of performance of their research work.
- To learn how to synthesize and communicate old research findings to their work of research.

The research scholar will review the important studies conducted at the national and international level either by individuals or organizations including government agencies and present the methodology adopted and important findings emerged from these studies. Based on this review of literature the researcher will identify the research gaps existing in the available literature and thus justifying the need for the present study.

The researcher is supposed to follow the pattern adopted in the standard national and international research journals.

**Recommended Textbooks and References;** 

- 1. Dharwadkar, Vinay, ed. Collected Essays of A. K. Ramanujan. Delhi: Oxford University Press, 1999.
- 2. During, Simon, ed. The Cultural Studies: Reader. London: Routledge, 1993.
- 3. Fanon, Frantz. The Wretched of the Earth. London: Penguin Books, 1963.
- 4. Zizek, Slavoj. Mapping Ideology. London: Verso, 1994.
- 5. Agger, Ben. Cultural Studies as Critical Theory. London: The Palmer Press, 1992.
- 6. Nicol, Bran, ed. Postmodernism and the Contemporary Novel: A Reader. Edinburg: Edinburg Univ Press, 1992.
- 7. Lodge, David, ed. Modern Criticism and Theory: A Reader. London: Longman, 1988.
- 8. Bulletin of the American Academy of Arts and Sciences, Vol. 43, No. 4 (Jan., 1990), pp. 11-34
- 9. Mikhail Bakhtin. Problems of Doestoevsky's Poetics. Trans. Caryl Emerson, Manchester: Manchester Univ. Press, 1984.
- 10. The American Historical Review, Vol. 99, No. 5 (Dec., 1994), pp. 1475-1490.
- 11. Barker, Chris. Cultural Studies: Theory and Practice. London: Sage, 2011.



Course Detail	PAPER-III: Network Security and Cryptography (Elective)
	PHDCS-103(I)
(Area of Research)	Detail Syllabus

Sessional Marks: 30 Exam Marks: 70

#### UNIT-I

Introduction to Information Security and Number theory What is Information Security, Need of Information Security; Security Architecture Data Security; Security Goals: Confidentiality, Integrity, Availability; Attacks on Security; Active vs. Passive Attacks; Authentication; Access Control; Non-Repudiation; Steganography; Basics of Cryptography; Cryptanalysis; Digital signatures; Public-key cryptography; Cryptographic Hash functions. Mathematical induction, Binomial Number theorem, Elementary Number Theory, Integer Arithmetic, Modular Arithmetic, Factorization, Exponentiation and Logarithm, Primes, Matrices, Groups, Rings, Fields, Finite Fields; Cryptography background;

#### UNIT-II

Cryptographic techniques and Cryptanalysis Symmetric Cryptography, Data Encryption Standard (DES), Triple-DES, the Advanced Encryption Standard (AES), International Data Encryption Algorithm (IDEA), Blowfish, C4, RC5, RC6, Asymmetric Cryptography, The Diffie-Hellman Algorithm, RSA, Elliptic Curve Cryptosystems (ECC)

#### UNIT-III

Latest Security Technologies SDN (Software-defined Networking), Virtual Dispersive Networking (VDN), Smart Grid Technologies, SAML & The Cloud, Distributed Ledger Technology principles, Blockchain, Advanced analytics, Context-Aware Behavioral Analytics, Deep learning, Gartner's CARTA approach, Bioprinting, Mobile Location Tracking, Behavioral Profiles, Third-Party Big Data, External Threat Intelligence, Tailor-made security, Early Warning Systems, Hardware authentication.

#### UNIT-IV

Security in Cloud and Distributed Systems The cloud computing and distributed systems concepts and models: virtualization, cloud storage: key-value/NoSQL stores, cloud networking, Consensus in Cloud Computing, FLP proof, fault-tolerance in cloud using PAXOS, peer-to-peer systems, classical distributed algorithms, leader election, time, ordering in distributed systems, distributed mutual exclusion, distributed algorithms for failures and recovery approaches, Security As a Service, Distributed Ledger Technology principles, Blockchain, Apache Spark, Google's Chubby, Apache Zookeeper, HBase, MapReduce, Apache Cassandra, Google's B4, Microsoft's Swan

#### **Recommended Textbooks:**

- 1. "Elementary Number Theory" by David M. Burton, Tata McGraw Hill Publication
- 2. "A Course in number theory and cryptography" by Neal Koblilz, Springer-Verlag Publication
- 3. "Cryptography & Network Security" by Behrouz Forouzan, Tata McGraw-Hill
- 4. "Handbook of Applied Cryptography" by A. Menezes, P. van Oorschot, and S. Vanstone, CRC Press, 1996.
- 5. "Cryptography and Network Security" by William Stallings, Pearson Education India, 2008
- 6. "Understanding Cryptography" by ChristofPaar& Jan Pelzl, Springer Heidelberg Dordrecht, London New York, 2010
- 7. "Blockchain Revolution: How the Technology Behind Bitcoin Is Changing Money, Business, and the World.", 2016. Print, Tapscott, Don, and Alex Tapscott.
- 8. "Big Data Analytics in Cybersecurity (Data Analytics Applications)" by OnurSavas (Editor),
- 9. "Cloud Computing: Principles and Paradigms", by Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, 2011
- 10. "Distributed Computing:Principles, Algorithms, & Systems" by Ajay D. Kshemkalyani& Mukesh Singhal **References**:
- 1. "Applied Cryptography" by Bruce Schneier, JohnWillley and Sons Inc, 2008



- 2. "Complexity and Cryptography: An Introduction" by John Talbot & Dominic Welsh, Cambridge University Press 2006
- 3. "Computer security and cryptography" by Alan g. Konheim, John Wiley & Sons, Inc., 2007
- 4. "Cryptography and Data Security" by Dorothy Elizabeth and Robling Denning' AddisonWesleyPublishing Company, 1982
- 5. "An Introduction to Mathematical Cryptography" by Jeffrey Hoffstein, Jill Pipher, Joseph H., Silverman, Springer Publication
- 6. "The Code Book: The Science of Secrecy from Ancient Egypt to Quantum Cryptography" by Simon Singh, Anchor Books Publication
- 7. http://www.ecrypt.eu.org/
- 8. http://www.iacr.org/
- 9. https://www.cyberdegrees.org/resources/hot-technologies-cyber-security/



Course Title	PAPER–III Cloud Computing(Elective) COURSE PHDCS-103(II)
Discipline Specific	Detail Syllabus

Sessional Test: 30 Final Exam: 70

#### UNITI

Cloud Computing definition, private, and public and hybrid cloud. Cloud types; Cloud Computing model, laaS, PaaS, SaaS, Benefits and challenges of cloud computing, public vs private clouds, role of virtualization in enabling the cloud; Business Agility: Benefits and challenges to Cloud architecture. Application availability, performance, security and disaster recovery; next generation Cloud Applications. Difference between mainframe computing, distributed computing, cloud computing, grid computing, and green computing. Limitation of cloud computing, Issues on cloud computing.

#### UNITII

Reliability, availability and security of services deployed from the cloud. Performance and scalability of services, tools and technologies used to manage services deployment; Cloud Economics: Cloud Computing infrastructures available for implementing cloud based services. Economics of choosing a Cloud platform for an organization, based on application requirement, economic constraints and business needs (e.g. Amazon, Microsoft and Google, Salesforce.com, Ubuntu and Red hat).

#### UNITIII

Cloud computing load balancing algorithms, Different types of load balancing in cloud computing, Cloud Computing load balancing Comparison with DNS Load Balancing, Importance of Load Balancing in cloud computing, Load Balancing Techniques in cloud computing, Scheduling Algorithms, Load Balancing Policies, A Comparative Study of Algorithms, Client-side Load Balancer Using Cloud, cloud load balancing services, cloud load balancers, Various resource allocation strategies in cloud computing, Comparison of load balancing algorithms used in cloud computing, Load balancing issues among multifarious issues of cloud computing environment, Load balancing in cloud computing using soft computing technique's, Load balancing in public cloud by division of cloud based on the geographical location,

#### UNITIV

Literature Review: A review of Cloud computing load balancing algorithms. A review of cloud computing load balancing strategies. A survey on cloud computing load balancing techniques. A Survey on cloud computing load balancing tools.

#### **Books & References:**

1. Gautam Shroff, "Enterprise Cloud Computing Technology Architecture Applications", Cambridge University Press; 1 edition, [ISBN: 978-0521137355], 2010.

- 2. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach"McGraw-Hill Osborne Media; 1 edition [ISBN: 0071626948], 2009.
- 3. Dimitris N. Chorafas, "Cloud Computing Strategies" CRC Press; 1 edition, ISBN1439834539, 2010.
- 4. Chee, Brian J.S. (2010). Cloud Computing: Technologies and Strategies of the Ubiquitous Data Center. CRC Press. ISBN 9781439806173.
- 5. Shatz, Gur (15 October 213). "Bringing Layer 7 Load Balancing into the Cloud". Incapsula. Retrieved 30 January 2014.
- 6. Randles, Martin, David Lamb, and A. Taleb-Bendiab. "A comparative study into distributed load balancing algorithms for cloud computing". Advanced Information Networking and Applications
- 7. Workshops (WAINA), 2010 IEEE 24th International Conference on IEEE, 2010.
- 8. Ferris, James Michael. "Methods and Systems for load balancing in cloud-based networks". US Patent Application 12/127, 926.



Course	Title
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#### PAPER-III: SOFT COMPUTING (Elective) PHDCS-103(III)

**Detail Syllabus** 

Discipline Specific Sessional Marks: 30

Exam Marks: 70

#### UNITI

Introduction to Soft Computing: Introduction to Fuzzy Computing, Neural Computing, Genetic Algorithms, Probabilistic Networks, Associative Memory, Deep learning, Adaptive Resonance Theory, SWARM Intelligence etc. Applications of Soft Computing in Pattern Recognition, Computer Vision, Natural Language Processing, Multimodal Information Access & Retrieval, Multisource Data Analysis, Image Processing, Video Analysis, Data Clustering etc.

#### UNITII

Fundamentals of Neural Network: Introduction to Artificial Neuron, Architectures, Learning Methods, Taxonomy of NN Systems, Single-Layer NN System, Applications. Back Propagation Network: Background, Back-Propagation Learning, Back-Propagation Algorithm. Associative Memory and Adaptive Resonance Theory.

#### UNITIII

Fuzzy Set Theory: Introduction to Fuzzy Set: Membership, Operations, Properties; Fuzzy Relations. Fuzzy Systems: Introduction, Fuzzy Logic, Fuzzification, Fuzzy Inference, Fuzzy Rule Based System, Defuzzification.

#### UNITIV

Genetic Algorithms & Modeling: Introduction to Encoding techniques, Operators of Genetic Algorithms, Basic Genetic Algorithms, and Hybrid Systems: Integration of NN, GA and FS. Introduction to SVM, SOM, Supervised & Unsupervised learning, Problems related to Data Clustering, Multi-criteria Decision Making, Video Analysis, etc. Mathematical tools of Soft Computing.

#### **Recommended Textbooks:**

- 1. Neural Network, Fuzzy Logic and Genetic Algorithms-Synthesis and Applications, S. Rajasekaran and G.A. Vijaya lakshmi Pai (2005), Prentice Hall.
- 2. Introduction To Data Mining And Soft Computing Techniques, M. Ramakrishna Murthy (2016), Laxmi Publications Private Limited.
- 3. Learning and Soft Computing, V. Kecman (2004), Pearson Education.
- 4. Materials Design Using Computational Intelligence Techniques, Shubhabrata Datta (2016), CRC Press.
- 5. Genetic Algorithms in Engineering and Computer Science, G. Winter, J. Periaux and M. Galan (1995), John Wiley & Son Ltd.
- 6. Pattern Recognition and Machine Learning, Christopher Bishop (2006), Springer.
- 7. Deep Learning, Ian Goodfellow, Yoshua Bengio and Aaron Courville (2016), MIT Press, http://www.deeplearningbook.org

#### Web References:

- 1. "SWAYAM: Introduction to Machine Learning", https://swayam.gov.in/courses/4733-july-2018-introduction-to-machine-learning.
- 2. "NPTEL: Deep Learning", https://onlinecourses.nptel.ac.in/noc18_cs41/
- 3. "SWAYAM: Artificial Intelligence", https://swayam.gov.in/courses/5011-artificial-intelligence.
- 4. "NPTEL: Introduction to Soft Computing", https://onlinecourses.nptel.ac.in/noc18cs13/ preview
- 5. "NPTEL: Introduction to Artificial Neural Networks", https://nptel.ac.in/courses/117105084/



Course Title	PAPER-III: MACHINE LEARNING (Elective)
	PHDCS-103(IV)
Discipline Specific	Detail Syllabus

Sessional Test: 30 Final Exam: 70

#### UNIT I

Introduction to machine learning and different types of learning: Overview of Machine Learning; Definition, Components of a learning problem, Applications, Choosing a Model Representation, Types of learning: Supervised Learning, Unsupervised Learning, Semi-supervised learning, Reinforcement Learning, Inductive Learning or Prediction,

#### UNIT II.

Linear Regression and Decision Trees, Instance based learning and Feature Selection: Regression, Types of Regression Models, LMS Algorithm, Decision Tree, Overfitting, InstanceBased Learning, Basic k-nearest neighbor classification, KNN, Euclidean Distance, Feature Reduction in ML, Subset selection, Feature extraction, PCA

#### UNIT III.

Probability and Bayes Learning, Support Vector Machines, Clustering: Probability for Learning, Bayes Theorem, MAP Learner, Naïve Bayes, Bayesian Network, Logistic Regression for classification, Support Vector Machines, Unsupervised learning, Partitioning Algorithms, Hierarchical Clustering, Density based Clustering, K-means algorithm.

#### UNIT IV.

Neural Network: Neuron, ANNs, Perceptrons, Gradient Descent, Backpropagation, Deep Learning, Deep Neural Network, Hierarchical Representation, Unsupervised Pre-training, Activation Functions

#### **Recommended Textbooks**

- 1. Alpaydin E, "Machine Learning", MIT Press, 2014.
- 2. Bishop C, "Pattern Recognition and Machine Learning", Springer, 2006.
- 3. Duda R, Hart E and Stork D, "Pattern Classification", Wiley-Interscience, 2000.
- 4. Mitchell T, "Machine Learning", McGraw-Hill, 2017.
- 5. Hastie T, Tibshirani R and Friedman J, "Elements of Statistical Learning", Springer, 2017.



Course Title	PAPER-III: Internet of Things (Elective) PHDCS-103 (V)
Discipline Specific	Detail Syllabus

Sessional Test: 30 Final Exam: 70

#### UNIT I:

Introduction – Concepts behind the Internet of Things IoT definition, advantages, and impact, essential components of IoT (Introduction of IoT devices and discussion on the difference among IoT devices, computers, and embedded devices). The IoT paradigm: Smart objects sensors and actuators in IoT (accelerometer, photo resistor, buttons, motor, LED, vibrator, analog signal vs. digital signal), Bits and atoms, Goal orientation.

#### **UNIT II:**

Technologies behind the Internet of Things Convergence of technologies. RFID + NFC, Wireless networks + WSN, RTLS + GPS, Agents + Multi agent systems. IoT architecture, component and technology (Device, networking, cloud computing and big data analysis). IoT challenges (computation and communication constraints, power constraints, maintenance cost, reliability, data trustworthiness, security, and privacy).

#### **UNIT III:**

Security and Privacy for Internet of Things Definitions, notions, relations, needs, threats, requirements; Privacy Enhancing Technologies (PET), etc. discussion on security threats on specific IoT applications (unauthorized access, side-channel attacks, safety ricks); cyber security overview in IoT, data privacy in IoT: introduction to privacy enhancing techniques including keyword search and differential privacy, device/user authentication in IoT: introduction to authentication techniques including password, biometric, proximity-based, and behavior based techniques, data trustworthiness problem in IoT and some mechanisms to enhance data trustworthiness.

#### Literature Review

#### **UNIT IV:**

A review of Internet of Things, a review on technologies behind the internet of Things, a survey on IoT devices, IOT applications, Security threats and techniques in IoT, survey on IOT security and privacy challenges, appropriate security/privacy solutions for IoT, Review on IoT Security Models and Frameworks.

#### Text Books and References:

- 1. Books, Rethinking the Internet of Things: A Scalable Approach to Connecting Everything, by Francis daCosta, ISBN: 978-1-4302-5740-0, 2013.
- 2. Security and the IoT ecosystem, KPMG International, 2015.
- 3. Architecting the Internet of Things, by Dieter Uckelmann, Mark Harrison and Florian Michahelles, ISBN: 978-3-642-19157-2, 2011.
- 4. Internet of Things: Privacy & Security in a Connected World" by Federal TradeCommission, 2015.
- 5. Internet of Things: IoT Governance, Privacy and Security Issues" by European Research Cluster, 2015.
- Internet of Things Global Technological and Society Trends Smart Environments and spaces to Green ICT; Ed. Ovidiu Vermesan, SINTEF, NO & Peter Friess, EU, BE; The River Publishers Series in Communications; ISBN: 978-87-92329-67-7.
- 7. Internet of Things Legal Perspectives; Rolf H. Weber and Romana Weber; Forlag
- 8. "The Internet of Things", Proceedings of the 20th Tyrrhenian Workshop on Digital Communications. E Daniel Giusto, Antonio lera, Giacomo Morabito and luigiatzori; Springer, 2010.



Course Title	Paper IV: Research and publication ethics CPE-RPE – 104
Core Theory	Detail Syllabus
T 4 1 00	

Internal: 20 External: 30

#### **RESEARCH AND PUBLICATION ETHICS**

**OBJECTIVE**: This course has total 6 units focusing on basics of philosophy of science and ethics, research integrity, publication ethics. Hands-on-sessions are designed to identify research misconduct and predatory publications. Indexing and citation databases, open access publications, research metrics (citations, h-index, Impact Factor, etc.) and plagiarism tools will be introduced in this course.

#### **COURSE CONTENTS:**

- 1. Pedagogy: Classroom teaching, guest lectures, group discussions, and practical sessions.
- 2. Evaluation: Continuous assessment will be done through tutorials, assignments, quizzes, and group discussions. Weightage will be given for active participation. Final written examination will be conducted at the end of the course.
- 3. Course structure: The course comprises of six modules listed in table below. Each module has 4-5 units.

MODULES	UNIT TITLE	TEACHING HOURS
Theory		
RPE 01	Philosophy and Ethics	4
RPE 02	Scientific Conduct	4
RPE 03	Publication Ethics	7
Practice		
RPE 04	Open Access Publishing	4
RPE 05	Publication Misconduct	4
RPE 06	Databases and Research Metrics	7

Total: - 30

#### SYLLABUS IN DETAIL

#### THEORY

#### **RPE 01: PHILOSOPHY AND ETHICS (3 hrs.)**

- 1. Introduction to philosophy: definition, nature and scope, concept, branches
- 2. Ethics: definition, moral philosophy, nature of moral judgments and reactions

#### RPE 02: SCIENTIFICCONDUCT (5 hrs.)

- 1. Ethics with respect to science and research
- 2. Intellectual honesty and research integrity
- 3. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
- 4. Redundant publications: duplicate and overlapping publications, salami slicing
- 5. Selective reporting and misrepresentation of data

#### **RPE 03: PUBLICATION ETHICS (7 hrs.)**

- 1. Publication ethics: definition, introduction and importance
- 2. Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
- 3. Conflicts of interest
- 4. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types
- 5. Violation of publication ethics, authorship and contributor ship



- 6. Identification of publication misconduct, complaints and appeals
- 7. Predatory publishers and journals

#### PRACTICE

#### RPE 04: OPEN ACCESS PUBLISHING (4 hrs.)

- 1. Open access publications and initiatives
- 2. SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies
- 3. Software tool to identify predatory publications developed by SPPU
- 4. Journal finder/journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggested, etc.

#### RPE 05: PUBLICATION MISCONDUCT (4hrs.)

(A) Group Discussions (2 hrs.)

- 1. Subject specific ethical issues, FFP, authorship
- 2. Conflicts of interest
- 3. Complaints and appeals: examples and fraud from India and abroad
  - (B) Software tools (2 hrs.): Use of plagiarism software like Turnitin, Urkund and other open-source software tools

#### RPE 06: DATABASES AND RESEARCH METRICS (7hrs.)

- (A) Databases (4 hrs.)
  - 1. Indexing databases
  - 2. Citation databases: Web of Science, Scopus, etc.
- (B) Research Metrics (3 hrs.)
  - 1. Impact Factor of journal as per Journal Citation Report, SNIP, SIR, IPP, Cite Score

Metrics: h-index, g index, i10 index, altmetrics



Course Detail	Seminar/Presentation PHDCS-105
Discipline Specific	Detail Syllabus

#### Seminar/Presentation: 50

This course will be handled by the Guide/Supervisor of the respective student. Concerned guide will assign topics for review writing other than the topic of Ph.D. Student and the students will have to submit the review to HOD/Dean/Director of the Research Center which will be assessed by an expert. This will be followed by presentation and will be assessed by group of teachers.