

IIMT College of Medical Sciences (Allied Health Sciences)

ACADEMIC HAND BOOK



BACHELOR OF PHYSIOTHERAPY (EVALUATION SCHEME & SYLLABUS)

DURATION OF COURSE:

- BPT course will be a full time regular course.
- Duration will be four years followed by compulsory six months rotatory internship.
- This course shall be divided into four professional examinations namely BPT Part-1 at the end of first academic year, BPT Part-II at the end of second academic year, BPT Part-III at the end of third academic year, BPT Part-IV at the end of fourth academic year.

EXAMINATION:

- There shall be an annual university examination at the end of each academic year in the form of theory papers and practical examinations. The candidate shall be required to appear in every subject as specified in the course structure for each year.

DURATION OF EXAMINATION:

Each theory paper shall be of 3 hrs. Duration.

**SCHEME OF EXAMINATION:
BPT- Part-I (First Year) University Examination**

S. No.	Subject	Subject Code	Theory Marks				Practical Marks				Total Marks
			Theory Paper	Internal Assessment	Total	Minimum Marks	Practical	Internal Assessment	Total	Minimum Marks	
1.	Anatomy	BPT-101	80	20	100	50	80	20	100	50	200
2.	Physiology	BPT-102	80	20	100	50	80	20	100	50	200
3.	Clinical Biochemistry	BPT-103	80	20	100	50					100
4.	Exercise Therapy I	BPT-104	80	20	100	50	80	20	100	50	200
5.	Electro Therapy I	BPT-105	80	20	100	50	80	20	100	50	200
6.	Psychology	BPT-106	80	20	100	50					100
7.	Basic Nursing & First Aid	BPT-107	80	20	100	50					100
Grand Total											1100

BPT- Part-II (Year) University Examination

S. No.	Subject	Subject Code	Theory Marks				Practical Marks				Total Marks
			Theory Paper	Internal Assessment	Total	Minimum Marks	Practical	Internal Assessment	Total	Minimum Marks	
1.	Biomechanics & Kinesiology	BPT-201	80	20	100	50	80	20	100	50	200
2.	Exercise Therapy-II	BPT-202	80	20	100	50	80	20	100	50	200
3.	Electro Therapy- II	BPT-203	80	20	100	50	80	20	100	50	200
4.	Pathology	BPT-204	80	20	100	50	80	20	100	50	200
5.	Medical Microbiology	BPT-205	80	20	100	50	80	20	100	50	200
6.	Pharmacology	BPT-206	80	20	100	50					100
Grand Total											1100

BPT- Part-III (Third Year) University Examination

S. No.	Subject	Subject Code	Theory Marks				Practical Marks				Total Marks
			Theory Paper	Internal Assessment	Total	Minimum Marks	Practical	Internal Assessment	Total	Minimum Marks	
1.	Clinical Orthopaedics	BPT- 301	80	20	100	50					100
2.	General Medicine	BPT- 302	80	20	100	50					100
3.	General Surgery	BPT- 303	80	20	100	50					100
4.	Clinical Neurology	BPT- 304	80	20	100	50					100
5.	Preventive & Social Medicine	BPT- 305	80	20	100	50					100
6.	Research Methodology & Biostatistics	BPT- 306	80	20	100	50					100
Grand Total											600

BPT- Part-IV (Fourth Year) University Examination

S. No.	Subject	Subject Code	Theory Marks				Practical Marks				Total Marks
			Theory Paper	Internal Assessment	Total	Minimum Marks	Practical	Internal Assessment	Total	Minimum Marks	
1.	Physiotherapy in Orthopaedic Conditions	BPT- 401	80	20	100	50	80	20	100	50	200
2.	Physiotherapy in in Cardio-Respiratory & General Conditions	BPT- 402	80	20	100	50	80	20	100	50	200
3.	Physiotherapy in Neurological Conditions	BPT- 403	80	20	100	50	80	20	100	50	200
4.	Sports Physiotherapy	BPT- 404	80	20	100	50	80	20	100	50	200
5.	Physiotherapy in Rehabilitation	BPT- 405	80	20	100	50	80	20	100	50	200
6.	Ethics, Administration & Supervision	BPT- 406	80	20	100	50					100
Grand Total											1100

INTERNAL ASSESSMENT

- It will be for theory and practical both.
- It will be done through the whole year.
- Candidate must obtain at least 35% marks in theory and practical's separately in internal assessment to be eligible for the annual university examination.

- Internal assessment (Theory) will be done as follows :
 - a) Mid-term and term examinations = 10 marks
 - b) Assignments/Projects/Class test/Clinical Presentations = 05 marks
 - c) Attendance = 05 marks
 - Total = 20 marks**
- Internal assessment of subjects without practical's will be done as :
 - a) Mid-term and term examinations = 10 marks
 - b) Assignments/Projects/Class test/Clinical Presentations = 05 marks
 - c) Attendance = 05 marks
 - Total = 20 marks**

CRITERIA FOR PASSING

- A candidate is declared to have passed University examination in a subject, if he/she secures 50% of the marks in theory and 50% in practicals separately. For computation of 50% marks in theory, the marks scored in the internal assessment (theory) shall be added to the University conducted written examination and for passing in practical the marks scored in University conducted practical examination and internal assessment (practical) shall be added together.

GRACE MARKS:

- If a candidate fails in one subject (theory only) in the annual University examination, five grace marks will be given to the candidate.
- Candidate failing in practical examination will be considered as failed.

SUPPLEMENTARY EXAMINATION:

- A candidate failing in a subject but securing at least 30% aggregate marks will be required to appear in the university examination after 3 months in that subject/ subjects while attending classes of next year. Those who secure less than 30% aggregate marks will be required to appear in all the subjects.
- If the candidate fails in supplementary examination his/her session will be shifted by one year. The candidate will have to take admission in the previous year and pay the tuition fee for the academic year. He/she will have to appear in all the subjects in the examination.
- Supplementary examination will be held not earlier than 3 months and later than 6 months from the date of annual University examination.
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DIVISION:

- Candidate will be awarded division at the end of fourth academic year as follows:
 - Distinction - 75% and above marks in any subject.
 - First division - 60% and above in the aggregate of marks of all subjects.
 - Second division- 50% or more but less than 60% in the aggregate of marks of all subjects.

DEGREE:

- The degree of B.P.T. course of the University shall be conferred on the candidates who have pursued the prescribed course of study for not less than four academic years and have passed examinations as prescribed under the relevant scheme and completed 6 months of compulsory rotatory internship.

SYLLABUS
Course of study
BPT- I Year

S. No	Subjects	Teaching hours		
		Theory	Practical's	Total
1.	Anatomy	180	120	300
2.	Physiology	140	60	200
3.	Clinical Biochemistry	70		70
4.	Exercise Therapy I	80	80	160
5.	Electro Therapy I	80	80	160
6.	Psychology	100		100
7.	Basic Nursing & First Aid	100		100

BPT- II Year

S.No	Subjects	Teaching hours		
		Theory	Practical's	Total
1.	Biomechanics & Kinesiology	80	80	160
2.	Exercise Therapy II	100	100	200
3.	Electro Therapy II	100	100	200
4.	Pathology	60	40	100
5.	Medical Microbiology	60	40	100
6.	Pharmacology	70		

BPT -III Year

S.No	Subjects	Teaching hours		
		Theory	Practical's	Total
1.	Clinical Orthopaedics	80	60	140
2.	General Medicine	80		80
3.	General Surgery	80		80
4.	Clinical Neurology	80	60	140
5.	Preventive & Social Medicine	80		80
6.	Research Methodology & Biostatistics	100		100

BPT-IV Year

S. No.	Subjects	Teaching hours		
		Theory	Practical's	Total
1.	Physiotherapy in Orthopaedic Conditions	80	100	180
2.	Physiotherapy in in Cardio- Respiratory & General Conditions	80	100	180
3.	Physiotherapy in Neurological Conditions	80	100	180
4.	Sports Physiotherapy	60	40	100
5.	Physiotherapy in Rehabilitation	80	40	120
6.	Ethics, Administration & Supervision	30		30

Internship:

- There shall be six months of Internship after the final year examination for candidates declared to have passed the examination in all the subjects.
- During the internship candidate shall have to work full time average 7 hours per day (each working day) for 6 Calendar months.
- Each candidate is allowed maximum of 6 holidays during entire Internship Program and in case of any exigencies during which the candidate remains absent for a period more than 6 days, he/she will have to work for the extra days during which the candidate has remained absent.
- The Internship should be rotatory and cover clinical branches concerned with Physiotherapy such as Orthopaedics, Cardiothoracic including ICU, Neurology, Neurosurgery, Paediatrics, General Medicine, General Surgery, Obstetrics and Gynaecology both inpatient and outpatient services.
- Based on the attendance and work done during posting the Director/Principal/ head of institution/department shall issue '**Certificate of Satisfactory completion**' of training following which the University shall award the Bachelor of Physiotherapy Degree or declare the candidate eligible for the same.
- **No candidate shall be awarded degree without successfully completing six months internship.**
- Institution shall have to satisfy themselves that satisfactory infrastructure facilities of Physiotherapy exist in the Institute / Hospital where the internship training has to be undertaken.
- Following parameters / guidelines have been suggested:
 - a. It is mandatory for the Institution to have its own Physiotherapy clinic fully furnished with all the necessary equipments as per the curriculum of the Program.
 - b. Senior Physiotherapist with sufficient clinical experience should manage the physiotherapy departments in the Institutes/Hospitals.
- Institute Director / Principal can at his discretion grant NOC to the students to do the Internship at the place of his choice provided the concerned Hospital fully satisfies the above criteria. For the purpose of granting NOC the candidate shall have to submit to the Institution the status of Physiotherapy services available at the place where he intends to do his Internship.

ANATOMY
Subject Code: BPT- 101
Min. Hours Theory : 150 hrs, Practical : 90 hrs

1. General Anatomy:
Introduction to Anatomy, terms and terminology.
Regions of Body, Cavities and systems.
Surface anatomy – musculo-skeletal, vascular, cardiopulmonary system
Applied anatomy.
2. Regional Anatomy
Thorax:
 - a. Cardio – Vascular System
Mediastinum: Divisions and contents
Pericardium: Thoracic Wall: position, shape and parts of the heart;
names of the blood vessels and their distribution in the body – region wise.
 - b. Respiratory system
Outline of respiratory passages
Pleura and lungs: position, parts, relations, blood supply and nerve supply;
Lungs – emphasize on bronchopulmonary segments
Diaphragm: Origin, insertion, nerve supply and action, openings in the diaphragm. Intercostal muscles and Accessory muscles of respiration: Origin, insertion, nerve supply and action.Abdomen
 - a. Peritoneum: Parietal peritoneum, visceral peritoneum, folds of peritoneum, functions of peritoneum.
 - b. Location, size, shape, features, blood supply, nerve supply and functions of the following: stomach, liver, spleen, pancreas, kidney, urinary bladder, intestines, gall bladder.Pelvis:
 - a. Position, shape, size, features, blood supply and nerve supply of the male and female reproductive system.Endocrine glands:
 - a. Position, shape, size, function, blood supply and nerve supply of the following glands : Hypothalamus and pituitary gland, thyroid glands, parathyroid glands, Adrenal glands, pancreatic islets, ovaries and testes, pineal glands, thymus.
- 3a. Musculo Skeletal Anatomy -(All the topics to be taught in detail)
 - Anatomical positions of body, axes, planes, common anatomical terminologies (Groove, tuberosity, trochanters etc)
 - Connective tissue classification.
 - Bones- Composition & functions, classification and types according to morphology and development.
 - Joints-definition-classification, structure of fibrous, cartilaginous joints, blood supply and nerve supply of joints.
 - Muscles – origin, insertion, nerve supply and actions

- 3b. Upper Extremity
- Osteology : Clavicles, Scapula, Humerus, Radius, Ulna, Carpals, Metacarpals, Phalanges.
 - Soft parts: pectoral region, axilla, front of arm, back of arm, cubital fossa,
 - Front of fore arm, back of fore arm, palm, dorsum of hand, muscles, nerves, blood vessels and lymphatic drainage of upper extremity.
 - Joints: Shoulder girdle, shoulder joint, elbow joints, radio ulnar joint, wrist joint and joints of the hand.
 - Arches of hand, skin of the palm and dorsum of hand.
- 3c. Lower Extremity
- Osteology: Hip bone, femur, tibia, fibula, patella, tarsals, metatarsals and phalanges.
 - Soft parts: Gluteal region, front and back of the thigh (Femoral triangle, femoral canal and inguinal canal), medial side of the thigh (Adductor canal), lateral side of the thigh, popliteal fossa, anterior and posterior compartment of leg, arches of the foot, lymphatic drainage of lower limb, venous drainage of the lower limb, arterial supply of the lower limb, arches of foot, skin of foot.
 - Joints: Hip Joint, Knee joint, Ankle joint, joints of the foot.
- 3d. Trunk & Pelvis:
- Osteology: Cervical, thoracic, lumbar, sacral and coccygeal vertebrae and ribs
 - Soft tissue: Pre and Para vertebral muscles, intercostals muscles, anterior abdominal wall muscles, Inter-vertebral disc.
 - Pelvic girdle and muscles of the pelvic floor
4. Head and Neck:
- Osteology: Mandible and bones of the skull.
 - Soft Parts: Muscles of the face and neck and their nerve and blood supply- extra ocular muscles, triangles of the neck.
5. Neuro Anatomy
- 1) Organization of Central Nervous system - Spinal nerves and autonomic nervous system mainly pertaining to cardiovascular, respiratory and urogenital system
 - 2) Cranial nerves
 - 3) Peripheral nervous system
 - Peripheral nerve
 - Neuromuscular junction
 - Sensory end organs
 - 4) Central Nervous System
 - Spinal segments and areas
 - Brain Stem
 - Cerebellum
 - Inferior colliculi
 - Superior Colliculi

- Thalamus
- Hypothalamus
- Corpus striatum
- Cerebral hemisphere
- Lateral ventricles
- Blood supply to brain
- Basal Ganglia
- The pyramidal system
- Pons, medulla, extra pyramidal systems
- Anatomical integration

PRACTICAL

List of Practical / Demonstrations *

Topics

1. Upper extremity including surface Anatomy
2. Lower extremity including surface Anatomy
3. Head & Spinal cord and Neck and Brain including surface Anatomy
4. Thorax including surface anatomy, abdominal muscles joints
 - Demonstration of the muscles of the whole body and organs in thorax and abdomen in a cadaver
 - Demonstration of movements in important joints.
 - Identification of body prominences on inspection and by palpation especially of extremities.
 - Points of palpation of nerves and arteries.

Recommended Text books:

1. SNELL [Richard S], Clinical Anatomy for Medical students: Ed. 5. Little Brown and Company Boston. (2011)
2. B.D Chaurasia's Human Anatomy – Regional And Applied; Volume I, Volume Ii And Volume Iii. (2015)
3. MOORIE [Kieth L], Clinically Oriented Anatomy. Ed.3., Williams and Wilkins, Baltimore. (2010)
4. DATTA [A.K], Essentials of human Anatomy: Thorax and Abdomen Ed 2. Vol. I Current Book International, Culcutta 2016, DATTA[A.K], Essentials of human Anatomy: Head and Neck Ed 2. Vol. II, Current Book International, Culcutta. (2016)
5. SINGH [Inderbir], Text book of Anatomy with colour atlas: Introduction, Osteology, Upper Extremity, Lower Extremity. Vol I. P Brothers, New Delhi. (2012)
6. SINGH [Inderbir], Text book of Anatomy with colour Atlas: Thorax and Abdomen. Vol II. JP Brothers, New Delhi. (2012)
7. SINGH [Inderbir], Text book of Anatomy with colour Atlas: Head and Neck Central Nervous System. Vol III. JP Brothers, New Delhi. (2012)
8. SINGH [Inderbir], Human Osteology. JP Brothers, New Delhi. (2012)

PHYSIOLOGY

Subject Code: BPT- 102

Min. Hours Theory: 150 hrs, Practical: 60 hrs

1. General Physiology

- Cell: Morphology. Organelles: their structure and functions
- Transport Mechanisms across the cell membrane
- Body fluids: Distribution, composition. Tissue fluid–formation.

2. Blood

- Introduction: Composition and functions of blood.
- Plasma: Composition, formation, functions. Plasma proteins.
- RBC: count and its variations. Erythropoiesis- stages, factors regulating. Reticulo-endothelial system (in brief) Haemoglobin - Anemia (in detail), types of Jaundice. Blood indices, PCV, ESR.
- WBC: Classification. Morphology, functions, count, its variation of each. Immunity
- Platelets: Morphology, functions, count, its variations
- Hemostatic mechanisms: Blood coagulation–factors, mechanisms. Their disorders. Anticoagulants.
- Blood Groups: Landsteiner’s law. Types, significance, determination, Erythroblastosis foetalis.
- Blood Transfusion: Cross matching. Indications and complications.

3. Nerve Muscle Physiology

- Introduction: Resting membrane potential. Action potential–ionic basis and properties.
- Muscle: Classification. Skeletal muscle: Structure. Neuromuscular junction : Structure. Neuromuscular transmission, myasthenia gravis. Excitation- Contraction coupling. Rigor mortis. Motor unit. Properties of skeletal muscles, Strength- Duration curve, Length-tension relationship, fatigue, load.
- Smooth muscle: Structure, types, mechanism of contraction. Plasticity.

4. Cardiovascular System

- Introduction: Physiological anatomy and nerve supply of the heart and blood vessels. Organisation of CVS. Cardiac muscles: Structure. Ionic basis of action potential and pacemaker potential. Properties.
- Conducting system: Components. Impulse conduction Cardiac Cycle: Definition. Phases of cardiac cycle. Pressure and volume curves. Heart sounds– causes, character. ECG: Definition. Different types of leads. Waves and their causes. P-R interval. Heart block.
- Cardiac Output: Definition. Normal value. Determinants. Stroke volume and its regulation. Heart rate and its regulation. Their variations
- Arterial Blood Pressure: Definition. Normal values and its variations. Determinants. Peripheral resistance. Regulation of BP.
- Arterial pulse.
- Shock – Definition. Classification–causes and features
- Regional Circulation: Coronary, Cerebral and Cutaneous circulation.

5. **Respiratory System**

- Introduction: Physiological anatomy – Pleura, tracheo-bronchial tree, alveolus, respiratory membrane and their nerve supply. Functions of respiratory system. Respiratory muscles.
- Mechanics of breathing: Intrapleural and Intrapulmonary pressure changes during respiration. Chest expansion. Lung compliance: Normal value, pressure-volume curve, factors affecting compliance and its variations. Surfactant – Composition, production, functions. RDS
- Spirometry: Lung volumes and capacities. Timed vital capacity and its clinical significance. Maximum ventilation volume. Respiratory minute volume.
- Dead Space: Types and their definition.
- Pulmonary Circulation. Ventilation-perfusion ratio and its importance.
- Transport of respiratory gases: Diffusion across the respiratory membrane. Oxygen transport – Different forms, oxygen-haemoglobin dissociation curve. Factors affecting it. P50, Haldane and Bohr effect. Carbon dioxide transport: Different forms, chloride shift.
- Regulation of Respiration: Neural Regulation. Chemical Regulation.
- Hypoxia: Effects of hypoxia. Types of hypoxia. Hypercapnoea. Asphyxia. Cyanosis – types and features.
- Disorders of Respiration: Dyspnoea. Orthopnoea. Hyperpnoea, hyperventilation, apnoea, tachypnoea.
- Artificial respiration
- Respiratory changes during exercise.

6. **Digestive System**

- Introduction: Physiological anatomy and nerve supply of alimentary canal. Enteric nervous system
- Salivary Secretion: Saliva: Composition. Functions. Regulation. Mastication (in brief)
- Swallowing: Definition. Different stages. Functions.
- Stomach: Functions. Gastric juice: Gland, composition, function, regulation. Gastrin: Production, function and regulation. Peptic ulcer. Gastric motility. Gastric emptying. Vomiting.
- Pancreatic Secretion: Composition, production, function. Regulation.
- Liver: Functions of liver. Bile secretion: Composition, functions and regulation. Gall bladder: Functions.
- Intestine: Succus entericus: Composition, function and regulation of secretion. Intestinal motility and its function and regulation.

7. **Renal System**

- Introduction: Physiological anatomy. Nephrons – cortical and juxtamedullary. Juxta-glomerular apparatus. Glomerular membrane. Renal blood flow and its regulation. Functions of kidneys.
- Mechanism of Urine Formation: Glomerular Filtration: Mechanism of glomerular filtration. GFR – normal value and factors affecting. Renal clearance. Inulin clearance. Creatinine clearance.
- Tubular Reabsorption: Reabsorption of Na⁺, glucose, HCO₃⁻, urea and water. Filtered load. Renal tubular transport maximum. Glucose clearance: TmG.

Renal threshold for glucose.

- Tubular Secretion: Secretion of H⁺ and K⁺. PAH clearance.
- Mechanism of concentrating and diluting the Urine: Counter-current mechanism. Regulation of water excretion. Diuresis.
- Micturition: Mechanism of micturition, Atonic bladder, automatic bladder.
- Acid-Base balance (very brief)
- Artificial Kidney: Principle of haemodialysis.
- Skin and temperature regulation.

8. Endocrine System

- Introduction: Major endocrine glands. Hormone: classification, mechanism of action. Functions of hormones
- Pituitary Gland: Anterior Pituitary and Posterior Pituitary hormones: Secretory cells, action on target cells, regulation of secretion of each hormone. Disorders: Gigantism, Acromegaly, Dwarfism, Diabetes insipidus. Physiology of growth and development: hormonal and other influences.
- Pituitary-Hypothalamic Relationship.
- Thyroid Gland: Thyroid hormone and calcitonin: secretory cells, synthesis, storage, action and regulation of secretion. Disorders: Myxoedema, Cretinism, Grave's disease.
- Parathyroid hormones: secretory cell, action, regulation of secretion. Disorders: Hypoparathyroidism. Hyperthyroidism. Calcium metabolism and its regulation.
- Adrenal Gland: Adrenal Cortex: Secretory cells, synthesis, action, regulation of secretion of Aldosterone, Cortisol, Androgens. Disorders: Addison's disease, Cushing's syndrome, Conn's syndrome, Adrenogenital syndrome. Adrenal Medulla: Secretory cells, action, regulation of secretion of adrenaline and noradrenaline. Disorders: Pheochromocytoma.
- Endocrine Pancreas: Secretory cells, action, regulation of secretion of insulin and glucagon. Glucose metabolism and its regulation. Disorder: Diabetes mellitus.
- Calcitonin, Thymus and Pineal gland (very brief).
- Local Hormones. (briefly).

9. Reproductive System

- Introduction: Physiological anatomy reproductive organs.
- Male Reproductive System: Functions of testes. Pubertal changes in males. Spermatogenesis. Testosterone: action. Regulation of secretion. Semen.
- Female Reproductive System: Functions of ovaries and uterus. Pubertal changes in females. Oogenesis. Hormones: oestrogen and progesterone-action. regulation of secretion. Menstrual Cycle: Phases. Ovarian cycle. Uterine cycle. Hormonal basis. Menarche. Menopause. Pregnancy: Pregnancy tests. Physiological changes during pregnancy. Functions of placenta. Lactation. Contraception methods

10. Special Senses

- Vision: Introduction: Functional anatomy of eye ball. Functions of cornea, iris, pupil, aqueous humor – glaucoma, lens – cataract, vitreous humor, rods and cones. Photopic vision. Scotopic vision.

- Visual Pathway and the effects of lesions.
- Refractive Errors: myopia, hypermetropia, presbyopia and astigmatism.
- Visual Reflexes: Accommodation, Pupillary and Light. Visual acuity and Visual field. Light adaptation. Dark adaptation. Color vision – color blindness. Nyctalopia.
- Audition: Physiological anatomy of the ear. Functions of external ear, middle ear and inner ear. Structure of Cochlea and organ of corti. Auditory pathway. Types of Deafness. Tests for hearing. Audiometry.
- Taste: Taste buds. Primary tastes. Gustatory pathway.
- Vestibular Apparatus: Crista ampullaris and macula. Functions. Disorders.

11. Nervous System

- Introduction: Organisation of CNS – central and peripheral nervous system. Functions of nervous system. Synapse: Functional anatomy, classification, Synaptic transmission. Properties.
- Sensory Mechanism: Sensory receptors: function, classification and properties. Sensory pathway: The ascending tracts – Posterior column tracts, lateral spinothalamic tract and the anterior spinothalamic tract – their origin, course, termination and functions. The trigeminal pathway. Sensory cortex. Somatic sensations: crude touch, fine touch, tactile localization, tactile discrimination, stereo gnosis, vibration sense, kinesthetic sensations. Pain sensation: mechanism of pain. Cutaneous pain—slow and fast pain, hyperalgesia. Deep pain. Visceral pain – referred pain. Gate control theory of pain. tabes dorsalis, sensory ataxia.
- Motor Mechanism: Motor Cortex. Motor pathway: The descending tracts – pyramidal tracts, extra pyramidal tracts – origin, course, termination and functions. Upper motor neuron and lower motor neuron. Paralysis, monoplegia, paraplegia, hemiplegia and quadriplegia.
- Reflex Action: components, Bell-Magendie law, classification and Properties. Monosynaptic and polysynaptic reflexes, superficial reflexes, deep reflexes. Stretch reflex– structure of muscle spindle, pathway, higher control and functions. Inverse stretch reflex. Muscle tone – definition, and properties hypotonia, atonia and hypertonia. UMNL and LMNL
- Spinal cord Lesions: Complete transection and Hemisection of the spinal cord.
- Cerebellum: Functions. Cerebellar ataxia.
- Posture and Equilibrium: Postural reflexes – spinal, medullary, midbrain and cerebral reflexes.
- Thalamus and Hypothalamus: Nuclei. Functions. Thalamic syndrome
- Reticular Formation and Limbic System: Components and Functions.
- Basal Ganglia: Structures included and functions. Parkinson's disease.
- Cerebral Cortex: Lobes. Brodmann's areas and their functions. Higher functions of cerebral cortex – learning, memory and speech. CSF: Formation, composition, circulation and functions. Lumbar puncture and its significance. Blood brain barrier. Hydrocephalus.
- ANS: Features and actions of parasympathetic and sympathetic nervous system.

PRACTICAL

I. Haematology

To be done by the students Determination of RBC count

- Determination of WBC count
- Differential leukocyte count
- Estimation of hemoglobin
- Calculation of blood indices
- Determination of blood groups
- Determination of bleeding time
- Determination of clotting time

Demonstrations only

- Determination of ESR
- Determination of PCV

II. Clinical Examination

- Examination of Radial pulse.
- Recording of blood pressure
- Examination of reflexes

III. Recommended Demonstrations

- **Spirometry** – To ensure various lung capacities & volumes, respiratory rate tidal volume, IRV, IC, ERV, EC, residual volume.

Recommended text books:

1. Text book of medical physiology – Guyton Arthur. (2012)
2. Concise medical physiology – Chaudhuri Sujit K. (2014)
3. Human Physiology – Chatterjee C.C. (2012)
4. Text book of practical Physiology – Ranade.(2010)
5. Text of Physiology – A.K.Jain. (2016)
6. Basics of Medical physiology- Venkatesh D & Sudhakar H H. (2010)
7. Manipal Manual of Physiology – Prof. C N Chandrashekar (2012)

CLINICAL BIOCHEMISTRY
Subject Code: BPT- 103
Minimum Hours Theory: 70 Hrs.

1. Nutrition: RDA, BMR, SDA, caloric requirement and balanced diet.
2. Carbohydrates: Definition, classification and general functions. Carbohydrate Metabolism - Glycolysis, T.C.A cycle.
3. Lipids: Definition, classifications and general functions. Essential fatty acids and their importance, Cholesterol, Lipoproteins. Metabolism- β -Oxidation of fatty acids, fatty liver and ketosis.
4. Amino Acids: Definition, classification, essential and non essential aminoacids.
5. Proteins: Definition, classification, and Bio-medical Importance. Metabolism: Formation and fate of ammonia, Urea cycle and its significance.
6. Study of hemoglobin and myoglobin with their functions.
7. Enzymes: Definition, classification with examples, Factors affecting enzyme action, isoenzyme and co-enzyme, Clinical importance of enzymes.
8. Biochemistry of connective tissue - Introduction, various connective tissue proteins : collagen, elastin-structure and associated disorders.
9. Vitamins: Definition, classification and functions, dietary source, daily requirement and deficiency disorders.
10. Diabetes mellitus - definition, types & causes.

Recommended Text books

1. MURRAY [ROBERT KK], Harper's Bio Chemistry Ed 24. (2014)
2. RAMAKRISHNA [S], PRASANNA [KG], RAJAN [R], Text Book of Medical Biochemistry, Ed1, orient Langman, Mumbai. (2010)
3. VASUDEVAN [DM] and SREE KUMARI [S], Text Book of Bio Chemistry for Medical students, Ed 1, Jaypee Brothers, New Delhi. (2015)
4. DAS [Debajyothi], Biochemistry, Ed. 7, Academic Publishers Calcutta. (2016)
5. PRASAD RM, RM's Physiotherapy Text Book Series, Text book of Biochemistry for Bachelor of Physiotherapy First Edition, RM Publications, Mangalore. (2010)

EXERCISE THERAPY – I

Sub. Code BPT-104

Minimum Hours Theory: 90 Hrs, Practical: 80 Hrs.

THEORY

1. Introduction to exercise therapy
2. Mechanical principle applied in human body – gravity, centre of gravity, line of gravity, base of support, equilibrium, axis and planes
3. Disability models – ICDH model of disability, Nagi model of disability, ICF model
4. Exercise physiology – effect of exercise in various systems – musculoskeletal, neuromuscular, cardiovascular, respiratory system
5. Movements
6. Passive movements – definition, classification, indications, contra indications, advantages, limitations, techniques - emphasize PROM to upper, lower, neck and trunk muscles
7. Active movements - definition, classification, indications, contra indications, advantages, limitations, techniques - emphasize active movements to upper, lower, and neck and trunk muscles
8. Starting positions – muscle work, effect and uses and derived positions
9. Relaxation – definition, types of relaxation, relaxation techniques
10. Balance – static and dynamic balance, mechanism of balance control, balancing exercises
11. Neuromuscular coordination – causes of in coordination, exercises to improve coordination – Frenkle exercise
12. Joint range measurement – Goniometer, types and techniques of measuring joint ROM
13. Measurement of limb length, girth
14. Manual muscle testing – grading system, techniques- emphasize on skill to grade upper, lower, neck and trunk muscles.
15. Mobility aids – crutches, canes, walker
16. Soft tissue manipulation (massage) – history, types, techniques, physiological effects, therapeutic uses, contraindications

PRACTICAL

1. Starting positions and derived positions
2. Range of motion (PROM, AROM, AAROM) exercises to all joints
3. Measurement of joint range using goniometer
4. General and local Relaxation techniques
5. Massage – upper limb, lower limb, back, face
6. Manual muscle testing of individual muscle .
7. Coordination exercises, balancing exercise.

Recommended Text Books

1. Therapeutic exercise by Barbara Bandy (2013)
2. Therapeutic exercise by Carolyn Kisner (2014)
3. Principles of exercise therapy by M. Dena Gardiner (2014)
4. Practical Exercise therapy by Hollis Margaret (2012)
5. Therapeutic exercise by Sydney Litch (2011)

6. Therapeutic exercise by Hall & Brody (2014)
7. Therapeutic exercise by Basmajian (2012)
8. Physical Rehabilitation by o'Sullivan. (2015)
9. Therapeutic massage by Sinha (2012)
10. Principles of muscle testing by Hislop (2013)

ELECTRO THERAPY – I

Subject Code: BPT-105

Min. Hrs.: Theory - 80 Hrs., Practical - 80 Hrs.

THEORY

1. Basic components of electric current – electrons, protons, neutrons, ions, matter, molecules
2. Current electricity – static electricity, electric charge, conductors, conduction of electricity, resistance, factors effecting resistance with example in human body, insulation, unit of electric current – ampere, coulomb, volt, ohms law
3. Magnetism, theories of magnetism, properties of magnet.
4. Electromagnetic induction, electromagnetic radiation, laws governing radiations– Grouth’s law, cosine law, inverse square law, law of reflection, rarefaction.
5. Electrical components – transformer, capacitor, diode, valves
6. Types of electric current, wave forms, current modulation – continuous, burst, beat, surge. Electric circuit in parallel and series.
7. Safety issues while using electrical equipments – for patients and therapist
8. Muscle and nerve response to electrical stimulation – polarization, depolarization and propagation of impulse.
9. Pain – types of pain, pain pathway, theories of pain, Gate control theory of pain, pain modulation at various levels.
10. Low frequency currents:
 - a. Neuromuscular electrical stimulation – physiological effects, therapeutic uses of electrical stimulation techniques – electrodes type, electrode size, electrode placement, stimulating points, methods of reducing skin electrode resistance, contraindications and precautions.
 - b. High voltage pulsed stimulation.
 - c. Russian stimulation.
 - d. Trans cutaneous Electrical Nerve stimulation (TENS) – therapeutic of TENS, types, electrode placement in TENS, contraindications and precautions
 - e. Iontophoresis – mechanism, biophysical effect, medication dosage, medicated ions used, techniques of application.
11. Electro diagnostic test – FG test, strength duration curve, chronaxie, reobase
12. Interferential therapy (IFT) – physiological effects, therapeutic indications, methods of application, sweep, base, contraindication and precautions.

PRACTICAL

1. Identify basic electrical components in electrotherapeutic equipments.
2. Reading of medical records, indentifying indications and contraindications for electrotherapy.
3. Stimulation of motor points, stimulation of individual muscle and group muscle
4. Faradic foot bath, Faradism under pressure.
5. Plotting SD graph, diagnosis using electro diagnostic test , SD curve.
6. Placement of electrodes in TENS & IFT with dosimeter for various indications.

Recommended Text Books

1. Claytons Electrotherapy by Forster & Alastangs (2014)
2. Electrotherapy Explained by Low & Reed (2014)

3. Clinical Electrotherapy by Nelson (2010)
4. Electrotherapy Evidence based practice by Sheila Kitchen (2012)
5. Physical agents by Michile Cameroon (2010)
6. Principles of Electrotherapy by Michile Camreeron (2010)
7. Thermal agents by Susan Michlovitz. (2010)

PSYCHOLOGY
Subject Code: BPT-106
Minimum Hours Theory: 100 Hrs

1. Introduction to Psychology
 - a. Schools: Structuralism, functionalism, behaviorism, psychoanalysis.
 - b. Methods: Introspection, observation, inventory and experimental method.
 - c. Branches: Pure psychology and applied psychology
 - d. Psychology and physiotherapy
2. Growth and Development
 - a. Life span : different stages of development (Infancy, childhood, adolescence, adulthood, middle age, old age).
 - b. Heredity and environment: role of heredity and environment in physical and psychological development, —Nature v/s Nature controversy
3. Sensation, attention and perception
 - a. Attention: Types of attention, Determinants and objective determinants
 - b. Perception: Gestalt principles of organization of perception (principle of figure ground and principles of grouping), factors influencing perception (past experience and context)
 - c. Illusion and hallucination: different types
4. Motivation
 - a. Motivation cycle (need, drive, incentive, reward).
 - b. Classification of motives.
 - c. Abraham Maslow's theory of need hierarchy
5. Frustration and conflict
 - a. Frustration: Sources of frustration.
 - b. Conflict: types of conflict.
 - c. Management of frustration and conflict.
6. Emotions
 - a. Three levels of analysis of emotion (physiological level, subjective state, and overt behavior).
 - b. Theories of emotion
 - c. Stress and management of stress.
7. Intelligence
 - a. Theories of intelligence.
 - b. Distribution of intelligence.
 - c. Assessment of intelligence.
8. Thinking
 - a. Reasoning: deductive and inductive reasoning
 - b. Problem solving: rules in problem solving (algorithm and heuristic)
 - c. Creative thinking: steps in creative thinking, traits of creative people

9. Learning
 - a. Factors effecting learning.
 - b. Theories of learning: trial and error learning, classical conditioning, Operant conditioning, insight learning, social learning theory.
 - a. The effective ways to learn: Massed/Spaced, Whole/Part, Recitation/Reading, Serial/ Free recall, Incidental/Intentional learning, Knowledge of results, association, organization, and mnemonic methods.

10. Personality
 - a. Approaches to personality: type & trait, behavioristic, psychoanalytic and humanistic approach.
 - b. Personality assessment: observation, situational test, questionnaire, rating scale, interview, and projective techniques.
 - c. Defense Mechanisms: denial of reality, rationalization, projection, reaction formation, identification, repression, regression, intellectualization, undoing, introjections, acting out.

11. Social psychology
 - a. Leadership: Different types of leaders. Different theoretical approaches to leadership.
 - b. Attitude: development of attitude. Change of attitude

Recommended text books:

1. Understanding Psychology. New Delhi: Tata McGraw hill. (2010).
2. Introduction to Psychology. New Delhi: Tata McGraw hill. (2012).
3. Psychology. Boston: Alwin & Bacot Company (2010).
4. Advanced Educational Psychology. New Delhi: prentice hall. (2010).
5. Dictionary of Psychology Atkinson (2010).

BASIC NURSING & FIRST AID
Subject Code: BPT-107

Basic Nursing:

1. What is nursing? Nursing principles. Inter-Personnel relationships, Bandaging: Basic turns, Bandaging extremities, Triangular Bandages and their application.
2. Nursing Position: Environment safety, Bed making, prone, lateral, dorsal, Dorsal recumbent, Flower's positions, comfort measures, Aids & rest and sleep.
3. Methods of Giving Nourishment: Feeding, Tube feeding, drips, transfusion.
4. Surgical Dressing: Observation of dressing procedures.
5. Lifting and transporting patients: Lifting patient up in the bed, transferring from bed to wheel chair, transferring from bed to stretcher.

First Aid

Syllabus as for Certificate of Red Cross Society of St. John's Ambulance Brigade.

Recommended Text Books

1. First aid in emergency – St-john. Ambulance Association. (2014)
2. Physiotherapy for burns & Reconstruction – Glassey. (2011)
3. Surgical & Medical Procedures for Nurses & Paramedical staff – Nathan. (2015)
4. First aid & management of general injuries & common ailments-Gupta & Gupta (2016)

Bachelor of Physiotherapy (BPT) - Second Year
BIOMECHANICS AND KINESIOLOGY
Subject Code: BPT-201
Min. Hrs: Theory- 80 Hrs., Practical - 80 Hrs.

THEORY

1. Mechanics - Definition of mechanics and Biomechanics
2. Motion: definition, types of motion, plane and axis of motion, factor determining the kind and modification of motion.
3. Force - Definition, diagrammatic representation of force, point of application, classification of forces, concurrent, coplanar and co-linear forces, composition and resolution of forces, angle of pulls of muscle
4. Friction
5. Gravity - Definition, line of gravity, Centre of gravity
6. Equilibrium - Supporting base, types, and equilibrium in static and dynamic state
7. Levers - Definition, function, classification and application of levers in physiotherapy & order of levers with example of lever in human body
8. Pulleys - system of pulleys, types and application
9. Elasticity - Definition, stress, strain, HOOKE'S Law
10. Springs - properties of springs, springs in series and parallel, elastic materials in use
11. Muscular system
12. Definition, properties of muscle, muscular contraction, structural classification, action of muscle in moving bone, direction of pull, angle of pull, functional classification, coordination of muscular system.
13. Joint structures and functions: Joint design, Structure of Connective Tissue, Properties of Connective
 - i. Tissue, joint function, changes with disease, injury, immobilization, exercise, over use
 - ii. Structure and functions of upper extremity joints – shoulder complex, elbow complex, wrist and hand complex
 - iii. Structure and functions of lower extremity joints – hip joint, knee joint, ankle and foot complex
 - iv. Structure and functions of axial skeletal joints – vertebral column – craniocervical, thorax, lumbar, lumbo pelvic region
 - v. Structure and functions of temporomandibular joint
14. Posture – dynamic and static posture, kinetic and kinematics of posture, analysis of posture, effect of age, pregnancy, occupation on posture.
15. Gait – kinematics and kinetics of gait, gait in running and stair climbing.

PRACTICAL

1. Goniometry – measurement of joint ROM
2. Identify Muscle work of various movements in body at different angle.
3. Identify normal and abnormal posture.
4. Normal gait with its parameters and identify abnormal gait with the problems in it.

Recommended Text Books:

1. Joint Structure and Function – A comprehensive Analysis, JP Bros Medical Publishers, New Delhi. (2015)

2. Brunnstrom, Clinical Kinesiology, JP Bros Medical Publishers, Bangalore, 5th Ed 2000, 1st Indian Ed (2015)
3. Clinical Kinesiology for Physical Therapist Assistants, JP Bros Medical Publishers, Bangalore, 1st Indian Ed (2015).

EXERCISE THERAPY – II

Subject Code: BPT-202

Min. Hrs.: Theory - 100 Hrs., Practical - 100 Hrs.

THEORY

1. Joint mobilization:
Definition – Mobilization, Manipulation, indications, limitations, contraindications and precautions, applications of Mobilization technique to various joints. Principles of Maitland, Mulligan and Meckzi joint Manipulation techniques.
2. Stretching:
Definition, properties of soft tissue, mechanical and neurophysiological properties of connective tissue, mechanical properties of non contractile tissue. Determinants, type and effect of stretching, precautions, general applications of stretching technique.
3. Resisted exercise:
Definition – strength, power, endurance. Guiding principle of resisted exercise, determinants, types Manual and Mechanical Resistance Exercise, Isometric Exercise, Dynamic Exercise - Concentric and Eccentric, Dynamic Exercise - Constant and Variable Resistance, Isokinetic Exercise, Open-Chain and Closed-Chain Exercise, precautions, contraindications Progressive Resistance Exercise - de Lormes, Oxford, Mac Queen, Circuit Weight Training, Plyometric Training—Stretch-Shortening Drills, Isokinetic Regimens
4. Proprioceptive Neuromuscular Facilitation – Principles, Diagonal patterns of movements, Basic procedures, Upper Extremity Diagonal patterns, Lower Extremity Diagonal Patterns. Technique in PNF – Rhythmic Initiation, Repeated Contractions, Reversal of Antagonists, Alternating Isometrics, Rhythmic Stabilization.
5. Aerobic Exercises – Definitions, Physiological response to Aerobic Exercise, Evaluation of aerobic capacity – exercise testing, Determinant of Aerobic Exercise, Physiological Changes with Aerobic Training, Aerobic Exercise Program, Applications of Aerobic Program in patients with chronic illness.
6. Hydrotherapy:
Definitions, Goals and Indications, Precautions and Contraindications, Properties of water, Therapeutic Exercises in Hydrotherapy, Special equipments used.
7. Balance training:
Definition and Key terms, Balance control, Components of balance, Balance Impairment, Examination of Impaired Balance, Balance training Exercises.
8. Posture:
Normal Postural Control, Postural Alignment, Postural Stability, Postural Impairment and Mal-Alignment, Postural Training.
9. Breathing Exercises:
Aims and Goals of Breathing Exercises, Procedures of Diaphragmatic Breathing, Segmental Breathing, Pursed-Lip Breathing, Preventing and Relieving Episodes of Dyspnea, Positive Expiratory Pressure Breathing, Respiratory Resistance Training, Glossopharyngeal Breathing. Exercises to mobilize the chest, Postural Drainage, Manual Technique used in Postural Drainage, Postural Drainage Positions, Modified Postural Drainage.
10. Gait Training:
Definition, Different methods of Gait Training, Gait Training in Parallel Bars,

Walking Aids: Types: Crutches, Canes, Frames; Principles and training with walking aids.

11. Soft Tissue Injury:
General Description of Inflammation and repair, Acute, Sub Acute, and Chronic stage, General Treatment Guidelines.
12. Yoga: History, Introduction, Classification, Various Asana.
13. Suspension – definition , types , uses and therapeutic applications.

PRACTICAL

1. Joint Mobilisation to individual joint
2. Stretching of individual and group muscles
3. Resisted exercises to individual and group muscles, open and closed kinematic exercises
4. PNF patterns to upper and lower limb.
5. Various types breathing exercises, chest mobilization exercises, postural drainage
6. Gait training with various walking aids
7. Suspension exercise to all major joints.

Recommended Text Books

1. Therapeutic exercise by Barbara Bandy (2013)
2. Therapeutic exercise by Carolyn Kisner (2015)
3. Principles of exercise therapy by M. Dena Gardiner (2015)
4. Practical Exercise therapy by Hollis Margaret (2015)
5. Therapeutic exercise by Sydney Litch (2012)
6. Therapeutic exercise by Hall & Brody (2011)
7. Therapeutic exercise by Basmajjian (2010)
8. Physical Rehabilitation by o' Sullivan. (2015)
9. Therapeutic massage by Sinha (2010)
10. Principles of muscle testing by Hislop (2010)

ELECTROTHERAPY - II

Subject Code: BPT-203

Min. Hrs.: Theory - 100 Hrs., Practical - 100 Hrs.

THEORY

1. Introduction to high frequency current, Electro Magnetic Spectrum
2. SWD: Define short wave, Frequency & Wavelength of SWD, Principle of Production of SWD, Circuit diagram & Production of SWD, Methods of Heat Production by SWD treatment, Types of SWD Electrode, Placement & Spacing of Electrodes, Tuning, Testing of SWD Apparatus, Physiological & Therapeutic effects, Indications & Contraindications, Dangers, Dosage parameters. Pulsed Electro Magnetic Energy
3. Micro Wave Diathermy: Define Microwave, Wave length & Frequency, Production Of MW, Applicators, Dosage Parameters, Physiological & Therapeutic effects, Indications & Contraindications, Dangers of MWD.
4. Ultrasound: Define Ultrasound, Frequency, Piezo Electric effects: Direct, Reverse, Production of US, Treatment Dosage parameters: Continuous & Pulsed mode, Intensity, US Fields: Near field, Far field, Half value distance, Attenuation, Coupling Media, Thermal effects, Nonthermal effects, Principles & Application of US: Direct contact, Water bag, Water bath, Solid sterile gel pack method for wound. Uses of US, Indications & Contraindications, Dangers of Ultrasound. Phonophoresis: Define Phonophoresis, Methods of application, Commonly used drugs, Uses. Dosages of US.
5. IRR: Define IRR, wavelength & parameters, Types of IR generators, Production of IR, Physiological & Therapeutic effects, Duration & frequency of treatment, Indication & Contraindication.
6. UVR: Define UVR, Types of UVR, UVR generators: High pressure mercury vapour lamp, Water cooled mercury vapour lamp, Kromayer lamp, Fluorescent tube, Theraktin tunnel PUVA apparatus. Physiological & Therapeutic effects. Sensitizers & Filters. Test dosage calculation. Calculation of E1, E2, E3, E4 doses. Indications, contraindications. Dangers Dosages for different therapeutic effects, Distance in UVR lamp.
7. LASER: Define LASER. Types of LASER. Principles of Production. Production of LASER by various methods. Methods of application of LASER. Dosage of LASER. Physiological & Therapeutic effects of LASER. Safety precautions of LASER. Classifications of LASER Energy density & power density.
8. Wax Therapy: Principle of Wax Therapy application – latent Heat, Composition of Wax Bath Therapy unit, Methods of application of Wax, Physiological & Therapeutic effects, Indications & Contraindication, Dangers.
9. Contrast Bath: Methods of application, Therapeutic uses, Indications & Contraindications.
10. Moist Heat Therapy: Hydro collator packs – in brief, Methods of applications, Therapeutic uses, Indications & Contraindications.
11. Fluidotherapy: Construction, Method of application, Therapeutic uses, Indications & Contraindications.
12. Cryotherapy: Define- Cryotherapy, Principle- Latent heat of fusion, Physiological & Therapeutics effects, Techniques of Applications, Indications & Contraindications, Dangers, and Methods of application with dosage.
13. EMG and Nerve Conduction Velocity test, Biofeedback

14. Define Long Wave Diathermy

PRACTICAL

The student of Electrotherapy must be able to demonstrate the use of electrotherapy modalities applying the principles of electrotherapy with proper techniques, choice of dosage parameters and safety precautions.

1. Application of Ultrasound for different regions-various methods of application
2. Demonstrate treatment techniques using SWD, IRR and Microwave diathermy
3. Demonstrate the technique of UVR exposure for various conditions – calculation of test dose
4. Calculation of dosage and technique of application of LASER
5. Technique of treatment and application of Hydrocollator packs, cryotherapy, contrast bath, wax therapy

Recommended Text Books

1. Claytons Electrotherapy by Forster & Alastangs (2014)
2. Electrotherapy Explained by Low & Reed (2014)
3. Clinical Electrotherapy by Nelson (2010)
4. Electrotherapy Evidence based practice by Sheila Kitchen (2012)
5. Physical agents by Michile Cameroon (2010)
6. Principles of Electrotherapy by Michile Camreoon (2010)
7. Thermal agents by Susan Michlovitz.

PATHOLOGY

Subject Code: BPT-204

Minimum Hours Theory: 80 Hrs. Practical: 40 Hrs.

General Pathology

1. Introduction to Pathology
2. Cell injuries:
Aetiology and Pathogenesis with a brief recall of important aspects of normal cell structure.
Reversible cell injury : Types, Sequential changes, Cellular swellings, vacuolation, Hyaline changes, Mucoïd changes. Irreversible cell injury: Types of Necrosis & Gangrene, Autolysis.
Pathologic calcification: Dystrophic and Metastatic. Intracellular Accumulations - Fatty changes, Protein accumulations, Glycogen accumulations, Pigments - Melanin / Hemosiderin.
Extra cellular accumulations: Amyloidosis - Classification, Pathogenesis, Pathology including special stains.
3. Inflammation and Repair Acute inflammation: features, causes, vascular and cellular events. Inflammatory cells and Mediators. Chronic inflammation: Causes, Types, Classification nonspecific and granulomatous with examples. Repair, Wound healing by primary and secondary union, factors promoting and delaying the process. Healing in specific site including bone healing.
4. Circulatory Disturbances Hyperemia/Ischemia and Haemorrhage Edema: Pathogenesis and types. Chronic venous congestion: Lung, Liver, Spleen, Systemic Pathology Thrombosis and Embolism: Formation, Fate and Effects. Infarction: Types, Common sites. Shock: Pathogenesis, types, morphologic changes.
5. Growth Disturbances and Neoplasia Atrophy, Hypertrophy, Hyperplasia, Aplasia, Hypoplasia, Metaplasia, Malformation, agenesis, dysplasia. Precancerous lesions. Neoplasia: Definition, classification, Biological behaviour : Benign and Malignant, Carcinoma and Sarcoma. Malignant Neoplasia: Grades and Stages, Local & Distant spread. Carcinogenesis: Environmental carcinogens, chemical, viral, occupational. Heredity and cellular oncogenes and prevention of cancer. Benign & Malignant epithelial tumours Eg. Squamous papilloma, Squamous cell carcinoma, Malignant melanoma. Benign & Malignant mesenchymal tumours Eg: Fibroma, Lipoma, Neurofibroma, Fibrosarcoma, Liposarcoma, Rhabdo-myosarcoma, Teratoma.
7. Hematology Constituents of blood and bone marrow, Regulation of hematopoiesis. Anemia: Classification, clinical features & lab diagnosis. Nutritional anemias: Iron deficiency anemia, Folic acid, Vit. B 12 deficiency anemia including pernicious anemia.
8. Hemolytic Anaemias: Classification and Investigations. Hereditary hemolytic anaemias: Thalessemia, Sickle cell anemia, Spherocytosis and Enzyme deficiencies. Acquired hemolytic anaemias
 - i. Alloimmune, Autoimmune
 - ii. Drug induced, Microangiopathic
Pancytopenia - Aplastic anemia.
Hemostatic disorders, Vascular and Platelet disorders & lab diagnosis.
Coagulopathies - (i) Inherited (ii) Acquired with lab diagnosis.
Leukocytic disorders: Leukocytosis, Leukopenis, Leukemoid reaction.

- Leukemia: Classification, clinical manifestation, pathology and Diagnosis.
9. Respiratory System [2 Hours]
Pneumonia, Bronchitis, Bronchiectasis, Asthma, Tuberculosis, Carcinoma of lungs, Occupational lung diseases
 10. Cardiovascular Pathology
Congenital Heart disease: Atrial septal defect, Ventricular septal defect, Fallot's tetralogy, Patent ductus arteriosus.
Endocarditis.
Rheumatic Heart disease.
Vascular diseases: Atherosclerosis, monckeberg's medial calcification, Aneurysm and Arteritis and tumours of Blood vessels.
Ischemic heart Disease: Myocardial infarction.
Hypertension and hypertensive heart Disease.
 11. Hepato – biliary pathology
Jaundice: Types, aetio-pathogenesis and diagnosis.
Hepatitis: Acute, Chronic, neonatal.
Alcoholic liver disease
Cirrhosis: Postnecrotic, Alcoholic, Metabolic and Portal hypertension Liver abscesses; Pyogenic, parasitic and Amoebic.
Tumours of Liver
 12. Musculoskeletal System Osteomyelitis, acute, chronic, tuberculous, mycetoma
Metabolic diseases: Rickets/Osteomalacia, osteoporosis, Hyperparathyroidism, Paget's disease.
Tumours Classification: Benign, Malignant, Metastatic and synovial sarcoma.
 13. Endocrine pathology Diabetes Mellitus: Types, Pathogenesis, Pathology, Laboratory diagnosis
Non-neoplastic lesions of Thyroid: Iodine deficiency goiter, autoimmune Thyroiditis, Thyrotoxicosis, myxedema, Hashimoto's thyroiditis.
 14. Neuropathology
Inflammations and Infections : TB Meningitis, Pyogenic Meningitis, viral meningitis and Brain Abscess Tuberculosis, Cysticercosis
 15. Dermatopathology Skin tumors : Squamos cell carcinoma, Basal cell carcinoma, Melanoma

PRACTICAL

1. Collection of blood and anticoagulants used..
2. Discussion about parts of microscope and different types of microscopes used in pathology.
3. Staining of slide by Leishman method.
4. Study of peripheral blood smear.
5. Estimation of hemaglobin by Sahli's method and discussion of other methods used.
6. ESR
7. Identification of various instruments in pathology lab & their uses (eg. Neubauer chamber, RBC, WBC, pipette etc.).
8. Bleeding Time, Clotting Time.

Recommended Text Books

1. Text book of pathology: Harshmohan (2016)
2. General systemic pathology: Churchill Livingstone (2015)
3. Text book of Pathology: Robbins (2014)

MICROBIOLOGY
Subject Code: BPT-205
Minimum Hours Theory: 80 Hrs. Practical: 40 Hrs.

Theory

1. General Microbiology
Definitions: infections, parasite, host, vector, fomite, contagious disease, infectious disease, epidemic, endemic, pandemic, Zoonosis, Epizootic, Attack rate.
Normal flora of the human body.
Routes of infection and spread; endogenous and exogenous infections; source at reservoir of infections.
Bacterial cell. Morphology limited to recognizing bacteria in clinical samples Shape, motility and arrangement. Structures, which are virulence, associated.
Physiology: Essentials of bacterial growth requirements.
Sterilization, disinfection and universal precautions in relation to patient care and disease prevention. Definition of asepsis, sterilization, disinfection.
Antimicrobials: Mode of action, interpretation of susceptibility tests, resistance spectrum of activity.
2. Immunology
Basic principles of immunity immunobiology: lymphoid organs and tissues. Antigen, Antibodies, antigen and antibody reactions with relevance to pathogenesis and serological diagnosis.
Humoral immunity and its role in immunity Cell mediated immunity and its role in immunity.
Imunology of hypersensitivity, Measuring immune functions.
3. Bacteriology
To be considered under the following headings Morphology, classification according to pathogenicity, mode of transmission, methods of prevention, collection and transport of samples for laboratory diagnosis, interpretation of laboratory reports Staphylococci, Streptococci and Pneumococci, Mycobacteria: Tuberculosis, M.leprae, atypical mycobacteria, Enterobacteriaceae,
Vibrios : V. cholerae and other medically important vibrios, Campylobacters and Helicobacters, Pseudomonas, Bacillus anthracis, Sporing and non-sporing anaerobes: Clostridia, Bacteroides and Fusobacteria,
4. General Virology
General properties: Basic structure and broad classification of viruses. Pathogenesis and pathology of viral infections. Immunity and prophylaxis of viral diseases. Principles of laboratory diagnosis of viral diseases. List of commonly used antiviral agents.
5. Mycology
General properties of fungi. Classification based on disease: superficial, subcutaneous, deep mycosel opportunistic infections including Mycotoxins, systemic mycoses. General principles of fungal diagnosis, Rapid diagnosis. Method of collection of samples. Antifungal agents.
6. Clinical/Applied Microbiology
Streptococcal infections: Rheumatic fever and Rheumatic heart disease, Meningitis.
Tuberculosis, Pyrexia of unknown origin, leprosy, Sexually transmitted diseases, Poliomyelitis, Hepatitis, Acute-respiratory infections, Central nervous System

infections, Urinary tract infections, Pelvic inflammatory disease, Wound infection, Opportunistic infections, HIV infection, Malaria, Filariasis, Zoonotic diseases.

Practical

1. Demonstration of Microscopes and its uses
2. Principles, uses and demonstration of common sterilization equipment
3. Demonstration of common culture media
4. Demonstration of motility by hanging drops method
5. Demonstration of Gram Stain, ZN Stain
6. Demonstration of Serological test: ELISA
7. Demonstration of Fungus

Recommended Text Books:

1. Short text book of Medical Microbiology by Sathish Gupta (2014)
2. Text book of Microbiology by Jayaram Panicker (2014)
3. Microbiology & Parasitology by Rajeshwar Reddy (2010)
4. Text book of Microbiology by Anantha Narayanan (2010)
5. Microbiology by Baveja (2010)
6. Text book of microbiology by Chakraborty (2012)

PHARMACOLOGY
Subject Code: BPT-206
Minimum Hours Theory: 80 Hrs.

1. General Pharmacology:
 - Introduction, Definitions, Classification of drugs, Sources of drugs, Routes of drug administration,
 - Distribution of drugs, Metabolism and Excretion of drugs, Pharmacokinetics, Pharmacodynamics,
 - Factors modifying drug response.
 - Elementary knowledge of drug toxicity, drug allergy, drug resistance, drug potency, efficacy & drug antagonism.
2. Autonomic Nervous system
 - General considerations – The Sympathetic and Parasympathetic Systems, Receptors, Somatic Nervous System
 - Cholinergic and Anti-Cholinergic drugs, Adrenergic and Adrenergic blocking drugs, Peripheral muscle relaxants.
3. Cardiovascular Pharmacology (in brief):
 - Drugs Used in the Treatment of Heart Failure: Digitalis, Diuretics, Vasodilators, ACE inhibitors
 - Antihypertensive Drugs: Diuretics, Beta Blockers, Calcium Channel Blockers, ACE Inhibitors, Central Acting Alpha Agonists, Peripheral Alpha Antagonists, Direct acting Vasodilators
 - Antiarrhythmic Drugs
 - Drugs Used in the Treatment of Vascular Disease and Tissue Ischemia: Vascular Disease, Hemostasis Lipid-Lowering agents, Antithrombotics, Anticoagulants and Thrombolytics
 - Ischemic Heart Disease – Nitrates, Beta-Blockers, Calcium Channel Blockers
 - Cerebral Ischemia
 - Peripheral Vascular Disease
4. Neuropharmacology (in brief):
 - Sedative-Hypnotic Drugs: Barbiturates, Benzodiazepines
 - Antianxiety Drugs: Benzodiazepines, Other Anxiolytics
 - Drugs Used in Treatment of Mood Disorders: Monoamine Oxidase Inhibitors, Tricyclic Antidepressants, Atypical Antidepressants, Lithium
 - Antipsychotic drugs
5. Disorders of Movement (in brief):
 - Drugs used in Treatment of Parkinson's Disease
 - Antiepileptic Drugs
 - Spasticity and Skeletal Muscle Relaxants
6. Inflammatory/Immune Diseases-
 - Non-narcotic Analgesics and Nonsteroidal Anti-Inflammatory Drugs: Acetaminophen, NSAIDs, Aspirin, Nonaspirin NSAIDs, drug Interactions with NSAIDs
 - Glucocorticoids: Pharmacological Uses of Glucocorticoids, adverse effects Physiologic Use of Glucocorticoids

- Drugs Used in Treatment of Arthritic Diseases: Rheumatoid Arthritis, Osteoarthritis, Gout
 - Drugs Used in the Treatment of Neuromuscular Immune/Inflammatory Diseases: Myasthenia gravis, Idiopathic Inflammatory Myopathies, systemic lupus Erythmatosus, Scleroderma, Demyelinating Disease
7. Respiratory Pharmacology (in brief) : Obstructive Airway Diseases, Drugs used in Treatment of Obstructive airway Diseases, Allergic Rhinitis
 8. Digestion and Metabolism (in brief):
 - Gastrointestinal Pharmacology: Peptic Ulcer Disease, Constipation, Diarrhea
 - Drugs Used in Treatment of Diabetes Mellitus: Insulin, Oral Hypoglycemics
 9. Geriatrics:
 - Pharmacology and the geriatric Population: Adverse effects of special concern in the Elderly, Dementia, Postural hypotension, urinary incontinence.

Recommended Text Books

1. Lippicott's Pharmacology (2014)
2. Essential of Medical Phramacology by Tripathi (2014)
3. Text book of Medical Pharmacology by Padmaja udaykumar (2012)
4. Pharmacology by N.Murugesh (2012)
5. Pharmacolgy & Pharmacotherapeutics by Sadoskar (2012)

BPT 3rd Year
Clinical Orthopaedics
Minimum Hours Theory: 80 Hrs. Practical:60
Sub. Code-BPT-301

1. Introduction
Introduction to orthopaedics. Clinical examination in an Orthopedic patient. Common investigative procedures. Radiological and Imaging techniques in Orthopaedics. Inflammation and repair, Soft tissue healing.
2. Traumatology
Fracture: definition, types, signs and symptoms. Fracture healing. Complications of fractures. Conservative and surgical approaches. Principles of management – reduction (open/closed, immobilization etc). Subluxation/ dislocations – definition, signs and symptoms, management (conservative and operative).
3. Fractures and Dislocations of Upper Limb
Fractures of Upper Limb - causes, clinical features, mechanism of injury, complications, conservative and surgical management of the following fractures: Fractures of clavicle and scapula. Fractures of greater tuberosity and neck of humerus. Fracture shaft of humerus. Supracondylar fracture of humerus. Fractures of capitulum, radial head, olecranon, coronoid, and epicondyles. Side swipe injury of elbow. Both bone fractures of ulna and radius. Fracture of forearm – Monteggia, Galeazzi fracture – dislocation. Chauffeur's fracture. Colle's fracture. Smith's fracture. Scaphoid fracture. Fracture of the metacarpals. Bennett's fracture. Fracture of the phalanges. (Proximal and middle.) Dislocations of Upper Limb - Anterior dislocation of shoulder – mechanism of injury, clinical feature, complications, conservative management (Kocher's and Hippocrates maneuver), surgical management (putti plat, bankart's) etc. Recurrent dislocation of shoulder. Posterior dislocation of shoulder – mechanism of injury, clinical features and management. Posterior dislocation of elbow – mechanism of injury, clinical feature, complications & management.
4. Fracture of Spine
Fracture of Cervical Spine - Mechanism of injury, clinical feature, complications (quadriplegia); Management-immobilization (collar, cast, brace, traction); Management for stabilization, management of complication (bladder and bowel, quadriplegia). Clay shoveller's fracture.
Hangman's fracture. Fracture odontoid. Fracture of atlas. Fracture of Thoracic and Lumbar Regions-Mechanism of injury, clinical features, management—conservative and surgical of common fractures around thoracic and lumbar regions. Fracture of coccyx.
Fracture of Rib Cage - Mechanism of injury, clinical features, management for Fracture Ribs, Fracture of sternum.
5. Fractures and Dislocations of Lower Limb
Fracture of Pelvis and Lower Limb - causes, clinical features, mechanism of injury, complications, conservative and surgical management of the following fractures: Fracture of pelvis. Fracture neck of femur – classification, clinical features, complications, management - conservative and surgical. Fractures of trochanters. Fracture shaft femur—clinical features, mechanism of injury, complications, management-conservative and surgical. Supracondylar fracture of femur. Fractures of the condyles of femur. Fracture patella. Fractures of tibial condyles. Both bones

- fracture of tibia and fibula. Dupuytren's fracture Maisonneuve's fracture. Pott's fracture – mechanism of injury, management. Bimalleolar fracture Trimalleolar fracture Fracture calcaneum – mechanism of injury, complications and management. Fracture of talus. Fracture of metatarsals—stress fractures jone's fracture. Fracture of phalanges. Dislocations of Lower Limb - mechanism of injury, clinical features, complications, management of the following dislocations of lower limb. Anterior dislocation of hip. Posterior dislocation of hip. Central dislocation of hip. Dislocation of patella. Recurrent dislocation of patella.
6. Soft Tissue Injuries
 - Define terms such as sprains, strains, contusion, tendinitis, rupture, tenosynovitis, tendinosis, bursitis. Mechanism of injury of each, clinical features, managements- conservative and surgical of the following soft tissue injuries: Meniscal injuries of knee. Cruciate injuries of knee. Medial and lateral collateral injuries of knee. Lateral ligament of ankle. Wrist sprains. Strains-quadriceps, hamstrings, calf, biceps, triceps etc. Contusions-quadriceps, gluteal, calf, deltoid etc. Tendon ruptures-Achilles, rotator cuff muscles, biceps, pectorals etc.
 7. Hand Injuries
mechanism of injury, clinical features, and management of the following - Crush injuries. Flexor and extensor injuries. Burn injuries of hand.
 8. Amputations
- Definition, levels of amputation of both lower and upper limbs, indications, complications.
 9. Traumatic Spinal Cord Injuries - Clinical features, complications, medical and surgical management of Paraplegia and Quadriplegia.
 10. Deformities- clinical features, complications, medical and surgical management of the following Congenital and Acquired deformities. Congenital Deformities - CTEV. CDH. Torticollis. Scoliosis. Flat foot. Vertical talus. Hand anomalies- syndactyly, polydactyly and ectrodactyly. Arthrogryposis multiplex congenital (amyoplasia congenita). Limb deficiencies- Amelia and Phocomelia. Klippel feil syndrome. Osteogenesis imperfect (fragile ossium). Cervical rib. Acquired Deformities - Acquired Torticollis. Scoliosis. Kyphosis. Lordosis. Genu varum. Genu valgum. Genu recurvatum Coxa vara. Pes cavus. Hallux rigidus. Hallux valgus. Hammer toe. Metatarsalgia.
 11. Disease of Bones and Joints: Causes, Clinical features, Complications, Management- medical and surgical of the following conditions:
 - a. Infective conditions: Osteomyelitis (Acute / chronic). Brodie's abscess. TB spine and major joints like shoulder, hip, knee, ankle, elbow etc.
 - b. Arthritic conditions: Pyogenic arthritis. Septic arthritis. Syphilitic infection of joints.
 - c. Bone Tumors: classification, clinical features, management - medical and surgical of the following tumors: Osteoma. Osteosarcoma, Osteochondroma. Enchondroma. Ewing's sarcoma. Gaint cell tumor. Multiple myeloma. Metastatic tumors.
 - d. Perthes disease, Slipped Capital Femoral Epiphysis and Avascular Necrosis.
 - e. Metabolic Bone Diseases: Rickets. Osteomalacia, Osteopenia. Osteoporosis.
 12. Inflammatory and Degenerative Conditions: causes, clinical feature, complications, deformities, radiological features, management- conservative and surgical for the following conditions:

- Osteoarthritis. Rheumatoid arthritis. Ankylosing spondylitis Gouty arthritis. Psoriatic arthritis. Hemophilic arthritis. Still's disease (juvenile rheumatoid arthritis). Charcot's joints. Connective Tissue Disorders- Systemic Lupus Erythematosus, Scleroderma, Dermatomyositis, Poliomyelitis, Mixed connective tissue Disease (MCTD)
13. Syndromes: Causes, Clinical features, complications, management- conservative and surgical of the following :
Cervico brachial syndrome. Thoracic outlet syndrome. Vertebro- basilar syndrome. Scalenus syndrome. Costo clavicular syndrome. Levator scapulae syndrome. Piriformis syndrome.
 14. Neuromuscular Disorders: Definition, causes, clinical feature, complications, management. (Multidisciplinary approach) medical and surgical of the following conditions :
Cerebral palsy. Poliomyelitis. Spinal Dysraphism. Leprosy.
 15. Cervical and Lumbar Pathology: Causes, clinical feature, patho-physiology, investigations, management-Medical and surgical for the following : Prolapsed intervertebral disc (PID), Spinal Canal Stenosis. Spondylosis (cervical and lumbar) Spondylolysis. Spondylolisthesis. Lumbago/ Lumbosacral strain. Sacralisation. Lumbarisation.
Coccydynia. Hemivertebra.
 16. Orthopedic Surgeries: Indications, Classification, Types, Principles of management of the following Surgeries :
Arthrodesis. Arthroplasty (partial and total replacement). Osteotomy, External fixators. Spinal stabilization surgeries(Harrington's, Luque's, Steffi plating) etc, Limb re-attachments.
 17. Regional Conditions: Definition, Clinical features and management of the following regional conditions
 - a. Shoulder: Periarthritic shoulder (adhesive capsulitis). Rotator cuff tendinitis. Supraspinatus Tendinitis. Infraspinatus Tendinitis. Bicipital Tendinitis. Subacromial Bursitis.
 - b. Elbow: Tennis Elbow. Golfer's Elbow. Olecranon Bursitis (student's elbow). Triceps Tendinitis.
 - c. Wrist and Hand: De Quervain's Tenosynovitis. Ganglion. Trigger Finger/ Thumb. Mallet Finger, Carpal Tunnel Syndrome, Dupuytren's Contracture.
 - d. Pelvis and Hip: IT Band Syndrome. Piriformis Syndrome. Trochanteric Bursitis.
 - e. Knee: Osteochondritis Dissecans. Prepatellar and Suprapatellar Bursitis. Popliteal Tendinitis. Patellar Tendinitis. Chondromalacia Patella. Plica Syndrome. Fat Pad Syndrome (Hoffa's syndrome).
 - f. Ankle and Foot: Ankle Sprains. Plantar Fasciitis/Calcaneal Spur. Tarsal Tunnel Syndrome. Achilles Tendinitis. Metatarsalgia. Morton's Neuroma.

Books Recommended:

1. Outline of Fractures—John Crawford Adams. (2015)
2. Outline of Orthopedics— John Crawford Adams (2015)
3. Text book of Orthopedics—Maheswari (2016)
4. Apley's Orthopedics (2014)
5. Text Book of Orthopedics and Traumatology— M.N.Natarajan (2012)

General Medicine
Subject Code: BPT-302
Min. Hours Theory: 80 hrs

1. Infectious Diseases: Brief description of concept of infection, types, classification & common clinical manifestation of infection and general principle of management
2. Poisoning: Clinical features – general management – common agents in poisoning – pharmaceutical agents – drugs of misuse – chemical pesticides – Envenomation.
3. Food and Nutrition: Assessment – Nutritional and Energy requirements; Deficiency diseases – clinical features and treatment; Protein – Energy Malnutrition: Clinical features and treatment; Obesity and its related disorders : Causes – Complications – benefits of weight loss – management of Obesity – diet, exercise and medications.
4. Endocrine diseases: Common presenting symptoms of Endocrine disease – common classical disease presentations, clinical features and its management; Diabetes Mellitus: Etiology and pathogenesis of diabetes – clinical manifestations of the disease – management of the disease – Complications of diabetes.
5. Diseases of the blood: Examinations of blood disorders – Clinical manifestations of blood disease; Anemia – signs and symptoms – types and management ; Hemophilia - Cause – clinical features severity of disease – management – complications due to repeated haemorrhages – complications due to therapy.
6. Diseases of the digestive system : Clinical manifestations of gastrointestinal disease – Aetiology, clinical features, diagnosis, complications and treatment of the following conditions : Reflux Oesophagitis, Achlasia Cardia, Carcinoma of Oesophagus, GI bleeding, Peptic Ulcer disease, Carcinoma of Stomach, Pancreatitis, Malabsorption Syndrome, Ulcerative Colitis, Peritonitis, Infections of Alimentary Tract; Clinical manifestations of liver diseases - Aetiology, clinical features, diagnosis, complications and treatment of the following conditions : Viral Hepatitis, Wilson’s Disease, Alpha1-antitrypsin deficiency, Tumors of the Liver, Gall stones, Cholecystitis.
7. Diseases of the Skin: Examination and clinical manifestations of skin diseases; Causes, clinical features and management of the following skin conditions : Leprosy, Psoriasis, Pigmentary Anomalies, Vasomotor disorders, Dermatitis, Coccoal and Fungal Parasitic and Viral infections.
8. Pediatrics: Problems and management of LBW infants, Perinatal problems and management, Congenital abnormalities and management, Respiratory conditions of childhood, Cerebral Palsy – causes, complications, clinical manifestations, treatment; Spina Bifida – management and treatment, Epilepsies – types, diagnosis and treatment; Recognizing developmental delay, common causes of delay; Orthopedic and Neuromuscular disorders in childhood, clinical features and management; Sensory disorders – problems resulting from loss of vision and hearing; Learning and behavioural problems – Hyperactivity, Autism, Challenging behaviours, Educational delay, The Clumsy Child.
9. Psychiatric Disorders: Classifications, Causes, Clinical manifestations and treatment methods used in Psychiatry
Cardiovascular Disease : Examination of the Cardiovascular System – Investigations: ECG, Exercise Stress Testing, Radiology ; Clinical manifestations of Cardiovascular disease; Definition, Etiology, Clinical features, signs and symptoms, complications, management and treatment of following diseases and disorders of the heart: Pericarditis, Myocarditis, Endocarditis, Rheumatic Fever – resulting in valve

disorders, Ischemic Heart Disease, Coronary Valve Disease, Congenital disorders of the Heart, Cardiac Arrest; Examination and Investigations of diseases of arteries and veins; Hypertension: Definition, causes, classification, types, assessment, investigations and management.

10. Respiratory Disease: Examination of the Respiratory System Investigations: Chest Radiographs, Pulmonary Function Testing, Arterial Blood Gas Analysis ; Clinical manifestations of Lung disease; Patterns of lung disease – Chronic Obstructive Lung Disease and Restrictive Lung Disease; Definition, Etiology, Clinical features, signs and symptoms, complications, management and treatment of following lung diseases: Chronic Bronchitis, Emphysema, Asthma, Bronchiectasis, Cystic Fibrosis, Upper Respiratory Tract Infections, Pneumonia, Tuberculosis, Fungal Diseases, Interstitial Lung Diseases, Diseases of the pleura, diaphragm and chest wall; Respiratory failure – Definition, types, causes, clinical features, diagnosis and management.

Recommended books:

1. Davidson's Principles and Practice of Medicine (2010)
2. Harrison's Internal Medicine (2012)
3. Braunwald Text of Cardiology (2012)
4. Text Book of Cardiology by Hurst (2014)

General Surgery
Subject Code: BPT-303
Min. Hours Theory: 80 hrs.

1. Fluid, Electrolyte and Acid-Base disturbances – diagnosis and management; Nutrition in the surgical patient; Wound healing – basic process involved in wound repair, basic phases in the healing process, clinical management of wounds, factors affecting wound healing, Scars – types and treatment. Hemostasis – components, hemostatic disorders, factors affecting bleeding during surgery. Transfusion therapy in surgery – blood components, complications of transfusion; Surgical Infections; General Post – Operative Complications and its management
2. Reasons for Surgery; Types of anaesthesia and its affects on the patient; Types of Incisions; Clips Ligatures and Sutures; General Thoracic Procedures – Radiologic Diagnostic procedures, Endoscopy – types, Biopsy – uses and types. Overview and Drainage systems and tubes used in Surgery.
3. Causes, Clinical Presentation, Diagnosis and treatment of the following Thoracic Trauma situations – Airway obstruction, Pnuemothorax, Hemothorax, Cardiac Tamponade, Tracheobronchial disruption, Aortic disruption, Diaphragmatic disruption, Esophageal disruption, Cardiac and Pulmonary Contusions.
4. Surgical Oncology – Cancer – definition, types, clinical manifestations of cancer, Staging of Cancer, surgical procedures involved in the management of cancer.
5. Disorders of the Chest Wall, Lung and Mediastinum – Definition, Clinical features, diagnosis and choice of management for the following disorders – chest wall deformities, chest wall tumors, Spontaneous Pneumothorax, Pleural Effusion, Empyema Thoracis, Lung abscess, Bronchiectasis, Tuberculosis, Bronchogenic Carcinoma, Bronchial Adenomas, Metastatic tumors of the Lung, tracheal Stenosis, Congenital tracheomalacia, Neoplasms of the trachea, Lesions of the Mediastinum. Carcinoma of the female breast.
6. Disorders of the Heart – Definition, Clinical features, diagnosis and choice of management for the following disorders: Congenital Heart diseases – Acyanotic congenital heart disease & Cyanotic congenital heart disease: Patent Ductus Arteriosus, Coarctation of Aorta, Atrial Septal Defect, Ventricular Septal Defect, Tetralogy of Fallot, Transposition of Great Vessels; Acquired Heart Disease – Mitral Stenosis & Insufficiency, Aortic Stenosis and Insufficiency, Ischemic Heart Disease – Coronary Artery Disease, Cardiac tumors.
7. Thoracic surgeries – Thoracotomy – Definition, Types of Incisions with emphasis to the site of insision, muscles cut and complications. Lung surgeries: Pnumonectomy, Lobectomy, segmentectomy – Indications, Physiological changes and Complications; Thoracoplasty, Pleurectomy, Pleurodesis and Decortication of the Lung. Cardiac surgeries – An overview of the Cardio-Pulmonary Bypass Machine – Extracardiac Operations, Closed Heart surgery, Open Heart surgery. Transplant Surgery – Heart, Lung and Kidney – Indications, Physiological changes and Complications.
8. Diseases of the Arteries and Veins : Definition, Etiology, Clinical features, signs and symptoms, complications, management and treatment of following diseases: Arteriosclerosis, Atherosclerosis, Aneurysm, Buerger’s disease, Raynaud’s Disease, Thrombophlebitis, Deep Vein Thrombosis, Pulmonary Embolism, Varicose Veins.
9. Definition, Indication, Incision, Physiological changes and Complications following Common operations like Cholecystectomy, Colostomy, Ileostomy, Gastrectomy,

- Hernias, Appendicectomy Mastectomy, Nephrectomy, Prostatectomy.
10. Burn: Definition, Classification, Causes, Prevention, Pathological changes, Complications, Clinical Features and Management. Skin Grafts – Types, Grafting Procedures, Survival of Skin Graft; Flaps – Types and uses of Flaps.
 11. Womens Health: Menstrual cycle and its disorders. Hormonal disorders of females- obesity and female hormones. Cancer of the female reproductive organs-management Infections and sexually transmitted disease in female Menopause - its effects on emotions and musculoskeletal system. Malnutrition and deficiencies in females. Sterility-pathophysiology-investigations-management. Maternal physiology in pregnancy. Musculo skeletal disorders during pregnancy. Prenatal complications-investigations-management. Child birth-Stages-complications-investigations-management–Pain relief in labour-Purperium-Post Natal care. Surgical procedures involving child birth. Incontinence–Types, Causes, Assessment and Management. Definition, Indications and Management of the following surgical procedures– Hysterosalphyngography, Dilatation and Curettage, Laproscopy, Colposcopy, Hysterectomy.
 12. ENT: Common problems of ear, otitis media, Otosclerosis, functional achonia and deafness, management facial palsy classification, medical and surgical management of lower motor neuron type of facial palsy.
 13. Ophthalmology: Ophthalmologic surgical conditions, refraction's, conjunctivitis, glaucoma, corneal ulcer, iritis, cataract, retinitis, detachment of retina, defects of extra-ocular muscles- surgical management

Recommended Books:

1. General Surgical Operations–by Kirk/Williamson (2012)
2. Surgery by Nan (2010)
3. Bailey and Love's – Short Practice of Surgery (2014)
4. Chest Disease by Crofton and Douglas. (2012)
5. Patrica A Downie, Text book of Heart, Chest Vascular Disease for physiotherapists, JP Bros. (2012)

Clinical Neurology

Subject Code: BPT-304

Min. Hours Theory: 80 hrs. Practical: 60hrs.

1. Disorders of function in the context of Path physiology, Anatomy in Neurology and Cortical Mapping.
2. Classification of neurological involvement depending on level of lesion.
3. Neurological assessment: Principles of clinical diagnosis, higher mental function, assessment of brain & spinal cord function, evaluation of cranial nerves and evaluation of autonomic nervous system.
4. Investigations: principles, methods, views, normal/abnormal values/features, types of following investigative procedures- skull x-ray, CT, MRI, evoked potentials, lumbar puncture, CSF examination, EMG, NCV.
5. Neuro-ophthalmology: Assessment of visual function – acuity, field, colour vision, Pupillary reflex, accommodation reflex, abnormalities of optic disc, disorders of optic nerve, tract, radiation, occipital pole, disorders of higher visual processing, disorders of pupil, disorders of eye movements, central disorders of eye movement.
6. Deafness, vertigo, and imbalance: Physiology of hearing, disorders of hearing, examination & investigations of hearing, tests of vestibular function, vertigo, peripheral vestibular disorders, central vestibular vertigo.
7. Lower cranial nerve paralysis – Etiology, clinical features, investigations, and management of following disorders - lesions in trigeminal nerve, trigeminal neuralgia, trigeminal sensory neuropathy, lesions in facial nerve, facial palsy, bell's palsy, hemi facial spasm, Glossopharangeal neuralgia, lesions of Vagus nerve, lesions of spinal accessory nerve, lesions of hypoglossal nerve. Dysphagia – swallowing mechanisms, causes of dysphagia, symptoms, examination, and management of dysphagia.
8. Cerebro-vascular diseases: Define stroke, TIA, RIA, stroke in evolution, multi infarct dementia and Lacunar infarct. Classification of stroke–Ischemic, hemorrhagic, venous infarcts. Risk factors, cause of ischemic stroke, causes of hemorrhagic stroke. Classification of hemorrhagic stroke, classification of stroke based on symptoms, stroke syndrome, investigations, differential diagnosis, medical and surgical management.
9. Head injury: Etiology, classification, clinical signs & symptoms, investigations, differential diagnosis, medical management, surgical management and complications.
10. Higher cortical, neuro psychological and neurobehavioral disorders: Causes of blackouts, physiological nature of Epilepsy, classification, clinical features, investigations, medical & surgical management of following disorders – Non-epileptic attacks of childhood, Epilepsy in childhood, Seizures, and Epilepsy syndromes in adult. Classification and clinical features of Dyssomnias, Parasomnias, Dementia, Obsessive-compulsive disorders. Neural basis of consciousness, causes & investigations of Coma, criteria for diagnosis of Brain death. Etiology, pathophysiology, classification, clinical signs & symptoms, investigations, differential diagnosis, management of Perceptual disorders and Speech disorders.
11. Movement disorders: Definition, etiology, risk factors, pathophysiology, classification, clinical signs & symptoms, investigations, differential diagnosis, medical management, surgical management and complications of following disorders– Parkinson's disease, Dystonia, Chorea, Ballism, Athetosis, Tics, Myoclonus and Wilson's disease.

12. Cerebellar and coordination disorders: Etiology, pathophysiology, classification, clinical signs & symptoms, investigations, differential diagnosis, management of Congenital ataxia, Friedreich's ataxia, Ataxia telangiectasia, Metabolic ataxia, Hereditary cerebellar ataxia, Tabes dorsalis and Syphilis.
13. Spinal cord disorders: Functions of tracts, definition, etiology, risk factors, pathophysiology, classification, clinical signs & symptoms, investigations, differential diagnosis, medical management, surgical management and complications of following disorders – Spinal cord injury, Compression by IVD prolapse, Spinal epidural abscess, Transverse myelitis, Viral myelitis, Syringomyelia, Spina bifida, Sub acute combined degeneration of the cord, Hereditary spastic paraplegia, Radiation myelopathy, Progressive encephalomyelitis, Conus medullaris syndrome, Bladder & bowel dysfunction, and Sarcodosis.
14. Brain tumors and spinal tumors: Classification, clinical features, investigations, medical and surgical management.
15. Infections of brain and spinal cord: Etiology, pathophysiology, classification, clinical signs & symptoms, investigations, differential diagnosis, medical management, surgical management and complications of following disorders – Meningitis, Encephalitis, Poliomyelitis and Post- polio syndrome. Complications of systemic infections on nervous system – Septic encephalopathy, AIDS, Rheumatic fever, Brucellosis, Tetanus, and Pertussis.
16. Motor neuron diseases: - Etiology, pathophysiology, classification, clinical signs & symptoms, investigations, differential diagnosis, medical management, and complications of following disorders - Amyotrophic lateral sclerosis, Spinal muscular atrophy, Hereditary bulbar palsy, Neuromyotonia and Post-irradiation lumbosacral polyradiculopathy.
17. Multiple sclerosis - Etiology, pathophysiology, classification, clinical signs & symptoms, investigations, differential diagnosis, medical management, and complications.
18. Disorders of neuromuscular junction – Etiology, classification, signs & symptoms, investigations, management, of following disorders Myasthenia gravis, Eaton-Lambert syndrome, and Botulism.
19. Muscle diseases: Classification, investigations, imaging methods, Muscle biopsy, management of muscle diseases, genetic counselling. Classification, etiology, signs & symptoms of following disorders – Muscular dystrophy, Myotonic dystrophy, myopathy, Non-dystrophic myotonia.
20. Polyneuropathy – Classification of Polyneuropathies, Hereditary motor sensory neuropathy, Hereditary sensory and Autonomic neuropathies, Amyloid neuropathy, Acute idiopathic Polyneuropathies. Guillain-Barre syndrome – Causes, clinical features, management of GBS, Chronic Idiopathic Polyneuropathies, diagnosis of polyneuropathy, nerve biopsy.
21. Focal peripheral neuropathy: Clinical diagnosis of focal neuropathy, neurotmesis, Axonotmesis, Neuropraxia. Etiology, risk factors, classification, neurological signs & symptoms, investigations, management, of following disorders – RSD, Nerve tumors, Brachial plexus palsy, Thoracic outlet syndrome, Lumbosacral plexus lesions, Phrenic & Intercostals nerve lesions, Median nerve palsy, Ulnar nerve palsy, Radial nerve palsy, Musculocutaneous nerve palsy, Anterior & Posterior interosseous nerve palsy, Axillary nerve palsy, Long thoracic nerve palsy, Suprascapular nerve palsy, Sciatic

- nerve palsy, Tibial nerve palsy, Common peroneal nerve palsy, Femoral nerve palsy, Obturator nerve palsy, Pudental nerve palsy.
22. Paediatric neurology: Neural development, Etiology, pathophysiology, classification, clinical signs & symptoms, investigations, differential diagnosis, medical management, surgical management and complications of following disorders - Cerebral palsy, Hydrocephalus, Arnold-chiari malformation, Basilar impression, Klippel-Feil syndrome, Achondroplasia, Cerebral malformations, Autism, Dandy walker syndrome and Down's syndrome.
 23. Toxic, metabolic and environmental disorders: Etiology, risk factors, classification, neurological signs & symptoms, investigations, management, of following disorders – Encephalopathy, Alcohol toxicity, Recreational drug abuse, Toxic gases & Asphyxia, Therapeutic & diagnostic agent toxicity, Metal toxicity, Pesticide poisoning, Environmental & physical insults, Pant & Fungal poisoning, Animal poisons, & Complications of organ transplantation.
 24. Introduction, Indications and Complications of following Neuro surgeries: Craniotomy, Cranioplasty, Stereotactic surgery, Deep brain stimulation, Burr-hole, Shunting, Laminectomy, Hemilaminectomy, Rhizotomy, Microvascular decompression surgery, Endarterectomy, Embolization, Pituitary surgery, Ablative surgery - Thalamotomy and Pallidotomy, Coiling of aneurysm, Clipping of aneurysm, and Neural implantation.

Recommended Books:

1. Davidson's principles and Practice of Medicine (2014)
2. Text Book of Neurology-Victor Adams (2014)
3. Brains Clinical Neurology. (2013)
4. Illustrated Neurology & Neurosurgery (2012)
5. Brains Diseases of Nervous System (2010)

Preventive & Social Medicine

Subject Code: BPT-305

Min. Hours Theory: 80 hrs.

1. Health and Disease: Definitions, Concepts, Dimensions and Indicators of Health, Concept of well-being, Spectrum and Determinants of Health, Concept and natural history of Disease, Concepts of disease control and prevention, Modes of Intervention, Population Medicine, The role of socio-economic and cultural environment in health and disease.
2. Epidemiology, definition and scope. Principles of Epidemiology and Epidemiological methods: Components and Aims, Basic measurements, Methods, Uses of Epidemiology, Infectious disease epidemiology, Dynamics and modes of disease transmission, Host defenses and Immunizing agents, Hazards of Immunization, Disease prevention and control, Disinfection. Screening for Disease: Concept of screening, Aims and Objectives, Uses and types of screening.
3. Epidemiology of communicable disease: Respiratory infections, Intestinal infections, Arthropod- borne infections, Zoonoses, Surface infections, Hospital acquired infections Epidemiology of chronic non-communicable diseases and conditions: Cardio vascular diseases: Coronary heart disease, Hypertension, Stroke, Rheumatic heart disease, Cancer, Diabetes, Obesity, Blindness, Accidents and Injuries.
4. Public health administration- an overview of the health administration set up at Central and state levels. The national health programme-highlighting the role of social, economic and cultural factors in the implementation of the national programmes. Health problems of vulnerable groups- pregnant and lactating women, infants and pre-school children, occupational groups
5. Health programmes in India: Vector borne disease control programme, National leprosy eradication programme, National tuberculosis programme, National AIDS control programme, National programme for control of blindness, Iodine deficiency disorders (IDD) programme, Universal Immunisation programme, Reproductive and child health programme, National cancer control programme, National mental health programme. National diabetes control programme, National family welfare programme, National sanitation and water supply programme, Minimum needs programme
6. Demography and Family Planning: Demographic cycle, Fertility, Family planning- objectives of national family planning programme and family planning methods, A general idea of advantage and disadvantages of the methods.
7. Preventive Medicine in Obstetrics, Paediatrics and Geriatrics: MCH problems, Antenatal, Intranatal and post natal care, Care of children, Child health problems, Rights of child and National policy for children, MCH services and indicators of MCH care, Social welfare programmes for women and children, Preventive medicine and geriatrics.
8. Nutrition and Health: Classification of foods, Nutritional profiles of principal foods, Nutritional problems in public health, Community nutrition programmes
9. Environment and Health: Components of environment, Water and air pollution and public health: Pollution control, Disposal of waste, Medical entomology.
10. Hospital waste management: Sources of hospital waste, Health hazards, Waste management
11. Disaster Management: Natural and manmade disasters, Disaster impact and response,

- Relief phase, Epidemiologic surveillance and disease control, Nutrition, Rehabilitation, Disaster preparedness
12. Occupational Health: Occupational environment, Occupational hazards, Occupational diseases, Prevention of occupational diseases. Social security and other measures for the protection from occupational hazard accidents and diseases. Details of compensation acts.
 13. Mental Health: Characteristics of a mentally healthy person, Types of mental illness, Causes of mental ill health, Prevention, Mental health services, Alcohol and drug dependence. Emphasis on community aspects of mental health. Role of Physiotherapist in mental health problems such as mental retardation.
 14. Health Education: Concepts, aims and objectives, Approaches to health education, Models of health education, Contents of health education, Principles of health education, Practice of health education

RESEARCH METHODOLOGY AND BIOSTATISTICS

Subject Code: BPT-306

Min. Hours Theory: 100 hrs.

RESEARCH METHODOLOGY

1. Introduction to Research methodology:
Meaning of research, objectives of research, Motivation in research, Types of research & research approaches, Research methods vs methodology, Criteria for good research.
2. Research problem:
Statement of research problem, Statement of purpose and objectives of research problem, Necessity of defining the problem
3. Research design:
Meaning of research design, Need for research design, Features for good design, Different research designs, Basic principles of research design.
4. Measurement & scaling techniques: Measurement in research- Measurement scales, sources of error in measurement, Technique of developing measurement tools, Meaning of scaling, its classification, important scaling techniques.
5. Methods of data collection: collection of primary data, collection data through questionnaires & schedules, Difference between questionnaires & schedules.
6. Computer technology:
Introduction to Computers, computer application in research computers & researcher.

BIOSTATISTICS

1. **Introduction:** Meaning, definition, characteristics of statistics. Importance of the study of statistics, Branches of statistics, Statistics and health science, Parameters and Estimates, Variables and their types, Measurement scales.
2. **Tabulation of Data:** Basic principles of graphical representation, Types of diagrams— histograms, frequency polygons, smooth frequency polygon, cumulative frequency curve, Normal probability curve
3. **Measures of Central Tendency:** Need for measures of central Tendency, Definition and calculation of **Mean** – ungrouped and grouped, interpretation and calculation of Median-ungrouped and grouped, Meaning and calculation of Mode, Geometric mean & Harmonic mean, Guidelines for the use of various measures of central tendency.
4. **Measures of Dispersion:** Range, mean deviation, standard deviation & variance.
5. **Probability and Standard Distributions:** Meaning of probability of standard distribution, the binominal distribution, the normal distribution, Divergence from normality – skewness, kurtosis.
6. **Correlation & regression :** Significance, correlation coefficient, linear regression & regression equation.
7. **Testing of Hypotheses, Level of significance, Degrees of freedom.**
8. **Chi-square test, test of Goodness of fit & student t-test.**
9. **Analysis of variance & covariance:** Analysis of variance (ANOVA), what is ANOVA? Basic principle of ANOVA, ANOVA technique, Analysis of Co variance (ANACOVA)
7. **Sampling:** Definition, Types- simple, random, stratified, cluster and double sampling. Need for sampling - Criteria for good samples, Application of sampling in community, Procedures of sampling and sampling designs errors

Recommended Text books:

1. Elements of Health Statistics: Rao. N. S. N (2012)
2. Anintroduction of Biostatistics: Sunder Rao. P. S. S. (2010)
3. Methods in Bio-Statistics 6th Edn. 1997: B. K. Mahajan (2012)
4. Biostatistics : A manual of Statistics Methods: K. Visweswara Rao (2012)
5. Elementary Statistics 1st Edn, 1990. in Medical Workers: Inderbir Singh (2014)
6. Statistics in Psychology and education: Great and Henry (@ (2012)
7. An Introduction to Gupta C.B. Statistical Methods, Ram Prasad & Sons (2010)
8. Basic Statistics, 3rd Edn.: Simpsory G. Kaftha. P (2011)
9. Research; Principles and Methods: L Denise F. Poli & Hungler (2012)
10. Fundamentals of Research, 4th Edn.: David J. fox (2015)

BPT 4th Year
Physiotherapy in Orthopaedic Condition
Subject Code: BPT-401
Min. Hours Theory: 80 hrs. Practical: 100hrs.

1. PT assessment for Orthopedic conditions - SOAP format. Subjective - history taking, informed consent, personal, past, medical and socioeconomic history, chief complaints, history of present illness. Pain assessment- intensity, character, aggravating and relieving factors, site and location. Objective- on observation - body built swelling, muscle atrophy, deformities, posture and gait. On palpation- tenderness-grades, muscle spasm, swelling-methods of swelling assessment, bony prominences, soft tissue texture and integrity, warmth and vasomotor disturbances. On examination – ROM – active and passive, resisted isometric tests, limb length- apparent, true and segmental, girth measurement, muscle length testing-tightness, contracture and flexibility, manual muscle testing, peripheral neurological examination- dermatomes, myotomes and reflexes, special tests and functional tests. Prescription of home program. Documentation of case records, and follow up.
2. Fractures - types, classification, signs and symptoms, complications. Fracture healing – factors affecting fracture healing. Principles of fracture management - reduction - open and closed, immobilization - sling, cast, brace, slab, traction - manual, mechanical, skin, skeletal, lumbar and Cervical traction, external fixation, functional cast bracing. PT management in complications - early and late - shock, compartment syndrome, VIC, fat embolism, delayed and mal union, RSD, myositis ossificans, AVN, pressure sores etc. Physiotherapy assessment in fracture cases. Aims of PT management in fracture cases - short and long term goals. Principles of PT management in fractures - Guidelines for fracture treatment during period of immobilization and guidelines for treatment after immobilization period.
3. Specific fractures and dislocations: PT assessment and management of upper limb fractures and dislocations. PT assessment and management of lower limb fractures and dislocations including pelvis. PT assessment and management spinal fractures.
4. Selection and application of physiotherapeutic techniques, maneuver's, modalities for preventive, curative and rehabilitative means in all conditions.
5. Principles of various schools of thought in manual therapy. (Briefly Maitland and McKenzie).
6. Degenerative and Inflammatory conditions: Definition, signs and symptoms, clinical features, path physiology, radiological features, deformities, medical, surgical management. Describe the PT assessment and management and home program for the following conditions – Osteoarthritis - emphasis mainly on knee, hip and hand, Rheumatoid Arthritis, Ankylosing spondylitis, Gout, Perthes disease, Periarthritic shoulder.
7. Infective conditions: Definition, signs and symptoms, clinical features, pathophysiology, radiological features, medical, surgical management. Describe PT assessment and management for following conditions – Osteomyelitis – acute and chronic, Septic arthritis, Pyogenic arthritis, TB spine and major joints - knee and hip.
8. Define, review the postural abnormalities of spinal column, clinical features, deformities, medical and surgical management. Describe PT assessment and management and home program.

9. Deformities: Review in detail the causes, signs and symptoms, radiological features, medical and surgical management. Describe the PT. assessment and management of the following conditions : Congenital : CTEV, CDH, Torticollis, pes planus, pes cavus and other common deformities. Acquired: scoliosis, kyphosis, coxa vara, genu varum, valgum and recurvatum.
10. Cerebral palsy: Definition, etiology, classification, clinical features, complications, deformities, medical and surgical management and home program with special emphasis on carrying techniques. PT management after surgical corrections.
11. Poliomyelitis: Definition, etiology, types, pathophysiology, clinical features, deformities, medical and surgical management. PT. assessment and management after surgical corrections and reconstructive surgeries - emphasis on tendon transfer and home program.
12. Leprosy: Definition, cause, clinical features, medical and surgical management. PT assessment, aims, and management after surgical procedures such as tendon transfer both pre and post operatively.
13. Amputations: Definition, levels, indications, types, PT assessment, aims, management pre and post operatively. PT management with emphasis on stump care and bandaging. Pre and post prosthetic training, checking out prosthesis, complications of amputations and its management.
14. Spinal conditions: Review the causes, signs and symptoms, investigations, radiological features, neurological signs. PT assessment, aims, and management and home program of the following conditions: Cervical spondylosis, Lumbar spondylosis, Spondylolisthesis, Spinal canal stenosis, Spondylolysis, Sacro-iliac joint dysfunction, Sacralisation, Lumbarisation, Intervertebral disc prolapse, Coccydynia, Spina bifida occulta.
15. Effects of spinal traction, types of traction, modes of application, indications for spinal traction, contraindications, precautions, limitations of traction.
16. Osteoporosis- causes, predisposing factors, investigations and treatment.
17. Orthopedic surgeries: Pre and post operative PT assessment, goals, precautions and PT management of following surgeries such as: Arthrodesis, Osteotomy, Arthroplasty-partial and total – Excision arthroplasty, excision arthroplasty with implant, interpositional arthroplasty and total replacement; Tendon transplant, Soft tissue release- tenotomy, myotomy, lengthening; Arthroscopy, Spinal stabilization, Re-attachment of limbs, External fixators, Synovectomy.
18. Shoulder joint: Shoulder instabilities, TOS, RSD, Impingement syndrome – conservative and Post operative PT management. Total shoulder replacement and Hemi replacement. - Post operative PT management. AC joint injuries - rehabilitation. Rotator cuff tears-conservative and surgical repair. Subacromial decompression - Post operative PT management.
19. Elbow and forearm: Excision of radial head - Post operative PT management. Total elbow arthroplasty- Post operative PT management.
20. Wrist and Hand: Total wrist arthroplasty. Repair of ruptured extensor tendons. Carpal tunnel syndrome. Flexor and extensor tendon lacerations - Post operative PT management.
21. Hip: Joint surgeries - hemi and total hip replacement - Post operative PT management Tendonitis and bursitis. - management.
22. Knee: Lateral retinacular release, chondroplasty- Post operative management. Realignment of extensor mechanism. ACL and PCL reconstruction surgeries - Post

operative rehabilitation. Meniscectomy and meniscal repair - Post operative management. Plica syndrome, patellar dysfunction and Hoffa's syndrome- conservative management. TKR- rehabilitation protocol. Patellar tendon ruptures and Patellectomy- rehabilitation.

23. Ankle and foot: Ankle instability. Ligamentous tears- Post operative management.
24. Introduction to Bio-Engineering; Classification of Orthoses and prostheses; Biomechanical principles of orthotic and prosthetic application; Designing of upper extremity, lower extremity and spinal orthosis, indications and check out; Designing of upper extremity and lower extremity prostheses, indications and check out; Psychological aspects of orthotic and prosthetic application; prescription and designing of footwear and modifications; Designing and construction of adaptive devices.

PRACTICALS

1. Practical demonstration of basic principles of physiotherapy assessment, functional assessment and application of physiotherapy in orthopaedics conditions.
2. Student must maintain a logbook. The duly completed logbook should be submitted during practical examination.

Recommended books:

1. Tidy physiotherapy. (2014)
2. Text book of orthopedics - Cash. (2012)
3. Clinical orthopedic rehabilitation - Brotzman. (2014)
4. Orthopedic physiotherapy – Jayant Joshi. (2015)
5. Physical Rehabilitation Assessment and Treatment – O' Sullivan Schmitz (2015)

Physiotherapy in Cardio- Respiratory & General Conditions

Subject Code: BPT-402

Min. Hours Theory: 80 hrs. Practical: 100 hrs.

1. Anatomy and Physiology of Respiratory System.
2. Assessment and Examination of Respiratory System.
3. Introduction to ICU: ICU monitoring –Apparatus, Airways and Tubes used in the ICU.
4. Management of Patient on ventilation.
5. Chest Physiotherapy and postural drainage.
6. Medical management of respiratory disorders.
7. Drug therapy – Drugs to prevent and treat inflammation, Drugs to treat Bronchospasm, Drugs to treat Breathlessness, Drugs to help sputum clearance, Drugs to inhibit coughing, Drugs to improve ventilation, Drugs to reduce pulmonary hypertension, Drug delivery doses, Inhalers and Nebulisers.
8. Management of wound ulcers- Care of ulcers and wounds - Care of surgical scars- U.V.R and other electro therapeutics for healing of wounds, prevention of Hyper granulated Scars, Keoloids, Electrotherapeutics measures for relief of pain during mobilization of scars tissues.
9. Neonatal and Pediatric Physiotherapy – Chest physiotherapy for children. The neonatal unit, Modifications of chest physiotherapy for specific neonatal disorders, Emergencies in the neonatal unit
10. Physiotherapy in Obstructive lung conditions
11. Physiotherapy in Restrictive lung conditions
12. Pulmonary Rehabilitation
13. Physiotherapy following Lung surgeries
14. Respiratory failure – Oxygen Therapy and Mechanical Ventilation
15. Physiotherapy in the ICU – Common conditions in the ICU – Tetanus, Head Injury, Lung Disease, Pulmonary Oedema, Multiple Organ Failure, Neuromuscular Disease, Smoke Inhalation, Poisoning, Aspiration, Near Drowning, ARDS, Shock; Dealing with an Emergency Situation in the ICU
16. Physiotherapy management following cardiac surgeries
17. Cardiac Rehabilitation
18. Physiotherapy management following Peripheral Vascular Disease.
19. Physiotherapy in Obstetrics – Antenatal Care, Antenatal Education, Postnatal Care. Electrotherapy and Exercise Therapy used in treatment of Obstetrics and Gynae Problems.
20. Treatment, Response to exercise and Implications of Physiotherapy in the following disease conditions: Hypertension, Diabetes, Renal Failure and Obesity.
21. Health Fitness and Promotion: Fitness Evaluation, Analysis of Body composition, Evaluation and prescription of Exercise, Factors affecting exercise Performance, Exercise Prescription for Specific groups: Elderly, Women and Children.

PRACTICAL

1. Practical demonstration of basic principles of physiotherapy assessment, functional assessment and application of physiotherapy in cardio – respiratory, OBG, Skin, and other medical conditions.

2. Student must maintain a logbook. The duly completed logbook should be submitted during practical examination.

Recommended books:

1. Tidy's physio therapy. (2015)
2. Cash's Text Book of Chest, Heart, Vascular Disorders for Physiotherapists. (2014)
3. The Brompton Guide to chest physiotherapy DU Gasket [Completed] (2012)
4. Physical Rehabilitation Assessment and Treatment – O'Sullivan Schmitz (2015)
5. Elements in Pediatric Physiotherapy – Pamela M Eckersley (2013)
6. Essentials of Cardio Pulmonary Physical Therapy by Hillegass and Sadowsky (2010)
7. Cardio pulmonary Symptoms in physical Therapy practice Cohen and Michel
8. Chest Physiotherapy in Intensive Care Unit by Mackenzi
9. Cash's Text book of General Medicine and Surgical conditions for Physiotherapists. (2012)
10. Physiotherapy in Psychiatry (2012)
11. Physical Therapy for the Cancer patient by M. C. Garvey (2011)
12. Physiotherapy in Obstetrics and Gynecology by Polden (2014)

Physiotherapy in Neurological Conditions

Subject Code: BPT-403

Min. Hours Theory: 80 hrs. Practical: 100hrs.

1. Neurological Assessment: Required materials for examination, Chief complaints, History taking – Present, Past, medical, familial, personal histories, Observation, Palpation, Higher mental function – Consciousness, Orientation, Wakefulness, memory, Speech, Reading, Language, Writing, Calculations, Perception, Left right confusion, Reasoning, and Judgment, Motor Examination – Muscle power, Muscle tone, Spasticity, Flaccidity, Reflexes – Developmental reflexes, deep tendon reflexes, Superficial reflexes, Sensory examination – Superficial, Deep and Cortical sensations, Special tests – Romberg's, Kernig's sign, Brudzki sign, Tinels's sign, Slum test, Lehermitte's sign, Bells Phenomenon, Gower's sign, Sun set sign, Battle's sign, Glabellar tap sign, etc, Balance examination, coordination examination, Gait analysis – Kinetics & Kinematics (Quantitative & Qualitative analysis), Functional Analysis, Assessment tools & Scales – Modified Ashworth scale, Berg balance scale, FIM, Barthel index, Glasgow coma scale, Mini mental state examination, Rancho Los Amigos Scale for Head injury, APGAR score, ASIA scale, Reflex Grading. Differential diagnosis.
2. Neuro physiological Techniques – Concepts, Principles, Techniques, Effects of following Neurophysiological techniques: NDT, PNF, Vojta therapy, Rood's Sensory motor Approach, Sensory Integration Approach, Brunnstorm movement therapy, Motor relearning program, Contemporary task oriented approach, Muscle re-education approach and Constraint induced movement therapy.
3. Paediatric Neurology: Paediatric Examination, Developmental milestones, developmental reflexes, Neuro developmental screening tests. Evaluation & Management – History, Observation, Palpation, Milestone Examination, developmental reflex Examination, Higher mental function, Cranial nerve examination, Motor & Sensory examination, Reflex testing, differential Diagnosis, Balance & Coordination examination, Gait analysis, Functional analysis, List of Problems & Complications, short & Long Term goals, Management of systemic complications, Management of Mechanical Complications, Use of various Neurophysiological approaches & Modalities in Risk babies, Minimum brain damage, Developmental disorders, Cerebral palsy, Autism, Down's Syndrome, Hydrocephalus, Chorea, Spina bifida, and syringomyelia.
4. Evaluation and Management of Brain, Spinal Cord and Muscle Disorders : History, Observation, Palpation, Higher mental function, Cranial nerve examination, Motor & Sensory examination, Reflex testing, differential Diagnosis, Balance & Coordination examination, Gait analysis, Functional analysis, List of Problems & Complications, short & Long Term goals, Management of systemic complications, Management of Mechanical Complications, Use of various Neurophysiological approaches & Modalities in Cerebro vascular Accident, Meningitis, Encephalitis, Head Injury, Brain Tumors, Perceptual disorders, Amyotrophic lateral sclerosis, and Multiple sclerosis. Cerebellar ataxia, Parkinson's disease, Muscular dystrophy (DMD), Myasthenia Gravis, Spinal tumors, Spinal Cord Injury, Transverse myelitis, Bladder and bowel dysfunction, Spinal Muscular atrophies, Polio myelites, Post Polio Syndrome.
5. Evaluation and Management of Cerebellar, Spinal Cord and Muscle Disorders : History, Observation, Palpation, Motor & Sensory examination, Reflex testing,

- differential Diagnosis, Balance & Coordination examination, Gait analysis, Functional analysis, List of Problems & Complications, short & Long Term goals, Management of systemic complications, Management of Mechanical Complications, Use of various Neurophysiological approaches & Modalities in Ataxia, Sensory Ataxia, Parkinson's disease, Muscular dystrophy (DMD), Myasthenia Gravis, Eaton-Lambert Syndrome, Spinal tumors, Spinal cord injury, Transverse myelitis, Bladder & Bowel Dysfunction, Spinal muscular atrophies, Poliomyelitis, Post Polio Syndrome
6. Evaluation and Management of Peripheral Nerve Injuries and its Disorders : History, Observation, Palpation, Motor & Sensory examination, Reflex testing, differential Diagnosis, Balance & Coordination examination, Gait analysis, Functional analysis, List of Problems & Complications, short & Long Term goals, Management of systemic complications, Management of Mechanical Complications, Use of various Neurophysiological approaches & Modalities in Hereditary motor sensory neuropathy, Guillain-Barre syndrome, Brachial plexus palsy, Thoracic outlet syndrome, Lumbosacral plexus lesions, Phrenic & intercostals nerve lesions, Median nerve palsy, Ulnar nerve palsy, Radial nerve palsy, Musculocutaneous nerve palsy, Anterior & Posterior interosseous nerve palsy, Axillary nerve palsy, Long thoracic nerve palsy, Suprascapular nerve palsy, sciatic nerve palsy, Tibial nerve palsy, Common peroneal nerve palsy, Femoral nerve palsy, Obturator nerve palsy, and Pudental nerve palsy.
 7. Assessment and management of Neurological gaits: Quantitative and Qualitative (Kinetic & Kinematics) analysis, List of Problems, short & Long Term goals, Management of following Neurological Gaits - Hemiplegic gait, Parkinson gait, High step gait, Hyperkinetic gait, Hypokinetic gait, Waddling gait, Scissoring gait, Spastic gait, Choreaform Gait, Diplegic Gait, and Myopathic Gait
 8. Pre and Post surgical assessment and treatment following conditions - Spinal disc herniation, Spinal stenosis, Spinal cord trauma, Head trauma, Brain tumors, Tumors of the spine, Spinal cord and peripheral nerves, Cerebral aneurysms, Subarachnoid hemorrhages, epilepsy, Parkinson's disease, Chorea, Hemiballism, Psychiatric disorders, Malformations of the nervous system, Carotid artery stenosis , Arteriovenous malformations, and Spina bifida

PRACTICAL

1. Practical demonstration of basic principles of physiotherapy assessment, functional assessment and application of physiotherapy in neurology conditions.
2. Student must maintain a logbook. The duly completed logbook should be submitted during practical examination.

Recommended books:

1. Tidy's physiotherapy. (2015)
2. Cash's Text book of Neurology for Physiotherapists (2014)
3. Neurological Rehabilitation by D Umphred (2012)
4. Physical Rehabilitation Assessment and Treatment – O' Sullivan Schmitz (2014)
5. Elements of Pediatric Physiotherapy - Eckersley (2012)

Sports Physiotherapy
Subject Code: BPT-404
Min. Hours Theory: 60 hrs. Practical: 40hrs.

1. Pre-exercise evaluation
2. Diet and nutrition.
3. Physiological effects of exercise on body systems - Muscular system, Endocrine system, Cardio-respiratory system, Nervous system
4. Common Sports injuries & its management - Whiplash Injury, Tennis Elbow, Golfer Elbow, Ankle strain, Groin Pull, hamstring Strain, ACL tear, PIVD
5. Evaluation/assessment of sports injuries – management of sports injuries.
6. Principles of Rehabilitation in sports injuries.
7. Exercise/training in sports injuries
8. Functional training, Strength training, Flexibility training, Endurance training.
9. Sports psychology.
10. Fitness assessment of Athlete/Player
11. Different techniques used in sports rehabilitation, Sports management, plyometric exercises, Taping, Theraband/swissball exercises.
12. Importance of warm-up and cool down in sports activities.
13. Blood doping, banned drugs in sports.
14. Principles of injury prevention.
15. Principles of training & Rehabilitation in sports injuries.
16. Sports in Special age groups: Females athletic triad, Younger athlete-Musculo-skeletal problems, management, children with chronic illness and nutrition. Older athlete- Physiological changes with aging, benefits, risks of exercise in elderly, exercise prescription guidelines for elderly.

Practical:

1. Practical demonstration of basic principles of physiotherapy assessment, functional assessment and application of sports physiotherapy
2. Student must maintain a logbook. The duly completed logbook should be submitted during practical examination.

Recommended books:

1. Clinical Sports Medicine – Peter Brukner & Karim Khan (2015)
2. Sports physiotherapy- Maria Zuluaga (2012)

Physiotherapy in Community based Rehabilitation

Subject Code: BPT-405

Min. Hours Theory: 80 hrs. Practical: 40hrs.

1. Introduction of Rehabilitation & History
2. Epidemiology of disability (Impairment, disability, phases of disability process, etc.).
3. Principles of Rehabilitation & concept of team approach with rolls of each individual participant.
4. Organization of Rehabilitation unit.
5. Disability prevention evaluation & principles of Rehabilitation Management.
6. Role of Physiotherapy in Rehabilitation (Preventive, treatment & restoration)
7. Brief outline of Communication disorder & its implications on Rehabilitation process.
8. Brief outline of psychosocial & vocational aspects of Rehabilitation.
9. Introduction to Occupational therapy.
10. Activities of daily living, functional assessment & training for functional independence.
11. Brief outline of basic community medicine with special reference to community based Rehabilitation, infrastructure and role of CBR
12. Assessment of disability in rural & urban setups. Health care delivery system & preventive measures with specific reference to disabling conditions. Community education program.
13. Application of Physiotherapy skills at community level with special reference to the need at rural level.
14. Role of voluntary Organizations in CBR: Charitable Organizations, Voluntary health agencies – National level and International NGO's, Multilateral and Bilateral agencies. International Health Organizations: WHO, UNICEF, UNDP, UNFPA, FAO, ILO, World bank, USAID, SIDA, DANIDA, Rockefeller, Ford foundation, CARE, RED CROSS.
15. National District Level Rehabilitation Program: Primary rehabilitation unit, Regional training center, District rehabilitation center, Primary Health center, Village rehabilitation worker, Anganwadi worker.
16. Role of Physiotherapy in CBR: Screening for disabilities, Prescribing exercise program, Prescribing and devising low cost locally available assistive aids, Modifications physical and architectural barriers for disabled, Disability prevention, Strategies to improve ADL, Rehabilitation program for various neuro-musculoskeletal and cardiothoracic disabilities.

ORTHOTICS AND PROSTHETICS

1. Introduction to surgical anatomy and various pathological deviations with respect to brace fitting.
2. Rationale of prescribing Prosthetic and Orthotic devices.
3. Types of Prosthetic and Orthotic devices: Spinal, Lower limb, and Upper limb.
4. Checkout, usage advice, precautions, and follow-up.
5. Walking aids and wheel chairs: prescription, usage advice, and follow-up.

PRACTICAL

1. Demonstration of methods of using orthotics & prosthetics devices.
2. Methods of organization of community based rehabilitation centers

3. Visit of different rehabilitation centers and preparing a report of the visit & viva-voice of the aforesaid report.

Recommended books:

1. Rehabilitation Medicine by Howard A Rusk. (2012)
2. Rehabilitation Medicine by Joel A De lisa (2014)
3. Text Book of Rehabilitation by S Sunder (2012)

ETHICS, ADMINISTRATION & SUPERVISION

Subject Code: BPT-406

Min. Hours Theory: 30 hrs.

Ethics:

1. History of physiotherapy, Ethical principles in health care, Ethical principles related to physiotherapy, Scope of practice, Enforcing standards in health profession-promoting quality care, Professional ethics in research, education and patient care delivery, Informed consent issues,
2. Rules of professional conduct
 - Physiotherapy as a profession
 - Relationship with patients
 - Relationship with health care institutions
 - Relationship with colleagues and peers
 - Relationship with medical and other professional.
3. Confidentiality and Responsibility, Malpractice and negligence, Provision of services and, advertising, Legal aspects: Consumer protection act, Legal responsibility of physiotherapist for their action in professional context and understanding liability and obligations in case of medico-legal action

ADMINISTRATION AND SUPERVISION

1. Introduction: Branches of administration, Nature and scope of administration, How to be an effective administrator, Planning hospital administration as part of a balanced health care program.
2. Principles of hospital administration and its applications to physiotherapy.

Recommended books:

1. Medical Ethics by C M Francis.(2014)
2. George V Lobo – Current Problems in Medical Ethics (2012)

IIMT College of Medical Sciences (Allied Health Sciences)

ACADEMIC HAND BOOK



Bachelor of Optometry (EVALUATION SCHEME & SYLLABUS)

**Marks Distributions:
B.OPTOM
Distribution of Subjects and Marks for First Year**

S. N. (A)	Course Code	Main Subjects	Written Paper		Internal Ass. Theory Marks	Viva Marks	Total Marks	Practical Marks			G. Total
			Duration	Marks				Ext. Marks	Int. Ass.	Total Marks	
1	BOPT-101	Basic Anatomy And Ocular Anatomy	3 hours	70	20	10	100	35	15	50	150
2	BOPT-102	Basic Physiology And Ocular Physiology	3 hours	70	20	10	100	35	15	50	150
3	BOPT-103	General Biochemistry And Ocular Biochemistry	3 hours	70	20	10	100	35	15	50	150
4	BOPT-104	Physical Optics And Geometric Optics	3 hours	70	20	10	100	35	15	50	150
5	BOPT-105	Optometric Optics-I	3 hours	70	20	10	100	35	15	50	150
S.N. (B) Subsidiary Subject							TOTAL 750				
1	BOPT-107	Communication in English	2 hours	35	15		50	No Practical		50	
2	BOPT-106	Computer Application	2 hours	35	15		50	No Practical		50	
3	BOPT-108	Medical Psychology	2 hours	35	15		50	No Practical		50	
							TOTAL150				

**Marks Distributions:
B.OPTOM
Distribution of Subjects and Marks for Second Year**

S. N. (A)	Course Code	Main Subjects	Written Paper		Internal Ass. Theory Marks	Viva Marks	Total Marks	Practical Marks			G. Total
			Duration	Marks				Practical Marks	Int. Ass.	Total Marks	
1	BOPT-201	Basic And Ocular Pathology/ Microbiology/ Pharmacology	3 hours	70	20	10	100	35	15	50	150
2	BOPT-202	Optometric Optics-II	3 hours	70	20	10	100	35	15	50	150
3	BOPT-203	Clinical Examination of visual system And Ophthalmic Instruments	3 hours	70	20	10	100	35	15	50	150
4	BOPT-204	Ocular Disease	3 hours	70	20	10	100	35	15	50	150
5	BOPT-205	Visual Optics	3 hours	70	20	10	100				100
6	BOPT-206	Low Vision Aid And Optometric Investigation	3 hours	70	20	10	100	35	15	50	150
S.N. (B)	Subsidiary subjects Total 850										
1	BOPT-207	Nutrition And Eye	2 hours	35	15		50	No Practical			50
								Total 50			

Marks distributions:
B.OPTOM
Distribution of Subjects and Marks for Third Year

S. N. (A)	Subject Codes	Main Subjects	Written Paper		Internal Ass. Theory Marks	Viva Marks	Total Marks	Practical Marks			G. Total
			Duration	Marks				Ext Marks	Int Marks	Total	
1	BOPT-301	Contact Lens	3 hours	70	20	10	100	35	15	50	150
2	BOPT-302	Binocular Vision And Advanced Orthoptics	3 hours	70	20	10	100	35	15	50	150
3	BOPT-303	Major Eye Diseases And Systemic Eye Diseases	3 hours	70	20	10	100	35	15	50	150
4	BOPT-304	Public Health, Community And Occupational Optometry	3 hours	70	20	10	100			100	
5	BOPT-305	Pediatric And Geriatric Optometry	3hours	70	20	10	100			100	
6	BOPT-306	Dispensing Optics	3 hours	70	20	10	100			100	
S. N. (B)	Subsidiary Subject							Total750			
1	BOPT-307	Biostatistics, Environmental Science And Health	2 hours	35	15		50	No Practical		50	
							Total 50				

BOPTOM IST YEAR

S.No	Subject	Total Theory Hours	Total Practical Hours
1	Basic Anatomy And Ocular Anatomy	160	143
2	Basic Physiology And Ocular Physiology	150	50
3	General Biochemistry And Ocular Biochemistry	72	60
4	Physical Optics And Geometric Optics	79	150
5	Optometric Optics-I	74	120
		Total Theory Hours= 535	Total Practical Hours= 523

Bachelor of Optometry
FIRST YEAR

Paper

1. Basic Anatomy And Ocular Anatomy
2. Basic Physiology And Ocular Physiology,
3. General Biochemistry And Ocular Biochemistry,
4. Physical Optics And Geometric Optics
5. Optometric Optics-I

Subsidiary Subject

6. Communication in English,
7. Computer Application.
8. Medical Psychology

Paper 1st
(B.Optom)

1. Basic Anatomy And Ocular Anatomy
(B.Optom)

A. Basic Anatomy Introduction-

Anatomy and Its Sub-division, planes of the body, terms in relation of structures, Regional Anatomy, Organ System

Unit 1-Tissues of the body (Histology of the body tissues)

1. Epithelium
2. Connective tissue
3. Bone and Cartilage
4. Muscles: Skeletal, Plain, Heart muscle
5. Blood vessels Neuron, Neuralgia
6. Glands exocrine and endocrine
7. Skin and appendages
8. Lymphoid tissues

Unit-2

1. Muscles

Different type of muscles, their functional differentiation, their relationship with different structure, their nerve supply.

2. Blood vessels

Differentiation between arteries and veins, embryology, histology of both arteries and veins, Functional differences between the two, anatomical difference at different locations.

3. Glands

Embryology, different types of glands (exocrine and endocrine), functional differences, neural control of gland

Unit 3-Organ System

1. Skeletal system

2. **Skin and appendages**
Embryology, Anatomical difference in different areas, functional and protective variations, innervations, relationship with blood vessels and organs.
3. **Lymphatic System**
Embryology, functions, relationship with blood vessels and organs.
4. **Nervous system**
Parts of nervous system, cell types of nervous system, Blood-brain barrier, Reflex arc, peripheral nerves, spinal nerves, Nerve fibers, Autonomic Nervous system.
5. **Brain and Cranial nerves**
Major parts of Brain, Protective covering of the Brain, Cerebrospinal fluid, Brain stem, Cerebellum, Diencephalon, Cerebrum, Cranial nerves.

B. Ocular Anatomy

Unit 1

1. **Cornea**
Anatomy of all the layers, cellular structure nerve supply, reason for transparency, refractive properties.
2. **Coats of eyeball**
 1. **Sclera** (episclera & sclera)
 2. **Choroid** (iris, ciliary body, choroid)
 3. **Retina**
Anatomy, cellular structure, vasculature, nerve supply for all the above coats, pupils, nerve supply for papillary actions, papillary pathway.
3. **Conjunctiva & eye Lids**
4. **Crystalline lens**
5. **Aqueous, anterior chamber, vitreous body**
6. **Ocular Embryology**
7. **Study of orbit**
8. **Ocular Adnexa and Lacrimal system**

Unit 2

- 1 **Extra ocular Muscles**
Anatomy, innervations, action
- 2 **Cranial Nerves**
Detail study of each nerves in the terms of their nuclei, course, relationship within brain, effect of compression etc at different regions.
- 3 **Visual pathway**
- 4 **Autonomic innervations of ocular structures**

Unit 3-Practical

- a. **Eye dissection of bulls or goat's eye**
- b. **Orbit bones and landmarks using skull**

Paper 2nd
(B.Optom)

2. Basic Physiology And Ocular Physiology

A. Basic Physiology

Unit 1

1. Cell structure and organization
2. Gene action
3. Tissue organization
4. Epithelium
5. Connective tissue- Collagen fibers- elastic fibres-areolar fibers-cartilage, bone
6. Contractive tissue- striated, skeletal, cardiac, non striated, plain myoepithelial
7. General principles of cell physiology
8. Electrophysiology of cells
9. Physiology of skeletal muscles

Unit 2-Blood

1. Physiology of blood- composition
2. Volume measurement and variations
3. Plasma proteins- classification and functions
4. Red blood cells- development, morphology and measurement- functions and dysfunctions
5. White blood cells – development, classification, morphology, functions and dysfunctions
6. Platelets- morphology, development, functions and dysfunctions
7. Clotting factors- mechanism, anticoagulants.
8. Blood grouping- classifications- importance in transfusion Rh factor and incompatibility
9. Suspension stability
10. Osmotic fragility
11. Reticule endothelial system
Spleen, lymphatic tissue, thymus, bone marrow, immune system, cellular, Humoral, autoimmune.

Unit 3-Physiology of various systems-Digestive system

1. General arrangement
2. Salivary digestion- function & regulations
3. Gastric digestion- function & regulations
4. Pancreatic digestion- function & regulations

Excretion

1. Body fluids-distribution, measurement & exchange
2. Kidney-structure of neoprene
 - mechanism of urine formation
 - composition of urine and abnormal constituents
 - urinary bladder & micturition

Endocrine system

- Hormone mechanism, negative feedbacks, tropic action, Permissive action, Cellular actions and hypothalamic regulation
- Thyroid- hormones, action, regulation.
- Adrenal cortex - hormones, action, regulation.
- Adrenal medulla - hormones, action, regulation.
- Parathyroid - hormones, action, regulation.
- Islets of pancreas- hormones, action, regulation.
- Miscellaneous - hormones, action, regulation.
- Common clinical disorders

Reproductive system

1. Male reproductive system- control & regulation
2. Female reproductive system-uterus, ovaries, menstrual cycle, regulation, pregnancy & delivery, breast, family planning.

Respiratory system

1. Mechanism of respiration
2. Pulmonary function test
3. transport of respiratory gases
4. Neural and chemical regulation of respiration
5. Hypoxia, cyanosis, dyspnoea, asphyxia

Circulatory system

1. General principle
2. Heart:- myocardium, innervations, transmission of cardiac impulse, event during cardiac cycle, Cardiac output
3. Peripheral circulation, peripheral resistance
4. Arterial blood pressure, measurement, factors regulation variations, capillary circulation, venous circulation.
5. Special circulation- coronary cerebral, miscellaneous.

Unit 4-Nervous system

1. Neuron- Conduction of impulse, synapse, receptor, Sensory organization, pathways and perception. Reflexes, cerebral cortex, functions. Thalamus- basal Ganglia
2. Cerebellum
3. Hypothalamus
4. Autonomic nervous system- motor control of movements, posture and equilibrium, conditioned reflex, eye hand coordination
5. Special senses (elementary)- Olfaction, Taste, Hearing.
6. Environmental physiology- body temperature regulation (including skin physiology).
- Exposure to low and high atmospheric pressure.

B. Ocular Physiology

Unit 5

1. Protective mechanisms in the eye.
2. Precorneal tear film,
3. Eye lid and lacrimal system- apparatus, secretion and drainage system.
4. Extrinsic ocular muscles, their action and control of their movements
5. saccadic, smooth pursuit and nystagmic eye movements
6. Coats of the eyeball
7. Corneal physiology
8. Aqueous and Vitreous humour
9. Intra ocular pressure
10. Iris and pupil
11. Crystalline lens and accommodation- presbyopia
12. Retina structure and function- dark and light adaptations.
13. Vision- general aspects of sensation
14. Pigments of the eye and photochemistry, electrophysiology
15. The visual stimulus, refractive errors
16. Visual acuity, Visual perception- Binocular vision, stereoscopic vision, optical illusions
17. Visual pathway, central and cerebral connections, lesions of pathway and effects

18. Color vision and Color vision defects
- Theories and diagnostic tests.

Unit 6-Practical Basic Physiology Blood test:-

1. Microscope
2. RBC count
3. Hb
4. WBC count
5. Differential count
6. Het demonstration
7. ESR
8. Blood group and Rh type
9. Bleeding time and clotting time
10. Measurement of Blood pressure and Pulse rate
11. Effect of exercise on blood pressure and pulse rate

Ocular Physiology

1. Color vision test, Field of vision test.
2. Test for lacrimal secretion(Schirmer's)
3. Break up time
4. Anterior segment examination- slit lamp examination- Demo
5. Pupillary reflex
6. Schiotz tonometry
7. Visual acuity measurement
8. Light and Dark adaptation
9. Binocular vision

Paper 3rd

2 General Biochemistry And Ocular Biochemistry (B.Optom)

A. General Biochemistry

Unit 1

1. Blood buffers, mechanism of buffer action, H⁺ and pH measurement
2. Biological macromolecules, glycosaminoglycans, collagens, plasma proteins, muscle proteins, nucleic acids
3. Enzymes, criteria for enzyme actions, clinically important enzymes.
4. Fundamentals of biological oxidative reactions- ATP formation
5. Fundamentals of intermediary metabolism-EMP-HMP-TCA pathways- NADPH, Fats
6. Urea cycle-important amino acids, common transamination reactions

Unit -2

1. Elements of protein metabolism
2. Lipid metabolism- β oxidation of fatty acids, synthesis, essential fatty acids, cholesterol, phospholipids, phosphoinositides, biological membranes, prostaglandins
3. Carbohydrate Metabolism

Unit 3

1. Important Vitamins A, B, C, E and inositol
2. Regularly mechanism of ophthalmologic ally important vitamins
3. Minerals and trace metals- Copper, Iron, Calcium, Magnesium, Phosphorous, Sodium, Potassium, Zinc, Selenium
4. Free radicals- Biological reactions, oxidants, antioxidants, diseases, therapeutic uses of antioxidants

B. Ocular Biochemistry

Unit 4

1. Importance of ocular biochemistry in clinical optometric practice
2. Tear film- composition, lipid layer, aqueous layer, mucoid layer, functions, diagnostic tests, tear, substitutes, recent development.
3. Cornea, biochemical composition of epithelium, bowmans layer, stroma, descemets, endothelium, functions, corneal metabolism nutrient uptake energy, transparency, barrier mechanism, pump action, irrigating solutions, aging and other anomalies, recent developments
4. Lens- Composition metabolism, glucose utilization, sorbitol pathways, glutathione and ascorbic acid transport, transparency, cataract formation, aging photooxidation, sugar cataract, cataract and ascorbic acid act, medical therapy and recent developemts

Unit 5

1. Vitreous humour-structure, composition, functions, vitreous biochemical pathology, intraocular gels,
2. Retina, pigment epithelium, structure, composition, photoreceptor cells, rhodopsin, lipids renewal and inner segment

3. Pigment epithelium-choroid, metabolism and function, phagocytosis, Vitamin A, retinal function and metabolism, Renal neurochemistry, monoamines, acetyl choline, gaba, amino acids, taurine, neuropeptides, Biochemical correlates of retinal diseases.

Unit 6

1. Reactions of monosaccharides, disaccharides, starch Glucose, Fructose, galactose, maltose, lactose, sucrose, starch
2. Analysis of unknown sugars.
3. Abnormal constituents in urine, sugar, proteins, ketones, blood and bile salts
4. Detection of abnormal constituents in urine.

Paper 4th

3 Physical Optics And Geometric Optics (B.Optom)

A. Physical Optics

Unit 1- Nature of light

1. Wave nature of light- short coming of wave theory
2. Quantum theory- dual nature of light
3. Huygen's Principle-Laws of reflection and refraction at spherical surfaces and lenses
4. The paraxial region
5. Ray and wave velocity

Unit 2- Interference

1. Description of the phenomenon- Young's experiments, coherent sources, phase and path difference and intensity. Theory of interference fringes
2. Interference in thin films- interference due to reflected and transmitted light- Lloyd's single mirror
3. Colors of thin films- wedge shaped thin films- testing of plainness of surface
4. Newton's rings experiment- refractive index of liquid
5. Non-reflecting films
6. Visibility of fringes- contrast and contrast threshold

Unit 3-Diffraction and scattering

1. Single slit, qualitative and quantitative
2. Diffraction by a circular aperture, Airy's disc
3. Double slit pattern and kirchoff's integral
4. Multiple slits- grating
5. Reflecting grating and the zone plate
6. Rayleigh's scattering
7. Raman scattering

Unit 4-Polarisation:

1. Polarisation of transverse waves-light as transverse waves
2. Double refraction, principal plans, Nicol prism, plane polarization
3. Circular, elliptic polarization production, detection and behavior
4. Optical activity- Fresnel's half shade polarimeter.
5. Polarisation by selective absorption- dichorism
6. Basic principles of Holography

Unit 5-Spectrum:

1. Sources of spectrum, Bunsen-carbon, mercury and sodium
2. Emission and absorption spectra,
3. classification, visible, ultraviolet and ultra violet and infra red spectra electromagnetic spectrum

Unit 6-Photometry & Radiometry

1. Basic concepts and definitions in photometry
2. Reflection co-efficient, transmission co-efficient, powers- transmitted and reflected- Lumen Bodhun Photometer.
3. Inverse square low of photometry, Lambert's law

4. Radiometry, solid angle, radiometric units,
5. Photometric units. photopic and scotopic luminous efficacy and efficacy curves

Unit 7-Practical

1. Determination of cardinal points of lens systems.
2. Fresnel's biprism experiment
3. Grating- wavelength determination
4. Newton's Rings- radius of curvature, Newton's Rings- Refractive index of a liquid.
5. Reflection grating
6. Resolving power of a telescope
7. Spectroscope, determination of refractive index of prism
8. Thickness of thin glass plate
9. Use of telescope in small observatory.

B. Geometric Optics

Unit 1-Refracton through spherical surfaces

1. Nature of light-light as electromagnetic oscillation, ideas of sinusoidal oscillations, amplitude and phase, speed of light in vacuum and other media, refractive index
2. Wave fronts-spherical, elliptical and plane, curvature and vergence in terms of rays and vergence at distance.
3. Refractive index, its dependence on wavelength
4. Fermet's and huygen's principle-Derivation of law of reflection and refraction (snell's law) from these principles
5. Introduction-Lens shapes, vergences and conversion factors. Divergence and convergence of wave fronts by spherical surfaces, definition of dioptrè, working of spherical lenses secondary focal point, predictable rays
6. Spherical refracting interfaces-convex, concave, derivation of vergence equation, sagittas, dioptric power, focal points, nodal points and plane. Symmetry point imaging examples, lateral magnification.
7. Thin lens equation lenses in contact separated. Two lens systems, reduced system using vergence techniques
8. Application-calculation of image points, dioptric powers reduced systems using vergence techniques
9. Prisms-angular dispersion, dispersive power, Abbe's number, prism diopter, prentice's law, deviation, ophthalmic prism- thin and thick., refractive index of prism,
10. Thick lenses-front and back vertex powers, reduced system, dioptric power of equivalent lenses, cardinal points. Application to calculate the equivalent dioptric power of thick meniscus lens. Plano convex, vertex powers, position of principal planes, dioptric powers using reduced systems. Matrix theory and lens matrices.
11. Cylindrical and spherocylindrical lenses-principle meridians, refraction by a cylindrical lens, calculation power in different meridians, circle of least confusion, interval of sturm, refraction through a sphrocylindeical lens, writing Rx in different forms.

Unit 2-Aberrations

1. Chromatic aberration- dispersion without deviation and deviation with dispersion

2. Dispersion by a prism, angular dispersion, dispersion power, dispersion without deviation and deviation without dispersion. Achromatic prisms and lenses- prism diopters
3. Monochromatic aberrations- first order and third order theory
4. Spherical aberrations, coma, astigmatism, curvature, distortion, cause and the methods of minimizing aberrations
5. Tangent condition for elimination of distortion

Unit 3-Optical Instruments

1. Fiber optics- introduction and uses, general applications in ophthalmic and optical industry
2. Laser optics-basic lasers principle and types of lasers, lasers in ophthalmology.
3. Resolving power of optical instruments and eye.
4. Spectrometer- simple and compound microscope, telescope. Fresnel's biprism, dispersion power, magnifying power of simple and compound microscope, telescope
5. Applications of vergence technique to calculate dioptric powers, separation distances in microscopes and telescopes.

Unit 4-Principle of lighting

1. Visual tasks- Factors affecting Visual tasks
2. Modern theory on light and color synthesis of light
3. Additive and subtractive synthesis of color
4. Light sources- Modern light sources, spectral energy, distribution, luminous efficiency, color temperature, colour rendering
5. Illumination- Luminous flux, candela, solid angle
6. Illumination- Utilization factor, depreciation factor
7. Illumination laws
8. Lighting installation- glare, luminaries, lighting fixtures, types of lighting.
9. Requirements for illuminations of work place
10. Typical lighting installations including psycho-physiological influences
11. Specialized aspects of illumination, endoscopes headlamps etc.
12. Photometry- measurement of illumination, photometers and filters
13. Eye care and lighting- special case

Practicals:

1. Refraction through a slab and a curved surface
2. Spherometer and lens gauge
3. Surface power, Spherometer and ray tracing
4. Apparent depth method for refractive index
5. Critical angle – glasses and water
6. Prism deviation and internal reflection
7. Dispersion of prisms
8. Lens system, effects of separations
9. Chromatic aberrations of simple lens
10. Magnifiers measurements of effects
11. Magnifying power of a simple and compound microscope telescope
12. Microscope systems.

Paper 5th

5. Optometric Optics-I (B.Optom)

Unit 1-Ophthalmic Lenses-basics

1. Introduction – Light, mirror, reflection, refraction & absorption.
2. Definitions – Prisms, lenses, frames, spectacles.
3. Prisms – definition, properties, refraction through prisms units.
4. Prisms – uses of prisms. Nomenclature prisms.
5. Thickness difference and base – apex notation.
6. Sign Conventions.
7. Lenses – Definition, Terminology used to describe lenses.
8. Form of Lenses – Convex lenses & concave lenses
9. Refraction & image formation through convex and concave lenses.
10. Determination of focal length and dioptric power of iris.
11. Surface power and radius, refractive index values.
12. Vertex distance and vertex power.
13. Effectivity and effective powers.
14. Lens shape, size, Types i.e. Spherical, Cylindrical, Sphero cylindrical
15. Toric surfaces and their significance, Toric lenses
16. Sturm's conoid.
17. Neutralization of lenses
18. Spherometer and sag formula
19. Focimeter – power of lens and prisms
20. Center marking & Axis marking by focimeter.
21. Transposition. Simple and Toric transposition.
22. Prismatic effect, Centeration. Decentration, Prentice's rule.
23. Prismatic effect of sphero-cylinders and Plano cylinders.
24. Differential prismatic effects.
25. Decentration of lenses and edge thickness.
26. Decentration examples.
27. Components and interpretation of spectacles prescription.
28. Prescription mistakes commonly made.
29. Prismatic effect of sphero-cylindrical lenses.
30. Aberrations in Ophthalmic lenses
31. Tilt induced power in spectacles lenses
32. Magnification in high plus lenses
33. Minification in high minus lenses

Unit 2-Ophthalmic Lenses Types, Manufacturing, Workshop Practice

1. Prescription laboratory in action.
2. Instruments for making lenses
3. Outline of lens surfacing and polishing
4. Recording and ordering of Ophthalmic lenses
5. Terminology used in Lens workshops
6. Ophthalmic raw material – history and general outline.
7. Manufacturing of Ophthalmic blanks – Glass
8. Glass lenses – material types and characteristics
9. Glass working –spherical surfaces

10. Glass working – Toric and Aspherical
11. ISI Standards for lenses
12. Ophthalmic lens designs – best form lenses
13. Design of high powered lenses
14. Bifocal design and manufacture
15. Faults in lenses – description
16. Faults in lenses – detection

Unit3- Spectacles Frames – theory basics (1)

1. History of spectacles
2. Nomenclature and terminology
3. Classification of frames- Materials (in detail)
4. Types and Parts of spectacle frames
5. Spectacles frames –colors, sides and joints
6. Spectacle frame bridge
7. Shapes of spectacle frames – advantages and disadvantages
8. Spectacle frame measurements and markings.
9. Special purpose frames – sports, kids, reading

Subsidiary Subject-

Paper 6th

6. Communication in English

1. INTRODUCTION :
2. Study Techniques
3. Organisation of effective note taking and logical processes of analysis and synthesis
Use of the dictionary
4. Enlargement of vocabulary
5. Effective diction
6. APPLIED GRAMMAR :
7. Correct usage
8. The structure of sentences
9. The structure of paragraphs
10. Enlargements of Vocabulary
11. WRITTEN COMPOSITION :
12. Precise writing and summarising
13. Writing of bibliography
14. Enlargement of Vocabulary
15. READING AND COMPREHENSION :
16. Review of selected materials and express oneself in one's words.
17. Enlargement of Vocabulary.
18. THE STUDY OF THE VARIOUS FORMS OF COMPOSITION :
19. Paragraph, Essay, Letter, Summary, Practice in writing
20. VERBAL COMMUNICATION :
21. Discussions and summarization, Debates, Oral reports, use in teaching

Paper 7th

7. Computer Application

1. Introduction to Computers
2. Block diagram of a computer & overview of its working
3. Interconnections of various peripherals with computers
4. Input/output & Secondary storage device
5. Classified of programming languages
6. Classification of computers
7. Familiarization with operating system
8. Introduction to Computer Operating System (Dos, Windows95/XP)
9. Introduction to DOS structure, system files, batch files & configuration files
10. Booting the system from floppy and hard disk
11. Brief introduction to DOS, Internal and External commands
12. Familiarization with windows structures, its use and application
13. Preparation of Documents through word processing
14. Idea of Text Editors like Microsoft Word, write etc.
15. Opening a document
16. Preparing documents, inserting diagrams and tables
17. Editing documents
18. Character, Word and line editing
19. Margin setting, Paragraph alignment
20. Block operations
21. Spell checker
22. Saving a document
23. Printing a document
24. Information Presentation for Decision making using Spreadsheet (Excel)
25. Application of spread sheet
26. Structure of spreadsheet
27. Preparing spreadsheet for simple data and numeric operations
28. Using formulae in spreadsheet operations
29. Making tables, sorting and quering
30. Creation of graphs, Pie charts, bar charts
31. Printing reports
32. Computer Aided Drafting (CAD)
33. Making simple drawings using features of CAD and conforming the drafting specifications
34. Saving and retrieving drawings
35. Dimensioning
36. Lettering
37. Plotting drawings

Practices (4 hrs/ week)

1. Identification of various parts of the PC
2. Demonstration of dis-assembly and assembly of PC and interconnection of Input and Output
3. devices to PC Installation of DOS and simple exercise on TYPE, REN, CD, MD, TREE, COPY, BACKUP

4. commands
5. Grouping commands with batch files
6. Disk diagnose, Correction of partitioning
7. Installation of windows 95
8. Familiarization with start menu, taskbar icons, windows explorer
9. Control panel of settings
10. Getting hardware recognized
11. Installation of MS-office
12. MS-Word, Basics of Letterwriting,tempalates,wizards,formatting documents
13. Creating Graphics, tables,mailmerge,etc.. using MS-Word
14. Building a sample worksheet using MS-Excel
15. Formulas for calculations, sorting etc..
16. Creating Lotus 1-2-3 sheet
17. Formulas, ranges and fuctions of Lotus 1-2-3
18. simple Graphics
19. Importing and exporting graphics through CAD
20. Drawing of geometric figures.
- 21.

Paper 8th

8 Medical Psychology

Lecture Topics

1. Introduction to Psychology – Definitions – Schools of thought, fields of Psychology.
2. Man in society
3. Emotions and feelings
4. Motivation – Human motivation
5. Personality – what it is, concept of body image
6. Normality and abnormality – major and minor psychiatric entities
7. Why Medical Psychology?
8. The patient in his milieu – socio-economic aspects.
9. The patient therapist relationship – The initial encounter – basic principles of the therapist.
10. Illness – it's impact on the patient.
11. Eye diseases – their impact on the patient
12. The patient's adaptation to variants of normalcy in vision –prejudices and biases
13. Rehabilitation of the blind.

B.OPTOM IInd YEAR

S. No.	Subject	Total Theory Hours	Total Practical Hours
1	BASIC AND OCULAR PATHOLOGY/MICROBIOLOGY /PHARMACOLOGY	71	40
2	OPTOMETRIC OPTICS II	66	90
3	VISUAL OPTICS	60	150
4	CLINICAL EXAMINATION OF VISUAL SYSTEM AND OPHTHALMIC INSTRUMENTS	44	120
5	OCULAR DISEASE	40	No Practical
6	LOW VISION AID AND OPTOMETRIC INVESTIGATION	30	40
		Total Theory Hours= 240	Total Practical Hours= 400

Bachelor of Optometry
Second Year

Paper

1. **Basic And Ocular Pathology/ Microbiology/ Pharmacology**
2. **Optometric Optics II.**
3. **Visual optics.**
4. **Clinical Examination of Visual system And Ophthalmic Instruments.**
5. **Ocular disease.**
6. **Low Vision Aid And Optometric Investigation.**

Subsidiary Subject

7. **Nutrition And eye**

Paper 1st

1. Basic And Ocular Pathology/ Microbiology/ Pharmacology (B.Optom)

A. Basic And Ocular Pathology

Unit 1

1. General pathology: principle
2. Pathophysiology of ocular Angiogenesis
3. Ocular infections
4. Inflammation and repair

Unit 2

1. Infection in general
2. Specific infections
 - Tuberculosis
 - Leprosy
 - Syphilis
 - Fungal infection
 - Viral Chlamydia infection
3. Neoplasia

Unit 3

1. Hematology
 - Anemia
 - Leukemia
 - Bleeding disorders
1. Circulatory disturbances
2. Thrombosis
3. Infarction
4. Embolism

Unit 4

5. Clinical Pathology
 - Examination of urine
 - Examination of blood smears

B. Basic And Ocular Microbiology

Unit 1

1. Introduction to microbiology.
2. Types of microorganism
3. Introduction to Bacteria, Virus, Fungus and their differentiation
4. Life cycles and special points about common Bacteria, Virus, Fungus
5. Morphology and principles of cultivating bacteria

Unit 2

1. Sterilization and disinfection used in laboratory and hospital practice

Unit 3

2. Common bacterial infections of the eye
3. Common fungal infections of the eye
4. Common viral infections of the eye
5. Common parasitic infections of the eye

C. Basic And Ocular Pharmacology

Unit 1

General pharmacology

1. Mechanisms of drug action
2. Dose-response relationships
3. Tachyphylaxis and idiosyncrasy
4. Pharmacokinetics of drug absorption, distribution, Biotransformation, excretion and toxicity.
5. Factors influencing drug metabolism of drug action.

Action of specific agents

- 1 Depressants
- 2 Anti-coagulants
- 3 C.N.S. Stimulants and antidepressants
- 4 Diuretics and hypertensive agents
- 5 Cardiovascular drugs
- 6 Histamines
- 7 Serotonin.
- 8 Prostaglandins

Principles of ocular pharmacology

- a. Preparation and packaging of ophthalmic drugs
 - b. General principles of ocular pharmacology
1. Drug actions and effectiveness
 2. Drug safety
 3. Factors influencing the objectively demonstrated response
 4. Ocular penetration.
 5. Routes of ocular penetration

Unit 2-Optometric diagnostic drugs:

- a. Optometric use of pharmaceuticals
 1. Classification of drug use
 2. Topical ophthalmic drugs
 3. References and drug indices
 4. Hazards of ophthalmic drugs
 5. Surface active drugs
 6. topical anesthetics
- b. Principles and classification of autonomic drugs
 1. Sympathomimetics
 2. Sympatholytics
 3. Parasympathomimetics

4. Parasympatholytics
5. Diagnostic use of autonomic drugs
- c. Other drugs of Optometric interest
 1. Physical agents
 2. Germicides and sterilizing agents
 3. Over-the-counter drugs
 4. Dyes and stains

Unit 3-Ophthalmological drugs use :

- a. Anti-glaucoma drugs
 1. Drugs for ocular hypertension
 2. Drugs that enhance aqueous outflow
 3. Inhibitors of aqueous secretion
- b. Sulfonamides
- c. Antibiotics
- d. Corticosteroids
- e. Anesthetics
- f. Proteolytic enzymes

Paper 2nd

2. Optometric Optics-II:

(B.Optom)

Unit 1-Ophthalmic Lenses Types, Manufacturing, Workshop Practice

1. Recording and ordering of Ophthalmic lenses
2. Terminology used in lens workshop
3. Ophthalmic raw materials – history and general outline
4. Manufacturing of Ophthalmic blanks – Plastics
5. Plastic lenses – materials types and characteristics
6. Plastic lenses – manufacture
7. Ophthalmic lens designs – best form lenses
8. Design of high powered lenses
9. Bifocal design and manufacture
10. Unusual Lens forms
11. Faults in lenses – description
12. Faults in lenses – detection

Unit 2-Types of Ophthalmic lenses

1. Raw materials – History and General Outline,
2. Manufacturing of Ophthalmic Blanks – Glass & Plastics,
3. Terminology used in Lens Workshops,
4. Surfacing process from Blanks to lenses
5. Definition & Materials (Glass, Plastics, Polycarbonate, Triology) types and Characteristics
6. Properties (Refractive index, specific gravity, UV cut off, impact resistance – include drop ball test, abbe value, Center thickness)
7. Best form of lenses & Safety standards for Ophthalmic lenses (FDA, ANSI, ISI, Others)
8. Design of High Powered Lenses
9. Hi-index lenses,
10. Calculation of Refractive index Aspheric lenses
11. High index lenses
12. Bifocal designs their manufacturing & uses (Kryptok, Unis D, Executive, Invisible, Occupational)
13. Progressive Addition Lenses,
14. modified near vision lenses (designs, advantages, limitations)
15. Lens enhancements
(Scratch resistant coatings – spin/dip, Anti-reflection coating, UV coating, Hydrophobic coating, anti-static coating)
16. Lens defects – Description and Detection
17. Glazing & edging (manual & automatic)
18. Special lenses
 - Lenticulars
 - Aspherics
 - Fresnel lenses & Prisms
 - Aniseikonic lenses
 - Photochromics
 - Polaroids

- Tinted lenses – Tints, filters
- 19. Tinted lenses – absorptive properties
- 20. Tinted lenses – examples and discussions
- 21. Special purpose lenses

Project

- Project to ensure awareness on lens availability in Indian market

Unit 3-Spectacle Frames –

1. History of spectacles
2. Nomenclature and terminology
3. Classification of frames – Temple position, colouration
4. Types of frame materials – advantages and disadvantages
5. Frame materials – Gold
6. Frame materials – Basic metal
7. Frame materials – Plastics
8. Manufacturing of spectacle frames – overview
9. Face and frame measurement
10. Dyes and colorants – lenses and frames

Paper 3rd

3. Visual optics:

(B.Optom)

Unit 1-A. Review of Geometrical Optics

1. Vergence and power
2. Sign convention
3. Spherical refracting surface
4. Spherical mirror; catoptric power
5. Cardinal points
6. Magnification
7. Light and visual function-Clinical relevance of:- Fluorescence, Interference, Diffraction, Polarization, Bi-refringence, Dichroism
8. Aberration and application, Spherical and Chromatic

Unit 2-B. Optics Of Ocular Structure

1. Cornea and aqueous
2. Crystalline lens
3. Vitreous
4. Schematic and reduced eye

Unit 3-C. Refractive conditions of eye

1. Emmetropia
2. Myopia
3. Hyperopia
4. Astigmatism
5. Presbyopia
6. Accommodation
7. Anisometropia and Aniseikonia
8. Aphakia and Pseudophakia

D. Refractive Anomalies And Their Cause

1. Aetiology of refractive anomalies
2. Contributing variabilites and their ranges
3. Populating distributions of anomalies
4. Optical component measurements
5. Growth of the eye in relation to refractive errors

Unit 4-Accommodation and Convergence

1. Far and Near point of accommodation, range of accommodation emplitude
2. Methods of measurement of Accommodation
3. Near point of convergence of significance
4. Methods of measurements of Convergence
5. Accommodative Convergence Accommodation ratio

Unit 5-Retinoscopy-principles and methods

1. Retinoscopy – speed of reflex and optimum condition

2. Retinoscopy – design consideration
3. Review of objective refractive methods
4. Review of subjective refractive methods
5. Cross cylinder methods for astigmatism
6. Difficulties in subjective tests and their avoidance
7. Transposition of lenses
8. Spherical equivalent.

Unit 6-Subjective Refraction

1. Review of subjective refractive methods
2. Cross cylinder methods for astigmatism, Astigmatism Fan Test
3. Difficulties in subjective and objective tests and their avoidance
4. Ocular refraction versus spectacle refraction
5. Ocular accommodation versus spectacle accommodation
6. Spectacle magnification and relative spectacle magnification
7. Retinal image blur, depth of focus and depth of field
8. Prescribing prism, Binocular Refraction

Unit 7-Measurements of Optical Constants of the eye

1. Corneal curvature and thickness
2. Keratometry
3. Curvature of the lens and ophthalmophakometry
4. Axial and axis of the eye
5. Basic aspects of vision
 - Visual acuity
 - Light and dark adaptation
 - Color vision
 - Spatial and temporal resolution
 - Science of measuring visual performance and application to clinical optometry

Optometric Optics Practical Demonstrations

1. Visual acuity, stereo acuity in emmetropia
2. Myopia and pseudomyopia, myopia and visual acuity
3. Measurement of accommodation: near and far points and range
4. Measurement of Convergence – near point and adduction and abduction range
5. Practice of Retinoscopy – Emmetropia
6. Practice of Retinoscopy - spherical ametropia
7. Practice of Retinoscopy – simple astigmatism
8. Practice of Retinoscopy – compound hyperopia
9. Practice of Retinoscopy – compound myopia
10. Practice of Retinoscopy – oblique astigmatism
11. Practice of Retinoscopy – media opacities
12. Practice of Retinoscopy – in irregular astigmatism
13. Interpretation of cycloplegic Retinoscopy findings

Paper 4th

4. Clinical Examination of Visual System And Ophthalmic instruments (B.Optom)

A. Clinical Examination of Visual System
(Lectures & Demonstration)

Unit 1

1. History taking
2. Visual acuity examination

Unit 2

1. Extraocular motility, cover test, Alternating cover test
2. Hirschberg test, modified krimsky
3. Pupil examination
4. Maddox rod
5. Van herrick
6. Color vision
7. Stereopsis
8. Confrontation test
9. Photostress test

Unit 3

1. External Examination of the eye, Lid eversion
2. Schirmer's , TBUT, tear meniscus level, NITBUT (keratometer)

Unit 4

1. Slitlamp biomicroscopy
2. Direct Ophthalmoscopy
3. Digital pressure, Schiottz Tonometry, Applanation tonometry, Gonioscopy.

Unit-5

1. ROPLAS
2. Amsler test
3. Corneal sensitivity test, HVID
4. Saccades and pursuits

B. Ophthalmic instruments

Unit 1

Refractive Instruments

1. Test charts standards
2. Choice of test charts
3. Trial case lenses
4. Refractor (phoropter) head units
5. Optical considerations of refractor units
6. Trial frame design
7. Near vision difficulties with units and trial frames
8. Retinoscope – types available
9. Adjustment of Retinoscope – special features
10. Cylinder retinoscopy
11. Objective optometers
12. Coincidence optometers-principals and details
13. Infrared optometer devices
14. The interpretation of objective findings
15. Special subjective test polarizing and displacement etc.
16. Projection charts
17. Illumination of the consulting room
18. Time and motion study in refraction
19. Furniture and accessories in the practice
20. Instruments of the future

Unit 2

Ophthalmoscopes and related devices

- a. Design of ophthalmoscopes-illumination
- b. Design of ophthalmoscopes-viewing
- c. Ophthalmoscopes disc
- d. Filters for ophthalmoscopes
- e. Indirect ophthalmoscopes
- f. The use of ophthalmoscopes in special cases.
2. Lensometer, lens gauge or clock

Unit 3

Slit Lamp

- a. Slit lamp systems
- b. Viewing microscope systems
- c. Slit lamps in production
- d. Slit lamp accessories
- e. Slit lamp techniques
- f. Slit lamp appearances
- g. Mechanical design instruments
3. Tonometer
 - a. Tonometer principles
 - b. Types of tonometers and standardization
 - c. Use and interpretation of tonometers
4. Fundus Camera
 - a. The fundus camera - principles

- b. The fundus camera – techniques
- 5. External eye photography - apparatus.
 - a. External eye photography - techniques
- 6. Corneal examination
 - a. Placidos Disc.
 - b. Keratometer
- 7. Exophthalmometer
- 8. Orthoptic Instruments
 - a. Orthoptic instruments - haploscopes
 - b. Orthoptic instruments – home devices
 - c. Orthoptic instruments – pleoptics
 - d. Historical instruments

Unit IV

Colour vision testing devices

- 9. Field of vision and screening devices.
 - a. Perimeter and visual field
 - b. Campimeters and fixation devices
 - c. Illumination of field testing instruments
 - d. Projection perimeters and Campimeters
 - e. Screening devices for field defects
 - f. Results of field examination
 - g. Vision screeners – principles
 - h. Vision screeners – details
 - i. Analysis of screener results

Paper 5th

5. Ocular Disease:

(B.Optom)

Unit 1-EYELIDS

1. Eyelid anatomy
2. Congenital and developmental anomalies
3. Blepharospasm
4. Ectropion
5. Entropion
6. Trichiasis and symblepharon
7. Eyelid inflammations
8. Eyelid tumors
9. Ptosis
10. Eyelid retraction
11. Eyelid trauma

LACRIMAL SYSTEM

1. Lacrimal anatomy
2. Lacrimal pump
3. Methods of lacrimal evaluation
4. Congenital and development anomalies of the lacrimal system
5. Lacrimal obstruction
6. Lacrimal sac tumors
7. Lacrimal trauma

Unit 2-SCLERA, EPISCLERA.

1. Ectasis and staphyloma
2. Scleritis and episcleritis

ORBIT

1. Orbital anatomy
2. Incidence of orbital abnormalities
3. Methods of orbital examination
4. Congenital and developmental anomalies of the orbit
5. Orbital tumors
6. Orbital inflammation
7. Sinus disorders affecting the orbit
8. Orbital trauma

Unit 3-CONJUNCTIVA AND CORNEA

- a. Inflammation
 - b. 1. Therapeutic principles,
2. Specific inflammatory diseases
 - c. Tumors
1. Tumors of epithelial origin
 2. Glandular and adenexa tumors

3. Tumors of neuroectodermal origin
4. Vascular Tumors
5. Xanthomatous origin
6. Inflammatory tumors
7. Metastatic lesions
 - d. Degeneration and dystrophies
 1. Definition
 2. Degeneration's
 3. Dystrophies
 - e. Miscellaneous conditions
 1. Keratoconjunctivitis Sicca (K-Sicca)
 2. Tear function tests
 3. Steven Johnson syndrome
 4. Ocular Rosacea
 5. Atopic eye disorders
 6. Benign mucosal pemphigoid (BMP)-ocular pemphigoid
 7. Vitamin A deficiency
8. Metabolic diseases associated with corneal changes

Unit 4-IRIS, CILIARY BODY AND PUPIL

1. Congenital anomalies
2. Primary and secondary disease of the iris and ciliary body
3. Tumors
4. Anomalies of pupillary reaction

CHOROID

1. Congenital anomalies of the choroid
2. Diseases of the choroid
3. Tumors

VITREOUS

1. Developmental abnormalities
2. Hereditary hyaloidoretinopathies
 - Juvenile retinoschisis
 - Asteroid hyalosis
 - Cholestrololosis
3. Vitreous hemorrhage
 - Blunt trauma and vitreous
 - Inflammation and vitreous
 - Parasitic infestations
 - Pigment granules in the vitreous
4. Vitreous complications in cataract surgery

RETINA

1. Retinal vascular anomalies
2. Diseases of the choroidal vasculature, Bruch's membrane, and retina pigment epithelium (RPE)
3. Retinal tumors and retinoblastoma

4. Other retinal disorders
 - Retinal inflammations
 - Metabolic diseases affecting the retina
 - Miscellaneous disorders
 - Electromagnetic radiation effects on the retina
1. Retinal physiology and psychophysics
2. Hereditary macular disorders (including albinism)
3. Peripheral retinal degeneration
4. Retinal holes and detachments
5. Intraocular foreign bodies
6. Photocoagulation

Unit 5-LENS

- a. Anatomy and pathophysiology
 1. Normal anatomy and aging process
 2. Developmental defects
 3. Acquired lenticular defects
- b. Management of lenticular defects

5. TRAUMA

- a. Anterior segment trauma
- b. Posterior segment trauma

BLINDNESS

- a. Blindness definitions
 1. Causes
 2. Social implications
 3. Rationale therapy
- b. Drug induced ocular disease.

Paper 6th

**6. Low Vision Aids & Optometric investigation
(B.Optom)**

A. LOW VISION AIDS

Lecture Topics:

Unit 1

1. Definitions & classification of Low vision
2. Epidemiology of low vision
3. Model of low vision service
4. Pre-clinical evaluation of low vision patients – prognostic & psychological factors; psychosocial impact of low vision

Unit 2

5. Types of low vision aids – optical aids, non-optical aids & electronic devices
6. Optics of low vision aids
7. Clinical evaluation – assessment of visual acuity, visual field, selection of low vision aids, instruction & training

Unit 3

8. Pediatric Low Vision care
9. Low vision aids – dispensing & prescribing aspects
10. Visual rehabilitation & counseling
11. Legal aspects of Low vision in India
12. Case Analysis

B. Optometric investigation

Unit 1

1. Visual Acuity Testing & Theory
2. Colour Vision Testing & Theory
3. Electro Retino Graphy, E.R.G.
4. Electro OculoGraphy, E.O.G.

Unit 2

1. Fluorescein Angiography F.A.
2. Ultrasono Graphy U.S.G.
3. Visual Evoked Response / Potential V.E.R. or V.E.P.
4. Tonometer, Tonometry & Tonography
5. Visual Field Charting & Perimetry
6. Adaptation & Adaptometry
7. Berman's Locator

Unit 3

1. Cryo Technique
2. Diathermy
3. Photo-coagulation

4. Method's of examination (Focal illumination)
5. Slit lamp and attachments
6. Gonioscopy
7. Ocular Photography (Ant.Seg.)
8. Contact & Trans-illumination

Unit 4

1. pH Testing & Schirmer's Test
2. Fluorescein Staining & Techniques
3. Syringing & Lacrimal Function Test
4. Ophthalmoscopy
5. Retinoscopy
6. Auto-Refraction
7. Keratometry
8. Ophthalmic Lens Measuring Instruments

Practical:

- a) Practical 1:
 - Attending in low vision care clinic and history taking.
- a) Practical 2:
 - Determining the type of telescope and its magnification (Direct comparison method & calculated method)
 - Determining the change in field of view with different magnification and different eye to lens distances with telescopes and magnifiers.
- b) Practical 3:
 - Inducing visual impairment and prescribing magnification.
 - Determining reading speed with different types of low vision aids with same magnification.
 - Determining reading speed with a low vision aid of different magnifications.

Subsidiary Subject-

Paper 7th

7 Nutrition And eye:

(B.Optom)

Unit 1

1. INTRODUCTION

- a. History of Nutrition, Nutrition as science. Food groups, RDA Balanced diet, diet planning.

2. ENERGY

- a. Units of energy, Measurement and energy value of food, Energy expenditure Toal energy / calorie requirement for different age groups and disease
- b. Satiety value, Energy imbalance – obesity, starvation

3. PROTEINS

- a. Sources and functions, Essential and non-essential amino acids, incomplete and complete proteins, supplementary foods, PEM and the eye, Nitrogen balance, changes in the protein requirement.

4. FATS

- Functions and sources, Essential fatty acids, Excess and deficiency, Lipids and the eye Hyperlipidemia, Heart diseases, atherosclerosis.

Unit 2

1. MINERALS

- a. General functions and sources, Macro and micro minerals associated with the eye deficiencies and excess ophthalmic complications (eg.) iron, calcium, iodine, etc.,

2. VITAMINS

- a. General functions food sources, vitamin deficiencies and associated eye disorders with particular emphasis on vitamin 'A'.

3. MISCELLANEOUS

- a. Measles and associated eye disorders, low birth weight.

B.OPTOM IIIrd YEAR

S.No	Subject	Total Theory Hours	Total Practical Hours
1	CONTACT LENS	68	240
2	BINOCULAR VISION AND ADVANCED ORTHOPTICS	68	240
3	MAJOR EYE DISEASES AND SYSTEMIC EYE DISEASES	80	300
4	PUBLIC HEALTH, COMMUNITY AND OCCUPATIONAL OPTOMETRY	12	No Practical
5	PEDIATRIC AND GERIATRIC OPTOMETRY	30	No Practical
6	DISPENSING OPTICS	23	No Practical
		Total Theory Hours= 281	Total Practical Hours= 780

Bachelor of Optometry
Third year
Paper

1. **Contact lens.**
2. **Binocular vision And Advanced Orthoptics.**
3. **Major Eye Diseases And Systematic Eye Diseases.**
4. **Public Health, Community And Occupational Optometry.**
5. **Pediatric And Geriatric Optometry.**
6. **Dispensing Optics.**

Subsidiary Subject

7. **Biostatics, Environmental Science And Health**

Paper 1st

1. Contact lens

(B.Optom)

Unit 1

1. History of Contact lenses
2. Related ocular anatomy and physiology
3. Related Visual Optics
4. Contact Lens materials, terminology, classification
5. Optics of contact Lenses, comparison spectacles
6. Indications and contraindications
7. Advantages and disadvantages of types of Contact lenses
8. Manufacturing Rigid and Soft Contact lenses – various methods
9. Pre-Fitting examination – steps, significance, recording of results
10. Instruments used for examination
11. Special Investigations in pre-fitting examinations
12. Keratometry and Cornea; topography
13. Slit Lamp examination
14. Discussion with patient, choice of lens type

Unit 2

1. Fitting philosophies of contact Lenses – general outline
2. Fitting Rigid Contact lenses
3. Using trial lenses – calculations involved
4. Methods of assessment of Contact Lense fit.
5. Types of fit – Steep, Flat, Optimum – on spherical cornea.
6. Types of fit – Steep, Flat, Optimum – on Toric cornea with spherical lenses
7. Types of fit – Steep, Flat, Optimum – on Toric cornea with toric lenses

Unit 3

1. Calculation and finalizing of Contact Lense parameters
2. Ordering Rigid verifying Contact Lense – writing a prescription to the Laboratory.
3. Checking and verifying Contact Lense from Laboratory
4. Modifications possible with Rigid lenses
5. Components of Lens Care systems for Rigid lenses
6. Contact lens solutions- composition necessity advantages.
7. Teaching the patient to insert and remove Rigid lenses.
8. Common handling instructions to first time wearers
9. Special instructions to the patient wearing Rigid Gas Permeable Contact Lenses.

Unit 4

1. Soft contact lens – Law materials, classification, terminology, etc.
2. Manufacturing Soft Contact Lenses –various methods- advantages & disadvantages
3. Various designs Soft Contact Lenses - advantages & disadvantages
4. Pre- Fitting examination – steps, significance, recording of result
5. Special points for in pre-fitting examination of Soft Contact Lenses
6. Discussion with patient choice of lens – type

7. Fitting Soft Contact Lenses general outline
8. Fitting Soft Contact Lenses – methods – Trial set method
9. Using trial lenses . calculations involved

Unit 5

1. Fitting Soft Contact Lenses methods first fit method
2. Methods of assessment of Soft Contact Lenses fit.
3. Types of fit – steep , Flat, Optimum – on spherical cornea
4. Types of fit – steep , Flat, Optimum – on Toric cornea with spherical lenses
5. Types of fit – steep , Flat, Optimum – on Toric cornea with toric lenses
6. Calculation and finalizing of Soft Contact Lenses parameters
7. Ordering Soft Contact Lenses – writing a prescription to the Laboratory
8. Fitting Soft Contact Lenses from stock – advantages, limitations, precautions

Unit 6

1. Checking and verifying Soft Contact Lenses
2. Components of Lens care systems for Soft Contact Lenses
3. Contact lens solutions – composition, necessity, advantages
4. Teaching the patient to insert and remove soft lenses
5. Common handling instruction to first time wearers
6. Special instructions to the patient for using soft lenses
7. Special soft lenses – cosmetics, Disposable , Toric
8. Special Rigid Lenses and designs – Toric, Keratoconus, etc.

Unit 7

1. Special considerations for fitting Contact Lenses, - Children, irregular cornea, Univocal Aphakia, sports one eyes patients post RK, post PRK
2. Ortho – keratology and myopia
3. Fitting Bifocal and multifocal – RGP & Soft lenses
4. After care and follow up for all Contact Lens patients.
5. Patient Problems – identification, differential diagnosis and management

Paper 2nd

**2. Binocular vision And Advanced Orthoptics.
(B.Optom)**

A. Binocular vision

Unit 1

1.1 General introduction

1.2 Binocular vision and space perception development

1. Fusion, diplopia, correspondence
2. Stereopsis, Panum's area. BSV
3. Stereopsis and monocular due – significance
4. Egocentric location, clinical applications
5. Theories of Binocular vision
6. Relative subjective visual direction
7. Alternation – theory of Binocular Vision
8. Projection theory of Binocular Vision
9. Motor theory of visual orientation

Unit 2

Summary of Anatomy of Extra Ocular Muscles

- Rectli and Obliques, PLS
- Innervation & Blood supply

Physiology of Ocular movements

- Center of rotation, Axes of Fick
- Action of individual muscle

Laws of ocular motility

- Donders' and Listing's law
- Sherrington's law
- Hering's law

Unit 3

Unocular & Binocular movements – fixation, saccadic & pursuits

- Version & Vergence
- Fixation & field of fixation
- Nystagmus

Near vision complex

- a. Accommodation
 - i) Definition and mechanism (process)
 - ii) Methods of measurement
 - iii) Stimulus and innervations
 - iv) Types of accommodations
 - vi) Anomalies of accommodation – aetiology and management

Unit IV

Convergence

- i) Definition and mechanism

- ii) Methods of measurement
- iii) Types and components of convergence – Tonic, accommodative fusional proximal
- iv) Anomalies of Convergence – aetiology and management

Pupillary Construction

- a. Relation to Accommodation and convergence
- b. Physiologic significance
- c. Reaction to fusion

Unit 5-Visual Acuity

- 1. Definition and basic concepts
- 2. Factors of affecting visual acuity
- 3. Optical effects of spectacles
- 4. Aniseikonia
- 5. Sensory adaptations
- 6. Confusion
- 7. Suppression
- 8. Abnormal Retinal Correspondence
- 9. Blind spot syndrome

Amblyopia

- a. Definition and types
 - b. Investigations
 - c. Management
- 1. Eccentric Fixation
 - 2. Investigation and management

B. Advanced Orthoptics

Unit 1

- 1. Neuro-muscular anomalies
 - Classification and etiological factors
 - History – recording and significance
- 2. Convergent strabismus
 - Accommodative convergent squint
 - Classification
 - Investigation and Management
 - B Non accommodative
 - Convergent squint
 - Classification
 - Investigation and Management
- 3. Divergent Strabismus
 - Classification
 - A& V phenomenon
 - Investigation and Management
- 4. Vertical strabismus
 - Classification

- Investigation and Management

Unit 2

5. Paralytic Strabismus
 - Acquired and Congenital
 - Clinical Characteristics
 - Distinction from comitant and restrictive Squint
6. Investigations
 - History and symptoms
 - Head Posture
 - Diplopia Charting
 - Hess chart
 - PBCT
 - Nine directions
 - Binocular field of vision
7. Non surgical Management of Squint
8. Restrictive Strabismus Features
 - Musculo fascical anomalies
 - Duane's Retraction syndrome
 - Clinical features and management
 - Brown's Superior oblique sheath syndrome
 - Strabismus fixus Congenital muscle fibrosis
 - Surgical management

Unit 3

1. Orthoptic check up and special instruments
 - a. Routine Orthoptic examination
 - b. Special Orthoptic investigation
 - c. Instruments used in Orthoptics
 - d. Diagnosis, prognosis & management methodologies
2. Neuro muscular anomalies
 - a. Classification
 - b. Hetrophoria&hetrotopia
 - c. Orthophoria
 - d. Concomitant & non concomitant
 - e. Paralytic squint

Unit IV

Aetiology
Factors responsible
Role of accommodation & convergence
Genetics and occurrence of squint and binocular vision problems.
Outline of Routine Orthoptics examination
Subjective symptoms – description and significance

Unit V

1. History – recording and significance
2. Measurement of angles of deviation

3. Sensory signs of patients
4. Clinical picture of types of squint
 - a. Accommodative
 - b. Intermittent
 - c. Alternate
 - d. A & V. Phenomenon

Paper 3rd

**3. Major Eye Diseases And Systemic Eye Diseases
(B.Optom)**

A. Major Eye Disease-

Unit 1

1. Cataract
2. Glaucoma
3. Retinal detachment

Unit 2

1. Cornea ulcer & opacities
2. Visual loss – ophthalmic lesion
3. Diabetic Retinopathy

Unit 3

1. Macular degeneration
2. Chemical burns

B. Systematic eye disease

Unit 1

1. **ARTERIAL HYPERTENSION**
 - i. Pathophysiology, classification, clinical examination, diagnosis, complications and management.
 - ii. Hypertension and the eye
2. **DIABETIS MELLITUS**
 - i. Pathology, classification, clinical features, diagnosis, complications and management.
 - ii. Diabetes mellitus and the eye
3. **ACQUIRED HEART DISEASE – EMBOLISM**
 - i. Rheumatic fever – pathophysiology, classification, diagnosis, complications and management.
 - ii. Embolism
 - iii. Subacute bacterial endocarditis
4. **CANCER – INTRODUCTION**
 - i. Definitions, nomenclature, characteristics of benign and malignant neoplasm.
 - ii. Grading of staging of cancer, diagnosis principles of treatment.
 - iii. Neoplasia of the eye.
5. **CONNECTIVE TISSUE DISEASE**
 - i. Anatomy and pathophysiology : Arthritis
 - ii. Eye and connective tissue disease.
6. **THYROID DISEASE**
 - Anatomy and physiology of thyroid gland, Classification of thyroid disease.
 - Diagnosis, complications, clinical features, management, thyroid disease of the eye

Unit 2

1. **TUBERCULOSIS**
 - i. Etiology, pathology, clinical feature, pulmonary tuberculosis, diagnosis, complications, treatment, tuberculosis and the eye
2. **HELMINTHIASIS**
 - i. Classification of helminthic disease, schistosomiasis, principles of diagnosis and management.
 - ii. Helminthic disease and the eye (Taenia, echinococcus, larvae migrans)
3. **COMMON TROPICAL ILLMENTS, (Malaria, leprosy, etc.)**
 - i. Introduction to tropical diseases : Malaria.
 - ii. Tropical diseases and the eye – leprosy, toxoplasmosis, syphilis, trachoma.
4. **MALNUTRITION**
 - i. Etiology, protein energy malnutrition, water electrolytes, minerals, vitamins, nutritional disorders and the eye.
5. **INTRODUCTION TO IMMUNOLOGY**
 - I. Introduction, components of the immune system, principle of immunity in health.
 - II. Immunology in disease, Immunology and the eye.

Unit III

1. **NEUROLOGICAL DISORDERS-STROKE/CVA**
 - i. Disseminated sclerosis and subacute combined degeneration
 - ii. Anatomy and patho-physiology
 - iii. Disseminated sclerosis, subacute combined degeneration
 - iv. Eye and connective tissue disease.
2. **GENERAL, MEDICAL EMERGENCIES – FIRST AID**
 - i. Ocular and first aid
3. **GENETICS**
 - I. Introduction to genetics
 - II. Organisation of the cell
 - III. Chromosome structure and cell division
 - IV. Gene structure and basic principles of genetics
 - V. Genetic disorders and their diagnosis
 - VI. Genes and the eye
 - VII. Genetic counselling and engineering

Paper 4th

**4. Public Health, Community Optometry And Occupational Optometry
(B.Optom)**

A Public health, Community Optometry

Unit 1

PHYLOSOPHY OF PUBLIC HEALTH

History of public health

History of public health optometry (including epideology, man power, projections, community reimbursement mechanisms)

Unit 2

HEALTH CARE SYSTEMS

Organisations of health services (principles of primary, secondary and tertiary care)

Detriments of health care delivery system

Planning of health services (including revelent legislation and implications to optometric practice)

Health economics

Health manpower protection and in the practice of ophthalmology

Third party involvement in financing health care services (including both governmental and nongovernmental programme)

Quality assurance

Unit 3

MODES OF HEALTH ANDVISION CARE DELIVERY

Solo and group practice modes

Multidisciplinary and institutional practice modes

Optometry's role as a care primary care profession

B Occupational Optometry

Lecturer Topics

Unit 1

1. Introduction to occupational health, hygiene and safety International Bodies like ILO. WHO, National bodies like Labor institutes, National institute of occupational health, National Safety Council etc.
2. Acts and Rules
Factories Act, and Rules
Workmen's compensation
ESI Act, etc.

Unit 2

3. Occupational diseases/occupational related diseases caused by-physical agents, chemical agents and biological agents
4. Occupational hygiene, environmental monitoring, Recognition, evaluation, control of hazards.
Illumination – definition, measurements, standards.

5. Occupational safety.
Causes of accidents. Vision, Lighting, color and their role.
Accident analysis. Accident prevention

Unit 3

6. Ocular and visual problems of occupation
Electromagnetic radiation
Ionising Non-ionising-infrared, Ultra violet , Microwave laser
Injuries-mechanical, chemical
Toxicology – metals, chemicals
7. Prevention of occupational diseases
Medical examination / medical monitoring
Pre-employment / pre placement
Periodic
8. Personal protective equipment
General
Goggles, face shields etc.
Selection and use
Testing for standards
9. Standards
Visual standards for jobs.
10. Problems of special occupational groups
Drivers, pilots and others

Unit-4

11. Field work – submission of reports
Visits to : Regional Labour Institute selected industries
12. Visual display units (terminals) VDU/VDT
Contact lens and work
Pesticides - general and visual and ocular defects

Paper 5th

5. Pediatric And Geriatric optometry

(B.Optom)

A Pediatric optometry

UNIT 1-HISTORY

1. Genetic factors
2. Prenatal factors
3. Perinatal factors
4. Postnatal factors
5. Measurement of visual acuity

Normal Appearance, pathology and structural anomalies of

- i. Orbit
 - ii. Eyelids
 - iii. Lacrimal system
 - iv. Conjunctiva
 - v. Cornea
 - vi. Sclera
 - vii. Anterior chamber, uveal tract, pupils
 - viii. Lens
 - ix. Vitreous, Funds
 - x. Oculomotor system
6. Measurement of refractive status
 7. Determining binocular status
 8. Determining sensory motor adaptability

UNIT 2-COMPENSATORY TREATMENT AND REMEDIAL THERAPY FOR

1. Myopia
2. Pseudo myopia
3. Hyperopic
4. Astigmatism
5. Anisometropia
6. Amblyopia

UNIT 3-REMEDIAL AND COMPENSATORY TREATMENT FOR STRABISMUS AND NUYSTAGMUS

1. vergence and accommodation

B Geriatric Optometry

UNIT 1

1. Structural and morphological changes in the eye
2. Physiological changes in the eyecourse of aging
3. Optical and refractive changes in the eye
4. Aphakia, psuedophakia-it's correction

5. Introduction to geriatric medicine – epidemiology , need for optometry care, systemic diseases (Hypertension, Atherosclerosis, coronary heart disease, congestive Heart failure, Cerebrovascular disease, Diabetes, COPD)
6. Ocular diseases common in old eye, with special reference to cataract disorders, vascular diseases of the eye
7. Contact lenses in elderly
8. Pharmacological aspects of aging

UNIT 2

1. Special considerations in ophthalmic dispensing to the elderly
2. Management of visual problems of aging
3. How to carry on one's visual task overcoming the problems of ageing
4. Low vision causes, management and rehabilitation in geriatrics

Paper 6th

6 Dispensing Optics

(B.Optom)

Unit 1

1. Components of spectacle prescription & interpretation,
2. transposition,
3. Add and near power relation

Unit 2

1. Frame selection – based on spectacle prescription, professional requirements, age group, face shape
2. Measuring Inter-pupillary distance (IPD) for distance & near, bifocal height

Unit 3

1. Lens & Frame markings, Pupillary centers, bifocal heights, Progressive markings & adjustments – facial wrap, pantoscopic tilt
2. Recording and ordering of lenses (power, add, diameter, base, material, type, lens enhancements)
3. Neutralization – Hand & lensometer, axis marking, prism marking

Unit 4

1. Faults in spectacles (lens fitting, frame fitting, patients complaints, description, detection and correction)
2. Final checking & dispensing of spectacles to customers,
3. counseling on wearing & maintaining of spectacles,
4. Accessories – Bands, chains, boxes, slevets, cleaners, screwdriver kit
5. Spectacle repairs – tools, methods, soldering, riveting, frame adjustments

Unit-5

1. Special types of spectacle frames
 - Monocles
 - Ptosis crutches
 - Industrial safety glasses
 - Welding glasses
 - Frame availability in Indian market
2. FAQ's by customers and their ideal answers

Subsidiary Subject:-

Paper 7th

**7 Biostatics, Environmental Science And Health
(B.Optom)**

A. Biostatics

Unit 1- Statistics

1. Correlation and Regression
2. X^2 - test (2x2)

Unit 2- hospital statistics

2. Introduction to biostatistics epidemiology
3. Measures of morality
4. Descriptive epidemiology
5. Biological variability
6. Screening
7. Sampling
8. Statistical significance
9. Retrospective studies
10. Prospective studies
11. RCT
12. Association and Causation
13. Bias and Confounding
14. Sample size determination
15. Survival analysis

B. Environmental Science & Health

Unit 1-General

- I:-Biotic and abiotic environment
- II:-Adverse effects of Environment Pollution
- III:-Control strategies

Unit 2-WaterPollution

- i. Water Quality standards for potable water
- ii. Impurities in water and their removal
- iii. Defluoridation
- II. IV:Self purification of streams

Unit 3-Air pollution

- i. Source of air contaminants
- ii. Adverse effects on human health
- iii. Measures to check air pollution
- iv. Greenhouse effect
- v. Acid Rain
- vi. Ozone depletion

Unit 5-(A) Biomedical Waste Management

- i. Introduction to Bio-medical waste
- ii. Types of bio-medical waste
- iii. Collection of bio-medical waste
- iv. Treatment and disposal of bio-medical waste

(B) Solid waste Management

- i. Introduction to solid waste
- ii. Its collection and disposal
- iii. Sanitary land-filling
- iv. Vermin-composting
- v. Hazardous waste management

Unit 6-(A) Land Pollution

- i. Soil conservation
- ii. Land erosion

(B) Ecology

- i. Basics of species
- ii. Biodiversity
- iii. Population dynamics
- iv. Energy flow
- v. Ecosystems

**BOPTOM
INTERNSHIP**

S.No	Department	Days
1	Primary Eye Care	1.5 month
2	Dispensing Optics/ Eye Banking	1.5 month
3	Contact Lens	1.5 month
4	Low Vision Aids	1.5 month
5	Orthoptics	1.5 month
6	Diagnostics	1.5 month
7	Anterior Segment clinic	1.5 month
8	Posterior Segment Clinic	1.5 month

IIMT College of Medical Sciences (Allied Health Sciences)

ACADEMIC HAND BOOK



Bachelor of Science in Medical Laboratory Technology (BMLT) (EVALUATION SCHEME & SYLLABUS)

SUMMARY

Programme	Bachelor of Science in Medical Laboratory Technology (BMLT)
Duration	Three years full time and six months internship
Medium	: (Annual System)
Minimum Required Attendance	: English
Maximum Credits	: 75 %
Minimum credits required for the degree	: 82
Assessment	: 82

Internal Evaluation (Theory Papers)

	Internal	External	Total
:	30	70	100

Evaluation of Practical/Dissertations

& Project Reports Duration of Examination

Class Test I	Class Test II	Class Test III	Assignment(s)	Other Activity (including attendance)	Total
Best two out of the three					
10	10	10	5	5	30

	Internal	External	Total
:	50	50	100

	External	Internal
:	3 hrs.	1.5 hr.

To qualify the course a student is required to secure a minimum of 50% marks in aggregate including the year-end examination and teacher's continuous evaluation (i.e. both internal and external). A candidate, who secures less than 50% marks in a course, shall be deemed to have failed in that subject/course(s). A candidate failing in more than two subjects will not be promoted to the next higher class. If a candidate fails in either theory or practical, he/she have to reappear in both the examination.

A candidate who has been placed under re-appear category in any of the subject shall be allowed to continue his/her studies in the next year but will have to pass the concerned subject in the supplementary examination to be conducted within three months after declaration of the result. Unless candidate passes the previous level examination, he /she shall not be allowed to appear in the next level examination. Failure in supplementary examination will be revert back to corresponding junior batch of students and will continue his/her studies with them for rest of the program.

Note: For internal assessment purpose, there will be three Class Tests in a year and best two tests will be computed for the final result.

INTERNSHIP

Internship is a phase of training wherein a graduate is expected to conduct actual practice of medical pathology technology and acquire skills under supervision so that he /she may become capable of functioning independently.

SPECIFIC OBJECTIVES

At the end of internship training the graduate shall be able to:

1. Perform all the diagnostic techniques
2. Use discretely the essential laboratory services
3. Manage all types of clinical diagnostic methods
4. Demonstrate skills in handling the modern equipments in laboratory test.
5. Develop leadership qualities to function effectively as a leader in the laboratory environment
6. Render services to the laboratory set up and to communicate effectively with the doctors and the hospital management.
7. Development of skill and competency in data processing, reporting and maintenance of records & Laboratory investigations.

INTERNSHIP TIME PERIOD: 6 Months

OTHER DETAILS

- i) Entire internship shall be done in a Hospital or Medical College.
- ii) Every candidate will be required after successfully completing the final Bachelor of Science in Medical Laboratory Technology (BMLT) Examination, to undergo compulsory rotator internship to satisfaction of the University for a period of 6 months so as to be eligible for the award of the degree.
- iii) The University shall issue a provisional degree of Bachelor of Science in Medical Laboratory Technology (BMLT) on passing the final examination after the completion of internship on demand by the candidate.
- iv) The internee shall be entrusted with laboratory responsibilities under direct supervision of Senior Medical Officer/Technician. They shall not be working independently.
- v) Internee will not issue certified copy of investigation reports or other related documents under their signature.

ASSESSMENT OF INTERNSHIP

1. The Internee shall maintain the record of work, which is to be verified and certified by the senior medical officer/Technician under whom he /she works. Apart from scrutiny of record of work, assessment and evaluation of training shall be undertaken by an objective approach using situation tests in knowledge, skills and attitude during at the end of training. Based on the record of work and date of evaluation The Director/Principal shall issue certificate for satisfactory completion of training following which the university shall award the degree of Bachelor of Science in Medical Laboratory Technology (BMLT) to the candidate.
2. Satisfactory completion shall be determined on the basis of the following.
 - a) Proficiency of knowledge required for each Laboratory techniques.
 - b) The competency and skills expected to manage each laboratory technique.

- c) Responsibility, punctuality work up of laboratory techniques, involvement in special procedures and preparation of reports.
 - d) Capacity to work in a team (behaviour with colleagues, nursing staff and relationship with medical and paramedical.
3. Initiating, participating in discussions and developing research aptitude. Only six leave are allowed to an internee during the period of his/her internship. If he/she extend his/her leave in the duration of internship, the period the internship shall be extended by double the days for which the student was absent.

PROJECT

by the candidate will be duly verified & a viva voce shall be conducted on the same at the time of Practical Examination of final year

Study & Evaluation Scheme
Programme: Bachelor of Science in Medical Laboratory Technology (BMLT)

Year-I

S. No.	Course Code	Subject	Periods			Evaluation Scheme		
			L	P	Credit	External	Internal	Total
1	BML-101	Human Anatomy	3	-	3	70	30	100
2	BML-102	Human Physiology	3	-	3	70	30	100
3	BML-103	Pathology	3	-	3	70	30	100
4	BML-104	Medical Biochemistry	3	-	3	70	30	100
5	BML-105	Community Healthcare	3	-	3	70	30	100
6	BML-106	Foundation English	2	-	2	35	15	50
7	BML-107	Basics of Computers	2	-	2	35	15	50
8	BML-001P	Human Anatomy(Practical)	-	2	1	70	30	100
9	BML-002P	Human Physiology(Practical)	-	2	1	70	30	100
10	BML-003P	Pathology (Practical)	-	2	1	70	30	100
11	BML-004P	Medical Biochemistry (Practical)	-	2	1	70	30	100
12	BML-005P	Basics of Computers (Practical)	-	2	1	70	30	100
13	BML-006P	Hospital Postings	-	10	5		100	100
		Total	19	20	29	770	430	1200

Year-II

S. No.	Course Code	Subject	Periods			Evaluation Scheme		
			L	P	Credit	External	Internal	Total
1	BML-201	Bacteriology & Mycology	3	-	3	70	30	100
2	BML-202 BML-203	Parasitology & Virology	3	-	3	70	30	100
3	BML-208	Histopathology	2	-	2		30	100
4	BML-204	Hematology	2	-	2	70	30	100
5	BML-205	Clinical Biochemistry-I	3	-	3	70	30	100
6	BML-206	Clinical Biochemistry-II	3	-	3	70	30	100
7	BML-207	English Communication	2	-	2	35	15	50
8	BML-007P	Bacteriology & Mycology (Practical)	-	2	1	70	30	100
9	BML-008P	Parasitology & Virology (Practical)	-	2	1	70	30	100
10	BML-009P	Histopathology & Hematology (Practical)	-	4	2	70	30	100
11	BML-010P	Clinical Biochemistry-I (Practical)	-	2	1	70	30	100
12	BML-011P	Clinical Biochemistry-II (Practical)	-	2	1	70	30	100
13	BML-012P	Hospital Postings	-	6	3		100	100
		Total	18	18	27	560	740	1250

Year-III

S. No.	Course Code	Subject	Periods			Evaluation Scheme		
			L	P	Credit	External	Internal	Total
1	BML-301	Immunology	3	-	3	70	30	100
2	BML-302	Bacteriology & Applied	3	-	3	70	30	100
3	BML-303	Bacteriology Cytology	-		3	70	30	100
4	BML-304	Immuno hematology & Blood Transfusion	3	-	3	70	30	100
5	BML-305	Clinical Biochemistry-III	3	-	3	70	30	100
6	BML-306/	Advanced Medical Biochemistry	-		3	70	30	100
7	BML-013P	Immunology (Practical)	-	2	1	70	30	100
8	BML-014P	Bacteriology & Applied Bacteriology (Practical)	-	2	1	70	30	100
9	BML-015P	Cytology (Practical)	-	2	1	70	30	100
10	BML-016P	Immuno hematology & Blood Transfusion(Practical)	-	2	1	70	30	100
11	BML-017P	Clinical Biochemistry-III (Practical)	-	2	1	70	30	100
12	BML-018P	Hospital Postings	-	6	3		100	100
		Total	16		26	770	430	1200

Note:

L – Lecture	T- Tutorial	P- Practical	C-Credits	
1L = 1Hr	1T= 1 Hr	1P= 1 Hr		1C = 1Hr of Theory Paper 2 Hrs of Practical/Tutorial

Evaluation Scheme for Practical (Internal & External)

Viva (General)	Long Case	Short Case	Student Journal	Total Marks
20 marks	10 marks	10 marks	10 marks	50

Theory Question Paper Structure

- The question paper shall consist of eight questions. First question shall be of short answer type and be compulsory. It shall contain 8 parts, covering the entire syllabus and the student shall be required to answer any five of them (weightage 4 marks each).
- Out of the remaining seven questions, student shall be required to attempt any five. The weightage of Question No. 2 to 8 shall 10 marks each.

Year- I
Human Anatomy

Course Code: BML-101
Course Contents

L-3, T-0, P-0, C-3

Unit I

Introduction: Human body as a whole

Definition of anatomy and its divisions, Terms of location, positions and planes, Cell and its organelles, Epithelium-definition, classification, describe with examples, function, Glands-classification, describe serous & mucous glands with examples, Basic tissues – classification with examples.

Unit II

Locomotion and Support

Cartilage – types with example & histology, Bone – Classification, names of bone cells, parts of long bone, microscopy of compact bone, names of bones, vertebral column, inter vertebral disc, fontanelles of fetal skull, Joints – Classification of joints with examples, synovial joint (in detail for radiology), Muscular system- Classification of muscular tissue & histology, Names of muscles of the body.

Unit III

Cardiovascular System

Heart-size, location, chambers, exterior & interior, Blood supply of heart, Systemic & pulmonary circulation, Branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial artery, superficial palmar arch, femoral artery, internal iliac artery, Peripheral pulse, Inferior venacava, portal vein, portosystemic anastomosis, Great saphenous vein, Dural venous sinuses, Lymphatic system- cisterna chyli & thoracic duct, Histology of lymphatic tissues, Names of regional lymphatics, axillary and inguinal lymph nodes in brief.

Unit IV

Gastro-intestinal System

Parts of GIT, Oral cavity (lip, tongue (with histology), tonsil, dentition, pharynx, salivary glands, Waldeyer's ring), Oesophagus, stomach, small and large intestine, liver, gall bladder, pancreas, Radiographs of abdomen.

Unit V

Respiratory System

Parts of RS, nose, nasal cavity, larynx, trachea, lungs, bronchopulmonary segments, Histology of trachea, lung and pleura, Names of paranasal air sinuses.

Unit VI

Peritoneum: Description in brief.

Urinary System

Kidney, ureter, urinary bladder, male and female urethra, Histology of kidney, ureter and urinary bladder.

Unit VII

Reproductive System

Parts of male reproductive system, testis, vas deferens, epididymis, prostate (gross & histology), Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology), Mammary gland-gross.

Unit VIII

Endocrine Glands

Names of all endocrine glands in detail on pituitary gland, thyroid gland, parathyroid gland, suprarenal gland (gross & histology).

Unit IX

Nervous System

Neuron, Classification of NS, Cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve (gross & histology), Meninges, Ventricles & cerebrospinal fluid, Names of basal nuclei, Blood supply of brain, Cranial nerves, Sympathetic trunk & names of parasympathetic ganglia.

1. Sensory Organs

Skin: Skin-histology, Appendages of skin, Eye: Parts of eye & lacrimal apparatus, Extra-ocular muscles & nerve supply, Ear: parts of ear- external, middle and inner ear and contents

2. Embryology

Spermatogenesis & oogenesis, Ovulation, Fertilization, Fetal circulation, Placenta

Reference Books:

1. William Davis, *Understanding Human Anatomy and Physiology*, McGraw Hill
2. Chaurasia's, *A Text Book of Anatomy*
3. Ranganathan, T.S., *A Text Book of Human Anatomy*
Fattana, *Human Anatomy*, (Description and Applied), Saunder's & C P Prism Publishers, Bangalore
Ester. M. Grishcimer, *Physiology & Anatomy with Practical Considerations*, J.P. Lippin Cott. Philadelphia.

Year -I
Human Physiology

Course Code: BML-102

L-3, T-0, P-0, C-3

Course Contents:

1. **Cell**
Definition, Structure and function of Cytoplasmic Organelles, Reproduction-Meiosis, Mitosis.
2. **The important physico-chemical laws applied to physiology**
Diffusion, Osmosis, Bonding, Filtration, Dialysis, Surface Tension, Adsorption, Colloid.
3. **Introduction- composition and function of blood**
Red blood cells- Erythropoiesis, stages of differentiation function, counts physiological Variation. Haemoglobin -Structure, function, concentration physiological variation. Methods of Estimation of Hb, White blood cell- Production, function, life span, count, differential count. Platelets- Origin, normal count, morphology functions. Plasma Proteins- Production, concentration, types, albumin, globulin, fibrinogen, Prothrombin functions. Haemostasis & Blood coagulation. Haemostasis – Definition, normal haemostasis, clotting factors, mechanism of clotting disorders of clotting factors.
Blood Bank, Blood groups-A, B, O system, Rh system, **Blood grouping & typing**, Cross-matching, Rh system-Rh factor, Rh in Cross-matching, Blood transfusion – Indication, universal donor and recipient concept. Selection criteria of a blood donor. Transfusion Anticoagulant – Classification, Examples and uses. Anaemia's: Classification – morphological and etiological. Effects of anaemia on body. Blood indices – Colour index, MCH, MCV, MCHC, Erythrocyte Sedimentation Rate (ESR) and Packed cell volume, Normal Values, Definition, determination. Blood Volume – Normal value, determination of blood volume and regulation of blood volume body fluid- pH, normal value, regulation and variation.
4. **Fundamentals of different Organ Systems:**
 - i. Cardiovascular System
 - ii. Respiratory System
 - iii. Excretory System
 - iv. Reproductive System
 - v. Endocrine System
 - vi. Lymphatic System

Reference Books:

1. Guyton, Arthur, *Text Book of Physiology*, Prism Publishers
2. Chatterjee, C C, *Human Physiology*, Medical Allied Agency
3. A.K Jain, *Human Physiology*

Year -I
Pathology

Course Code: BML-103

L-3, T-0, P-0, C-3

Course Contents:

1. Histopathology

Introduction to Histopathology, Receiving of Specimen in the laboratory, Grossing Techniques, Mounting Techniques – various Mounts, Maintenance of records and filling of the slides. Use & care of Microscope, Various fixatives, Mode of action, Preparation and Indication. Section Cutting, Tissue processing for routine paraffin sections, Decalcification of Tissues. Staining of tissues - H& E Staining. Bio-Medical waste management.

2. Clinical Pathology

Introduction to Clinical Pathology. Collection, Transport, Preservation, and Processing of various clinical Specimens of Urine Examination – Collection and Preservation of urine. Physical, Chemical, Microscopic Examination, Examination of body fluids. Examination of cerebro spinal fluid (CSF), Sputum Examination. Examination of feces.

3. Haematology

Introduction to Haematology, Normal constituents of Blood, their structure and function. Collection of Blood samples, Various Anticoagulants used in Haematology. Various instruments and glassware used in Haematology, Preparation and use of laboratory glassware. Laboratory safety guidelines, SI units and conventional units in Hospital Laboratory, Hb, PCV, ESR, Normal Haemostasis, Bleeding Time, Clotting Time, Prothrombin Time, Activated Partial Thromboplastin time.

4. Blood Bank

Introduction, Blood grouping and Rh Types, Cross matching

Reference Books:

1. Rabbins & Cotran, *Pathologic Basis & Diseases*
2. Harsh Mohan, *Pathologic Basis & Diseases*
3. Todd & Sanford, *Clinical Diagnosis by Laboratory Method*
4. Dacie & Lewis, *Practical Hematology*
5. Ramanik Sood, *Laboratory Technology Methods and Interpretation*

Year-I
Medical Biochemistry

Course Code: BML-104

L-3, T-0, P-0, C-3

Course Contents:

1. Specimen Collection

- a. Pre-analytical variables, Collection of blood, Collection of CSF & other fluids, Urine collection. Use of preservatives, Anticoagulants

2. Introduction to Laboratory Apparatus

- a. Pipettes- different types (Graduated, volumetric, Pasteur, Automatic etc.), Calibration of glass pipettes, Burettes, Beakers, Petri dishes, depression plates. Flasks - different types (Volumetric, round bottomed, Erlenmeyer conical etc.), Funnels – different types (Conical, Buchner etc.) Bottles: Reagent bottles – graduated and common, Wash bottles – different types, Specimen bottles etc.
- b. **Measuring cylinders, Porcelain dish**, Tubes – Test tubes, centrifuge tubes, test tube draining rack Tripod stand, Wire gauze, Bunsen burner. Cuvettes, significance of cuvettes in colorimeter, cuvettes for visible and UV range, Cuvette holders Racks – Bottle, Test tube, Pipette, Desiccators, Stop watch, rimers, scissors, Dispensers – reagent and sample.
- c. *Any other apparatus which is important and may have been missed should also be covered*

3. Maintenance of Lab Glassware and Apparatus

- a. Glass and plastic ware in Laboratory, use of glass: significance of boro-silicate glassware and cleaning of glassware, different cleaning solutions of glassware and cleaning of plastic ware, different cleaning solutions.

4. Instruments (Theory and demonstration)

- a. Water bath: Use, care and maintenance, Oven & Incubators: Use, care and maintenance. Water Distillation plant and water deionizers. Use, care and maintenance, Refrigerators, cold box, deep freezers – use, care and maintenance. Reflux condenser: Use, care and maintenance. Centrifuges (Theory and demonstration) *Diagrams to be drawn.*
- b. Definition, Principle, Svedberg unit, centrifugal force, centrifugal field rpm, ref. Conversion of G to rpm and vice versa. Different types of centrifuges, Use care and maintenance of a centrifuge. Laboratory balances [Theory & Practical) *Diagrams to be drawn.* Manual balances: Single pan, double pan, trip balance, Direct read out electrical balances. Use care and maintenance. Guideline to be followed and precautions to be taken while weighing. Weighing different types of chemicals, liquids. Hygroscopic compounds etc. Colorimeter and spectrophotometer (Theory and Practical) *Diagrams to be drawn.* Principle, Parts diagram. Use, care and maintenance of pH meter and electrodes, Guidelines to be followed and precautions to be taken while using pH meter.

c. Conventional and SI Units

- a. Preparation of normal solutions e.g., In Na_2CO_3 , O In Oxalic acid, 0.1N HCl, 0.1N H_2SO_4 , 0.66 N H_2SO_4 etc. Percent solutions. Preparation of different solutions – v/v, w/v (solids, liquids and acids). Conversion of a percent solution into a molar solution.

d. Dilutions

Diluting solutions: e.g. Preparation of 0.1N NaCl from 1N NaCl from 2N HCl etc., preparing working standard from stock standard, Body fluid dilutions, Reagent dilution techniques, calculating the dilution of a solution, body fluid reagent etc., Saturated and supersaturated solutions.

Standard solutions: Technique for preparation of standard solutions e.g. Glucose, urea, etc., Significance of volumetric flask in preparing standard solutions. Volumetric flasks of different sizes, Preparation of standard solutions of deliquescent compounds (CaCl_2 , potassium carbonate, sodium hydroxide etc.) Preparation of standards using conventional and SI units.

Acids, bases, salts and indicators: Acids and Bases – Definition, physical and chemical properties with examples. Arrhenius concept of acids and bases, Lowry – Bronsted theory of acids and bases classification of acids and bases. Difference between bases and alkali, acidity and basicity, monoprotic and polyprotic acids and bases. Concepts of acid base reaction, hydrogen ion concentration, Ionisation of water, buffer, pH value of a solution, preparation of buffer solutions using pH meter.

Salts – Definition, classification, water of crystallization – definition and different types, deliquescent and hygroscopic salts.

Acid-base indicators: (Theory and Practical) Definition, concept, mechanism of dissociation of an indicator, colour change of an indicator in acidic and basic conditions, use of standard buffer solution and indicators for pH determinations, preparation and its application, list of commonly used indicators, and their pH range, suitable pH indicators used in different titrations, universal indicators.

Quality control: Accuracy, Precision, Specificity, Sensitivity. Limits of error allowable in laboratory, Percentage error, Normal values and Interpretations, pH Regulation, Disturbance in acid Base Balance, Metabolic acidosis & alkalosis, Respiratory acidosis & alkalosis, Respiratory alkalosis, Basic Principles and estimation of Blood Gases and pH, Basic principles and estimation of Electrolytes, Nutritional importance of lipids, carbohydrates, proteins and Vitamins.

Reference Books:

1. Varley, *Clinical Chemistry*
 2. Teitz, *Clinical Chemistry*
 3. Kaplan, *Clinical Chemistry*
 4. Ramakrishna S, Prasanna KG, Rajna, *Text Book of Medical Biochemistry*, Orient Longman
- a. Vasudevan DM & Sreekumari S, *Text Book of Biochemistry for Medical Students*.

- b. Das, Debajyothi, Biochemistry, Academic, Publishers, Calcutta.
- c. Chatterjee, *A Text book of Medical Biochemistry*
- d. U. Satyanarayan, *Medical Biochemistry*

Year-I
Community Healthcare

Course Code: BML-105

L-3, T-0, P-0, C-3

Course Contents:

- 1. Definition of Health, Determinants of Health, Health Indicators of India, Health Team Concept.**
National Health Policy.
National Health Programmers (Briefly Objectives and Scope). Population of India and Family welfare programme in India.
- 2. Family:**
The family, meaning and definitions, Functions of types of family, Changing family patterns. Influence of family on Individuals Health, family and nutrition, the effects of sickness in the family and psychosomatic disease and their Importance to physiotherapy.
- 3. Community:**
Rural community: Meaning and features – Health hazards to rural communities, health hazards to tribal community.
Urban community – Meaning and features – Health hazards of urbanities.
- 4. Culture and Health Disorders**
Social Change: Meaning of social changes, Factors of social changes, Human adaptation and social changes, Social changes and stress, Social changes and deviance, Social changes and health programme, the role of social planning in the Improvement of health and rehabilitation.
- 5. Social Problems of disabled:**
Consequences of the following social problems in relation to sickness and disability
Population explosion.

Reference Books:

1. K. Perks, Sunder Lal, Adarsh Pandey, *Textbook of Preventive Social Medicine*

Year I
Foundation English
Course Code: BML-106
(Common with BRT106/BPT107/COT105)

L T P C
2 2 0 3

Unit I

Functional Grammar: Patterns & Parts of speech Subject, Predicate, Noun, Pronoun, Adjective, Adverb, Verb, Verb phrases, Conjunction, Interjection. Articles, Preposition, Tenses: functions, Synthesis, Transformation, Spotting errors and correction of sentences. **(12 Hours)**

Unit II

Vocabulary: Word formation, Prefix, Suffix, compound words, conversion, Synonyms, Antonyms, Homophones and Homonyms, How to look up a dictionary, The Language of Doctor and Patient, General description and Medical description, Medical abbreviations, Terminology used in Medical Lab Technology etc. **(12 Hours)**

Unit III

Communication: Meaning & importance of communication, elements of human communication, Barriers to effective communication, channels of communication, Language as a tool of communication, 7C's of Communication, Tips for effective communication. **(12 Hours)**

Unit IV

Requisites of Sentence writing: Fragmented sentences, a good sentence, expletives, garbled sentences, rambling sentences, loaded sentences, Parallel Comparison, Series, Squinting construction, Loose & periodic sentences, Dangling participles, ellipsis. **(12 Hours)**

Unit V

Requisites of Paragraph writing: Structure of Paragraph, Coherence & Unity, Development of paragraph, Inductive order, Deductive order, spatial order, Linear, chronological orders, expository writing, and Argumentative writing, Factual description of objects, process, experiments. **(12 Hours)**

Recommended Books:

1. Wren & Martin, *High School English Grammar & Composition* – S. Chand & Co. Delhi.
2. Lewis Norman, *Word Power Made Easy* – W.R. Goyal Publication & Distributors, Delhi.
Raman Meenakshi & Sharma Sangeeta, *Technical Communication-Principles & Practice* – O.U.P. New Delhi. 2007.
3. Medical Lab Technology Terminology.

NOTE:

This syllabus has been designed to improve the oral and written communication skills of students. The faculty members should put emphasis on practical (oral) activities for generating students' interest in language learning.

Year-I
Basics of Computers

Course Code: BML-107

L-2, T-0, P-0, C-2

Course Contents:

Unit I

Input and Output units: Their functional characteristics, main memory, cache memory read only memory, overview of storage devices – floppy disk, hard disk, compact disk, tape. Computer Networks and Communication: Network types, network topologies.

Unit II

Internet - Evolution, Protocols, Interface Concepts, Internet Vs Intranet, Growth of Internet, ISP.SSS.

Connectivity – Dial-up, Leased line, VSAT etc. URLs, Domain names, Portals.

E-MAIL- Concepts, POP and WEB based E-mail, merits, address, Basics of Sending & Receiving, E-mail Protocols, Mailing List, Free E-mail services.

Unit III

Electronic Payment Systems: Introduction, Types of Electronic Payment Systems, Digital Token - Based, Electronic Payment Systems, Smart Card and Electronic Payment Systems, Credit Card-Based Electronic Payment Systems, Risk and Electronic Payment Systems.

Unit IV

Html – Concepts of Hypertext, Versions of HTML, Elements of HTML syntax, Head & Body Sections, Building HTML documents, Inserting texts, Images, Hyperlinks, Backgrounds and Color Controls, Different HTML tags, Table layout and presentation, Use of font size & Attributes, List types and its tags, Use of Frames and Forms in web pages. Overview of MS Front Page, Macromedia Dream weaver, and other popular HTML editors, designing web sites using MS Front Page (using at least Front Page 2000).

Reference Books:

- a) Sanders, D.H., *Computers Today*, McGraw Hill.
- b) Trainer, T.N., *Computers*, McGraw-Hill.
- c) Joseph, P.T., S.J., *E- Commerce: An Indian Perspective*, Prentice Hall of India.

Year-I
Human Anatomy (Practical)

Course Code: BML-001P

L-0, T-0, P-2, C-1

Course Contents:

1. Histology of types of epithelium, Histology of serous, mucous & mixed salivary gland.
2. Histology of the 3 types of cartilage, Demo of all bones showing parts, radiographs of normal bones & joints, Histology of compact bone (TS & LS), Demonstration of all muscles of the body, Histology of skeletal (TS & LS), smooth & cardiac muscle.
& Demonstration of heart and vessels in the body, Histology of large artery, medium sized artery & vein, large vein, Microscopic appearance of large artery, medium sized artery & vein, large vein, pericardium, Histology of lymph node, spleen, tonsil & thymus, Normal chest radiograph showing heart shadows, Normal angiograms.
3. Demonstration of parts of respiratory system, Normal radiographs of chest, Histology of lung and trachea.
4. Demonstration of reflections.
5. Demonstration of parts of urinary system, Histology of kidney, ureter, urinary bladder, Radiographs of abdomen-IVP, retrograde cystogram.
6. Demonstration of section of male and female pelvis with organs in situ, Histology of testis, vas deferens, epididymis, prostate, uterus, fallopian tubes, ovary, Radiographs of pelvis – hystero salpingogram.
7. Demonstration of the glands, Histology of pituitary, thyroid, parathyroid, suprarenal glands.
8. Histology of peripheral nerve & optic nerve, Demonstration of all plexuses and nerves in the body, Demonstration of all part of brain, Histology of cerebrum, cerebellum and spinal cord.
9. Histology of thin and thick skin, Demonstration and histology of eyeball, Histology of cornea & retina.

Reference Books:

1. William Davis, *Understanding Human Anatomy and Physiology*, McGraw Hill.
2. Chaurasia's, *Practical of Human Anatomy*.

Year-I
Human Physiology (Practical)

Course Code: BML-002P

L-0, T-0, P-2, C-1

Course Contents:

1. Haemoglobinometry.
2. White Blood Cell Count.
3. Red Blood Count.
4. Determination of Blood Groups.
5. Leishman's staining and Differential WBC count.
6. Determination of packed cell Volume.
7. Erythrocyte sedimentation rate [ESR].
8. Calculation of blood indices.
9. Determination of Clotting Time, Bleeding Time.
10. Blood pressure Recording.
11. Auscultation for Heart Sounds.
12. Artificial Respiration.
13. Determination of vital capacity.

Reference Books:

1. A.K Jain, *Practical Handbook of Human Physiology*.
2. Nageshwari, *Practical Workbook of Human Physiology*.
3. Gupta, *Medical Physiology Made Easy*.

Year-I
Pathology (Practical)

Course Code: BML-003P

L-0, T-0, P-2, C-1

Course Contents:

1. Urine Examination.
 - a) Physical
 - b) Chemical
 - c) Microscopic
2. Blood Grouping Rh typing.
3. Hb Estimation, Packed Cell Volume [PCV], Erythrocyte Sedimentation rate{ESR}
4. Bleeding Time, Clotting Time.
5. Histopathology – Section cutting and H &E Staining.

Reference Books:

1. Rabbins & Cotran, *Pathologic Basis & Diseases*.
2. Harsh Mohan, *Pathologic Basis & Diseases*.
3. Todd & Sanford, *Clinical Diagnosis by Laboratory Method*.
4. Dacie & Lewis, *Practical Hematology*.
5. Ramanik Sood, *Laboratory Technology Methods and Interpretation*.

Year-I
Medical Biochemistry (Practical)

Course Code: BML-004P

L-0, T-0, P-2, C-1

Course Contents:

1. Analysis of Normal Urine.
2. Liver Function tests.
3. Lipid Profile.
4. Renal Function test.
5. Blood gas and Electrolytes.
6. Demonstration of Glucometer with strips.

Reference Books:

1. Varley, *Clinical Chemistry*.
2. Kaplan, *Clinical Chemistry*.
3. Das, Debajyothi, *Biochemistry*, Academic, Publishers, Calcutta.
4. Chatterjee, *A Text book of Medical Biochemistry*.
5. Satyanarayan, U., *Medical Biochemistry*.

Year-I
Basics of Computers (Practical)

Course Code: BML-005P

L-0, T-0, P-2, C-1

Course Contents:

Unit I

Concept in Computer: Definition of Computer, History of Computer , Generations, Characteristic and Application of Computers, Classification of Computers, Computer Hardware, CPU, Various Types of I/O devices, Peripherals Devices, Storage Devices. Management Introductory concepts in operating system, textual Vs GUI Interface, Introduction to DOS

Unit II

Starting MS WORD, Creating and formatting a document, Changing fonts and point size, Table Creation and operations, Autocorrect, Auto text, spell Check, Word Art, Inserting objects, Page setup, Page Preview, Printing a document, Mail Merge.

Unit III

Starting Excel, Work sheet, cell inserting Data into Rows/ Columns, Alignment, Text wrapping, Sorting data, Auto Sum, Use of functions, referencing formula cells in other formulae , Naming cells, Generating graphs, Worksheet data and charts with WORD, Creating Hyperlink to a WORD document , Page set up, Print Preview, Printing Worksheets.

Unit IV

Starting MS–Power Point,, Creating a presentation using auto content Wizard, Blank Presentation, creating, saving and printing a presentation, Adding a slide to presentation, Navigating through a presentation, slide sorter, slide show, editing slides, Using Clipart, Word art gallery, Adding Transition and Animation effects, setting timings for slide show, preparing note pages, preparing audience handouts, printing presentation documents, MS- Access, Creating tables and database, Internet, Use of Internet (Mailing, Browsing, Surfing).

Text Books:

1. Sinha P. K., Computer Fundamentals.
2. Bruck Bill, The Essentials Office 2000 Book.

Reference Books:

1. Leon A and Leon M., Introduction to Computers.
2. Norton’s Peter, Introduction to Computers.

Year -I
Hospital Postings

Course Code: BML-006P

L-0, T-0, P-10, C-5

Course Contents:

Students shall be deputed to various labs of Pathology department wherein they shall undergo practical training of handling patients, collection and processing of blood, urine, sputum stool and body fluids samples.

Identification of patient's particulars based on CR number, Lab Number and transfer of samples from collection to different labs.

Process of performing various tests in different labs.

Each student is required to maintain a logbook of the various posting. Student's performance shall be evaluated on continuous basis by the faculty posted in various sections. The faculty shall submit the assessment records of each student posted in his/her section on monthly basis to the HOD. Marks will be awarded out of 50.

Year -II
Bacteriology & Mycology

Course Code: BML-201

L-3, T-0, P-0, C-3

Course Contents:

Unit I

Bacteriology:

1. Morphology of Bacteria
 - a) Classification
 - b) Size & shape, Structure of Bacteria
2. Growth and Nutrition of Bacteria
3. Anti Microbial Sensitivity Test
4. Sterilization and Disinfection

Unit II

Mycology:

1. Introduction of Mycology. Terms & Classification.
2. Lab Diagnosis of Fungal Infections
3.
 - c) Superficial Mycoses
 - d) Subcutaneous Mycoses
 - i) Mycetoma
 - ii) Rhinosporidium
 - iii) Sporotrichosis
 - e) Dermatophytes
 - f) Systemic Mycoses
 - i) Histoplasmosis
 - ii) Blastomycosis
 - iii) Coccidioidosis
 - iv) Paracoccidioidosis
 - g) Opportunistic Fungi
 - i) Aspergillosis
 - ii) Penicillosis
 - iii) Zygomycosis
 - iv) Pneumocystis
 - v) Mycotoxins

Reference Books:

1. Anand Narayan and Panikar, *Textbook of Microbiology*
2. Baweja, *Medical Microbiology*
3. Arora, *Medical Lab Technology*

Year -II
Parasitology & Virology

Course Code: BML-202

L-3, T-0, P-0, C-3

Course Contents:

Unit I

Parasitology

1. Protozoology
 - a) Entamoeba histolytica
 - b) Balantidium coli
 - c) Giardia
 - d) Toxoplasma
 - e) Malaria
 - f) Leishmania
2. Helminthology
 - a) Cestodes - Taenia, Echinococcus, D.latum, H.nana
 - b) Trematodes - Schistosoma, Fasciola
 - c) Nematodes – Ascaris, hookworm, Strongyloides, Trichuris, Trichinella, Dracunculus, Filarial worms

Unit II

Virology

General properties of virus, cultivation of viruses, Pox viruses, Herpes viruses, Adenoviruses, Picornaviruses, Orthomyxovirus, Paramyxoviruses, Arboviruses, Rhabdoviruses, Hepatitis viruses, Oncogenic viruses, HIV, Parvovirus, Viral haemorrhagic fevers, SARS, Rotavirus, Norwalk virus, Astrovirus, Corona virus

Reference Books:

1. Anand Narayan and Panikar, *Textbook of Microbiology*
2. Baweja, *Medical Microbiology*
3. Arora, *Medical Lab Technology*
4. Karykatee and Damle, *Textbook of Parasitology*

Year -II
Histopathology

Course Code: BML203/BML-208

L-2, T-0, P-0, C-2

Content

Unit-I: Introduction of histopathology, cytology & histotechniques, laboratory organization, care & maintenance of equipments used in histotechnology lab, Safety measures in histotechnology lab, Reception, Recording, Labelling and transportation of tissue specimens, Basic concepts of fixation and various types of fixative used in histopathology and cytopathology.

Tissue and its types, Location and function, Grossing of tissues, whole mount, sections, smears, tissue processing and its steps, manual and automated method, components & principle of automatic tissue processor

Decalcification, decalcification methods, types of decalcifying fluid, Processing of bones and teeth, Embedding media, its type and properties

Unit-II: Microtome, its type and working, various type of microtome, Microtome knives, its type and knife sharpening, Section cutting, fault and remedies, Section adhesive

Cryostat, frozen sections of fresh, fixed and unfixed tissue, freeze drying, rapid frozen sections and staining for emergency diagnosis

Dye chemistry, Stains and dyes, natural dye, acidic dye, basic dye, neutral dyes, fluorescence dye, mordant, accelerators, accentuators, metachromasia, metachromatic dyes

Unit- III: Types of hematoxylin, Haematoxylin and eosin staining, use of control sections in tissue staining, mounting and mounting media, advantages & disadvantages, refractive index, Museum Techniques

Staining of carbohydrates: preparation of Schiff reagent, PAS staining, Alcian blue, staining of glycogen, Amyloid, other staining method

Connective tissue & its staining: Trichrome staining, verhoeff stain, Weigert resorcin stain, Gordon's and Sweet stain, Gomori's method, von Geison stain, PTAH stain

Unit-IV: Demonstration and identification of lipids, Demonstration of nucleic acids, Processing and staining of bone marrow sample.

Demonstration of enzymes, diagnostic application and the demonstration of phosphatases, dehydrogenases, oxidases and peroxidises, Demonstration of microorganism on tissue specimens, Bacteria, AFB, Actinomyces, spirochetes, fungi

Unit-V

Demonstration of sex chromatin, Museum techniques

Electron microscopy: Principle and working, fixation, processing and staining of tissue

Fluorescence Microscope: Principle and working

Immunohistochemistry: principle, types, applications, antigen retrieval, APAAP, PAP Staining, Quality control in histopathology

Changed w.e.f Session 2017-2018

Course Contents:

Reference Books:

1. Bancroft's Theory and Practice of Histological Techniques, 7th Edition, Elsevier Publications
2. Harshmohan (2017), Textbook of Pathology, 7th edition, Jaypee Publications
3. Godkar.B. Praful,(2016) Textbook of MLT, 3rd edition, Bhalani Publications
4. C F A Culling,(1974),Handbook of Histopathological and Histochemical Techniques: Including Museum Techniques, 3rd edition, Butterworths Publishers

Year -II
Hematology

Course Code: BML-204

L-2, T-0, P-0, C-2

Course Contents:

Unit I

Haematopoiesis, Stem cells, formed elements of blood and their functions Anticoagulants used in various hematological studies, Routine hematological tests and normal values:

- a) Determination of Hemoglobin and Hematocrit
- b) Enumeration of RBC, WBC & Platelets
- c) Absolute Eosinophil count
- d) Reticulocyte count
- e) Calculation of Red cell Indices
- f) Preparation and staining of blood film for morphological examination of red cells and differential count.

Unit II

Special Hematological tests:

- a) Sickling tests
- b) Osmotic fragility test
- c) Determination HbF and HbA2
- d) Hemoglobin Electrophoresis
- e) Investigation of G6PD deficiency
- f) Plasma haptoglobin and demonstration of hemosiderin in urine
- g) Tests for Autoimmune hemolytic anaemia
- h) Measurement of abnormal Hb pigments

Unit III

Hemostasis and Coagulation

- a) Normal hemostasis, mechanism of blood coagulation and normal fibrinolytic system
- b) Collection of blood and anticoagulants used in coagulation studies
- c) Investigation of hemostatic mechanism-BT, CT, whole blood coagulation time test, PT, PTT
- d) Assay of clotting factors.
- e) Tests for fibrinolytic activity- Euglobulin , clot lysis test and FDP
- f) Platelet function tests

Unit IV

Investigation of Megaloblastic anaemia and Iron deficiency anaemia

- a) B12 and Folate assay and Schilling test
- b) Estimation of serum iron and iron binding capacity

Unit V

Bone marrow biopsy study

- a) Needle aspiration and surgical biopsy technique
- b) Preparation of smears and staining
- c) Demonstration of LE cells

d) Quality control

Reference Books:

1. Praful Godkar, *Textbook of Medical Laboratory Technology*
2. Dasie Lewis, *Medical Laboratory Technology*
3. Kanai Mukherjee, *Medical Laboratory Technology*
4. Mehendi, *Laboratory Procedure in Haematology*

Year -II
Clinical Biochemistry –I

Course Code: BML-205

L-2, T-0, P-0, C-2

Course Contents:

1. Colorimetry- Principle & It's working.
2. Carbohydrates (Metabolism & disorder of carbohydrate metabolism) - Blood sugar & its types, DM, complications.
3. Lipids (metabolism & disorder) – digestion & absorption. Metabolism.
4. Proteins – digestion & absorption.
5. Vitamins.
6. Enzymes.
7. Biophysics – surface tension, osmolarity & viscosity.
8. Spectrophotometry.
9. Urine Chemistry.
10. Quality control in clinical biochemistry laboratory.

Reference Books:

1. Raju Bindu, *Review of Medical Biochemistry*
2. Damodaran K, *Practical Biochemistry*
3. DS Sheriff, *Textbook of Medical Biochemistry*
4. U.Satyanarayan, *Textbook of Medical Biochemistry*

Year –II
Clinical Biochemistry –II

Course Code: BML-206

L-2, T-0, P-0, C-2

Course Contents:

1. Liver function test.
2. Renal function test.
3. Gastric function test.
4. Cardiac profile test.
5. Hormones – introduction, classification, chemistry & function.
6. Water & Mineral metabolism.
7. Urolithiasis – formation & types of urinary stones & examination.
8. Serum electrophoresis.
9. Importance of blood urea, uric acid & creatinine.

Reference Books:

1. Raju Bindu, *Review of Medical Biochemistry*
2. Damodaran K, *Practical Biochemistry*
3. DS Sheriff, *Textbook of Medical Biochemistry*
4. Satyanarayan,U., *Textbook of Medical Biochemistry*

Year II
English Communication
Course Code: BML207
(Common with BRT207/BPT207)

L T P C
2 2 0 3

Unit I

Technical Paper writing: Definition and purpose, essentials of a good technical paper/Article, Scientific Article writing, Difference between Technical Paper, Article and Scientific Article, elements, Steps in writing Technical paper & Scientific Article, Methods of writing technical paper & Scientific article.
(12 Hours)

Unit II

Office Management: Types of Correspondence- different types of official correspondence, Demi Official letters, Government letters, Memos and notes. Receipt and Dispatch of mail, Filing System, Classification of Mails, Managing Computer & E-mail.
(12 Hours)

Unit III

Presentation skills: Importance of Presentation Skills, Capturing Data, Voice & Picture Integration, Guidelines to make Presentation Interesting, Body Language, Voice Modulation, Audience Awareness, Presentation Plan, Visual Aids, Forms of Layout, Style of Presentation.
(12 Hours)

Unit IV

Writing skills: Precis writing, Report writing (with special stress on scientific/technical report, preparing field/observation report). Letter writing/application writing (Social, business letter, applying for a job, for higher studies, Preparing curriculum vitae, subscribing to a journal, letters to the Editor), Essay writing.
(12 Hours)

Unit V

Corporate behavior & Oral communication: Corporate behavior, Corporate expectation, Office etiquettes, Telephonic conversation & etiquette. Principles of effective oral communication, features, Vitals of communication, communicating with concern & empathy, interpersonal communication, Persuasive communication.
(12 Hours)

Recommended Books:

1. Newstrom John W., *Organizational Behaviour: Human Behaviour at work* – Tata McGraw Hill.
2. Mishra Sunita & Muraliksishra C., *Communication Skills for Engineers* – Pearson Education, New Delhi.
3. Raman Meenakshi & Sharma Sangeeta, *Technical Communication-Principles & Practice* – O.U.P. New Delhi. 2007.

NOTE:

This syllabus has been designed to improve the oral and written communication skills of students. The faculty members should put emphasis on practical (oral) activities for generating students' interest in language learning.

Year -II
Bacteriology & Mycology (Practical)

Course Code: BML-007P

L-0, T-0, P-2, C-1

Course Contents:

Bacteriology:

1. Compound Microscope.
2. Demonstration and sterilization of equipments – Hot Air Oven, Autoclave, Bacterial filters.
3. Demonstration of commonly used culture media, Broth, and different agars.
4. Antibiotic sensitivity test.
5. Demonstration of common serological tests – Vidal, VRDL, ELISA Techniques.
6. Grams staining.
7. Acid fast staining.

Mycology:

1. Slide culture technique
2. KOH mount
3. Identification of fungal cultures
4. Colony characteristics and Microscopic examination of *Candida*, *Cryptococcus*, *Trichophyton*, *Microsporum*, *Aspergillus niger*, *Aspergillus fumigatus*, *Rhizopus*, *Fusarium*, *Penicillium*.

Reference Books:

1. Anand Narayan and Panikar, *Textbook of Microbiology*
2. Baweja, *Medical Microbiology*
3. Arora, *Medical Lab Technology*

Year -II
Parasitology & Virology (Practical)

Course Code: BML-008P

L-0, T-0, P-2, C-1

Course Contents:

Parasitology:

1. Stool examination
2. Saline mount
3. Iodine mount

Virology

1. Demonstration of embryonated egg inoculation
2. Virology exercise:
 - a) Spots test, ELISA (HBv, HCV, HIV), HI, Paul Bunnell test
 - b) Applied exercise – Rabies, Infantile Diarrhoea, Herpes, HBV, HIV, Influenza.

Reference Books:

1. Nand Narayan and Panikar *Textbook of Microbiology*
2. Baweja, *Medical Microbiology*
3. Arora, *Medical Lab Technology*
4. Karykatee and Damle, *Textbook of Parasitology*

Year -II
Histopathology & Hematology (Practical)

Course Code: BML-009P

L-0, T-0, P-4, C-2

Course Contents:

1. Paraffin section cutting
2. Staining by Hematoxylin & Eosin and other special stains
3. Determination of Hemoglobin and Hematocrit
4. Red blood cell count
5. Total white blood cell count
6. Platelet count
7. Differential count of white blood cells
8. Absolute Eosinophil count
9. Reticulocyte count
10. Calculation of red cell indices
11. Determination of ESR
12. Determination of BT, CT, Whole blood clotting time
13. Determination of PT and PTT
14. Blood smear preparation and staining
15. Osmotic fragility test
16. Sickling test
17. LE cell preparation

Reference Books:

1. Praful Godkar, Textbook of Medical Laboratory Technology
2. Dasie Lewis
3. Kanai Mukherjee, Medical Laboratory Technology, 3rd vol.
4. Bancroft, Textbook of Medical Laboratory Techniques
5. Mehdi, Laboratory Procedure in Haematology.

Year –II
Clinical Biochemistry–I Practical

Course Code: BML-010P

L-0, T-0, P-2, C-1

Course Contents:

1. Estimation of glucose, urea, creatinine. & uric acid.
2. Estimation of bilirubin, amylase, SGOT, SGPT.
3. Estimation of cholesterol, triglyceride & serum HDL.
4. Estimation of total protein, A:G ratio & globulin fraction.

Reference Books:

1. Chawla, *Practical Clinical Biochemistry Methods and Interpretation.*

Year –II
Clinical Biochemistry –II Practical

Course Code: BML-011P

L-0, T-0, P-2, C-1

Course Contents:

1. Estimation of acid & alkaline phosphates, & inorganic phosphorus.
2. Estimation of sodium, potassium, calcium.
3. Estimation of urinary proteins, & urea calcium.
4. Electrophoresis of serum, CSF proteins.

Reference Books:

1. Chawla, Practical Clinical Biochemistry Methods and Interpretation.



Year -II
Hospital Postings

Course Code: BML-012P
Course Contents:

L-0, T-0, P-6, C-3

Students shall be deputed to various labs of Pathology department wherein they shall undergo practical training of handling patients, collection and processing of blood, urine, sputum stool and body fluids samples.

Identification of patient's particulars based on CR number, Lab Number and transfer of samples from collection to different labs.

Process of performing various tests in different labs.

Each student is required to maintain a logbook of the various posting. Student's performance shall be evaluated on continuous basis by the faculty posted in various sections. The faculty shall submit the assessment records of each student posted in his/her section on monthly basis to the HOD. Marks will be awarded out of 50.

Year –III
Immunology

Course Code: BML-301

L-3, T-0, P-0, C-3

Course Contents:

1. Infection 2hrs

2. Immunity 4 Hrs.

- a) Innate immunity
- b) Acquired immunity (adaptive immunity)
- c) Active and passive immunity
 - i) Natural acquired active immunity
 - ii) Artificial acquired active immunity
 - iii) Natural acquired passive immunity - Breast feeding
 - iv) Artificial acquired passive immunity

3. Immune System Brief Introduction

- a) Cell development
- b) Lymphocytes
 - i) Bursa of Fabricus
 - ii) Stem cell differentiation
 - iii) Gut-associated lymphoid tissue (GALT)
 - iv) T- lymphocytes
 - Stem cell differentiation (general knowledge of their role)
 - Cytotoxic T (TC) cells
 - Delayed-type hypersensitivity T (TD) cells
 - Helper T (TH) cells
 - Suppressor T (TS) cells
 - v) Natural killer cells
- c) Dual nature of the immune system
 - i) Humeral immunity
 - ii) Cell-mediated immunity
- d) General properties of immune responses
 - i) Recognition of self versus non self
 - Clonal selection theory B-cells Tolerance
 - Clonal deletion
 - ii) Specificity
 - Definition
 - Cross-reactions
 - iii) Heterogeneity
 - iv) Memory
 - Memory cells
 - Anamnestic response

4. Humoral Immunity

- i) General characteristics Antigen types

Antigen sensitization Plasma cells

5. Antigen & Antibody

- i) Antigens
- ii) Epitopes (antigenic determinants)
- iii) Happen
- iv) Antibodies consequences of antibody binding
- v) Titer

6. Immune Response

- a) Properties of Antibodies (immunoglobulin's)
 - i) Light chains
 - ii) Heavy chains
 - iii) Constant and variable regions
 - iv) Antigen binding sites

7. Fab and Fc regions

B. Classes of immunoglobulin's

1. IgG
2. IgM
3. IgA
 - a. J chain
 - b. Secretory piece
4. IgE
5. IgD
6. Antibody titre

C. Primary and secondary responses

1. Primary response
2. Secondary response

D. Kinds of antigen-antibody responses

E. How humeral responses eliminate foreign antigens 1. Basic mechanisms

- a. Agglutination
- b. Opsonization
- c. Activation of complement

2. Summary of humoral immunity

8. Monoclonal Antibodies

A. Production

1. Hybridoma formation
2. Cloning of cells

B. Uses

1. Research tools
2. Diagnostic uses
3. Therapy

9. Cell-Mediated Immunity

- A. General characteristics
- B. The cell-mediated immune reactions
 - 1. Antigen processing
 - 2. Helper T (TH) cells
 - a. TH1 (inflammatory T) cells
 - b. TH2 cells
 - 3. Suppressor T (TS) cells
 - 4. Cytotoxic (killer) T (TC) cells
 - 5. Natural killer (NK) cells
 - 6. Memory T cells
 - 7. Lymphokine release
 - 8. Superantigens

10. Factors That Modify Immune Responses

- A. Compromised host
- B. Modifying factors
 - 1. Age
 - 2. Stress
 - 3. Diet
 - 4. Exercise
 - 5. Injuries
 - 6. Environmental factors
 - 7. Hypersensitivity reactions
 - 8. Autoimmune disorders
 - 9. Transplantation immunology

Reference Books:

- 1. Anand Narayan and Panikar Textbook of Microbiology
- 2. Baweja, Medical Microbiology
- 3. Arora, Medical Lab Technology

Year –III
Bacteriology & Applied Bacteriology

Course Code: BML-302

L-3, T-0, P-0, C-3

Course Contents:

1. Antimicrobial Sensitivity.
2. Bacteriology of Water, Milk and Air
3. Systematic Bacteriology
Classification, Morphology, Genotypic & Phenotypic characteristics, Pathogenesis, Disease caused,

Lab Diagnosis & Prophylaxis

A. Gram Positive Bacteria

- i. Staphylococcus
- ii. Streptococcus
- iii. Pneumococcus
- iv. Corynebacteria
- v. Clostridia
- vi. Bacillus
- vii. Listeria
- viii. Actinomyces
- ix. Nocardia

B. Gram Negative Bacteria

- i. Neisseria
- ii. Enterobacteriaceae
- iii. Escherichia
- iv. Klebsiella
- v. Enterobacter
- vi. Proteus
- vii. Salmonella
- viii. Shigella
- ix. Yersinia
- x. Pseudomonas
- xi. Haemophilus
- xii. Brucella
- xiii. Pasturella
- xiv. Legionella
- xv. Bordetella
- xvi. Burkholderia
- xvii. Gardnerella
- xviii. Vibrio
- xix. Campylobacter
- xx. Helicobacter
- xxi. Bacteroides
- xxii. Fusobacterium

- C. **Spirocheates**
 - i. Treponema
 - ii. Borrelia
 - iii. Leptospira

- D. **Mycobacteria**
 - i. M.tuberculosis
 - ii. M.leprae
 - iii. Atypical Mycobacteria

- E. **Mycoplasma**
- F. **Chalmydiae**
Rickettsiaceae
- G. **APPLIED MICROBIOLOGY RELATED TO DISEASES.** Molecular techniques in diagnostic microbiology- PCR, DNA hybridisation

Reference Books:

1. Anand Narayan and Panikar Textbook of Microbiology
2. Baweja, Medical Microbiology
3. Arora, Medical Lab Technology

Year –III
Cytology

Course Code: BML-303
Course Contents:

L-3, T-0, P-0, C-3

Unit-I

Cell: basic structure and function, cell organelles, cell cycle, Benign and Malignant tumors, Instruments used in cytology, preparation of buffers, stains
Microscopy: Light, compound, phase contrast, fluorescence

Unit- II

Instruments and equipments used in cytology
Fixation and Fixatives used in cytology, Adhesive and mounting media, Cell block and cytopspin technique,
Staining such as PAP, Diff-quick, MGG, H&E, Shorr staining, significance of PAP-HPV, Destaining and restaining of slides, Cover slipping

Unit-III

Aspiration and exfoliative cytology, Patient preparation, Sample collection, Fixation, Processing and Staining FNAC, collection, processing of sample and staining, on site quick staining procedure

Unit-IV

Pap staining, Progressive & Regressive, Hormonal cytology in different age groups, Collection and processing of sputum, BAL, CSF, Pleural, peritoneal and pericardial fluid, Gynaecologic sample

Unit-V

Sex chromatin demonstration, Introduction of Immunocytochemistry, different markers and its applications, Automation in cytology, Liquid based preparation & automated screening device

Reference Books:

1. Bancroft's Theory and Practice of Histological Techniques, 7th Edition, Elsevier Publications
2. Harshmohan (2017), Textbook of Pathology, 7th edition, Jaypee Publications
3. Godkar.B. Praful,(2016) Textbook of MLT, 3rd edition, Bhalani Publications
4. C F A Culling,(1974), Handbook of Histopathological and Histochemical Techniques: Including Museum Techniques, 3rd edition, Butterworths Publishers

Year –III

Immunohematology and Blood transfusion

Course Code: BML-304

L-3, T-0, P-0, C-3

Course Contents:

1. ABO Blood group and Rh system
2. Subgroups of A and B , Other blood groups and Bombay group
3. HLA antigens and their significance
4. Principles of Blood transfusion:
 - (a) Blood donor selection
 - (b) Methods of bleeding donors
 - (c) Blood containers, anticoagulants and storage of blood
 - (d) Coomb's test and its significance
 - (e) Screening of blood for infective material
 - (f) Blood components, preparation & component therapy
 - (g) Autologous transfusion
 - (h) Transfusion reactions and work up
 - (i) Blood bank organization, standards, procedures, techniques and quality control

Reference Books:

1. Rudman, Blood Banking
2. Ramnik Sood , Textbook of Medical Laboratory Technology
3. Mehdi, Essential of Blood Banking: A Handbook of Students of Blood Banking and Clinical Residence

Year –III
Clinical Biochemistry- III

Course Code: BML-305

L-3, T-0, P-0, C-3

Course Contents:

Liver Function tests. Role of the Liver in metabolism, formation of bilirubin and mode of excretion.
Gastric Analysis: Composition of gastric juice, concepts of free and bound acids, gastric acid secretions stimulations.

Renal function, renal function test and renal clearance test.

Calculi: Theory of formation and analysis, Renal clearance concentration and application of Phenolsulfonaphthalein.

Acid – Base balance and its disturbances.

Inorganic ions: Calcium metabolism, phosphate metabolism, sodium-potassium balance and trace element (Fe, CU).

Metabolism of proteins and amino acids.

Over view & replication, translation, transcription and genetic engineering. Metabolic disorders:

- a. Amino acids
 - b. Proteins
 - c. Inborn errors of metabolic disorders.
- Clinical enzymologist.

Reference Books:

1. Varley, Clinical Chemistry
2. Teitz, Clinical Chemistry
3. Kaplan, Clinical Chemistry
4. Ramakrishna S, Prasanna KG, Rajna, Text Book of Medical Biochemistry, Orient Longman
5. Vasudevan DM & Sreekumari S, Text Book of Biochemistry for Medical Students.
6. Das, Debajyothi, Biochemistry, Academic, Publishers, Calcutta.
7. Chatterjee, A Text book of Medical Biochemistry
8. Satyanarayan, U., Medical Biochemistry

Year –III
Advanced Medical Biochemistry

Course Code: BML-306

L-3, T-0, P-0, C-3

Course Contents:

Unit-I

Thyroid function test: Thyroid hormones, biological function, hypothyroidism, hyperthyroidism, Determination of T3, T4, TSH, FT3, FT4, TBG, Disorder associated with thyroid dysfunction.

Unit-II

Infertility profile: LH, FSH, TSH, Estrogen, Progesterone, Total Testosterone, Free testosterone, DHEA-S, 17- Ketosteroids, Prolactin, their estimation and clinical significance, reference range, hypo and hyper secretion, Triple Test and quadruple test

Unit-III

Growth hormone, ACTH, Aldosterone, Cortisol their estimation and clinical significance, reference range, hypo and hyper secretion

Unit-IV

Introduction of Toxicology, Alcohol poisoning, Lead poisoning, Zinc poisoning, Mercury poisoning drugs abuse, screening procedure for drug screening, Spot tests, hair and urine test, Immunoassay for drugs.

Unit-V: Radioisotopes, Radioactivity, instruments for radioactivity measurement, applications of radioisotopes in clinical biochemistry

Immunoassay: ELISA, RIA, FIA, FACS and their applications in clinical diagnosis.

Statistics, data, population, samples, parameters; Representation of Data: Tabular, Graphical, Measures of central tendency, Arithmetic mean, mode, median; Measures of dispersion, Range, mean deviation, variation, standard deviation, Standard error, Chi-square test

Population mean, correlation coefficient, standard deviation, standard error

Reference Books:

1. D M Vasudevan, (2011), Text book of Medical Biochemistry, 6th edition Jaypee Publishers
2. M N Chatterjea & Rana Shinde, (2012), Text book of Medical Biochemistry, 8th edition, Jaypee Publications
3. Singh & Sahni, (2008), Introductory Practical Biochemistry, 2nd edition, Alpha science
4. Lehninger, (2013), Principles of Biochemistry, 6th edition, W H Freeman
5. U Satyanarayan, (2008), Essentials of Biochemistry, 2nd edition, Standard Publishers



Year –III
Immunology (Practical)

Course Code: BML-013P

L-0, T-0, P-2, C-1

Course Contents:

Estimation of different immunoglobulisation.
Study of antigen and antibody reaction.
Electrophoresis

Reference Books:

1. Anand Narayan and Panikar Textbook of Microbiology
2. Baweja, Medical Microbiology
3. Arora, Medical Lab Technology

Year –III

Bacteriology & Applied Bacteriology (Practical)

Course Code: BML-014P

L-0, T-0, P-2, C-1

Course Contents:

BACTERIOLOGY

1. Staining
 - a. Grams staining ZN staining Alberts staining
2. Hanging drop preparation
3. Culture methods
4. Introduction to biochemical reactions Identification of bacterial culture Colony characteristics, Morphological characteristics, Motility study
5. Interpretation of biochemical reactions
6. Antibiotic sensitivity testing- Kirby Bauer method
1. Applied bacteriology- exercise
2. Immunology: Serological tests: Specimen collection, Principle, Methods.
Procedure
Normal values/ significant titer
Interpretations
Limitations: of all the following tests
Widal, ASO, CRP, RPR/VDRL/TRUST, RA, HBsAg /anti HIV detection, ELISA

Reference Books:

1. Anand Narayan and Panikar, Textbook of Microbiology
2. Baweja, Medical Microbiology
3. Arora, Medical Lab Technology

Year –III
Cytology (Practical)

Course Code: BML-015P

L-0, T-0, P-2, C-1

1. Preparation of various cytology smears and fixation
2. Papanicolaou's and May Grunwald Geimsa staining
3. Hormonal cytology study

Reference Books:

1. Orell, Fine Needle Cytology, 4th ed

Year –III

Immunohematology and Blood Transfusion (Practical)

Course Code: BML-016P

L-0, T-0, P-2, C-1

Blood grouping and Rh typing
Cross matching techniques
Screening of Donor's blood for infective agents
Transfusion reaction work up
Preparation of blood components

Reference Books:

1. Rudman, Blood Banking
2. Ramnik Sood, Textbook of Medical Laboratory Technology
3. Mehdi, Essential Of Blood Banking: A Handbook of Students of Blood Banking and Clinical Residence

Year –III
Clinical Biochemistry-III (Practical)

Course Code: BML-017P

L-0, T-0, P-2, C-1

List of Practicals:

1. Specimen Collections: Urine, Blood, Gastric juice,
2. Accuracy, precision and quality control –Methods used to check the accuracy of a result by histogram, F-test and Barr test.
3. Enzymes: amylase (salivary and Pancreatic), Alkaline Phosphates, Acid Phosphates, SGOT, SGPT, LDH and CPK- demonstration on auto analyzer.
4. Liver function tests: estimation of Bilirubin – total and conjugates, Urobilinogen,
5. Gastric analysis: Determination of free and total acid, gastric stimulation.
6. Lipid determination of serum lipids – cholesterol, triglycerides and lipoprotein Fractionation.
7. Inorganic ions – Determination of calcium in serum and urine, serum phosphates, chloride sodium and potassium.
8. Analysis of calculi
9. Urine – screening for inborn errors of metabolism
10. RFT
11. Cardiac markers.
12. (Relevant charts on the above topics for interpretation and diagnosis).

Reference Books:

1. Vasudevan DM & Sreekumari S, Text Book of Biochemistry for Medical Students.
2. Das, Debajyothi, Biochemistry, Academic, Publishers, Calcutta.
3. Chatterjee, A Text book of Medical Biochemistry
4. Satyanarayan, U., Medical Biochemistry



**Year -III
Hospital Postings**

**Course Code: BML-018P
Course Contents:**

L-0, T-0, P-6, C-3

Students shall be deputed to various labs of Pathology department wherein they shall undergo practical training of handling patients, collection and processing of blood, urine, sputum stool and body fluids samples.

Identification of patient's particulars based on CR number, Lab Number and transfer of samples from collection centres to different labs.

Process of performing various tests in different labs

Each student is required to maintain a logbook of the various posting. Student's performance shall be evaluated on continuous basis by the faculty posted in various sections. The faculty shall submit the assessment records of each student posted in his/her section on monthly basis to the HOD. Marks will be awarded out of 50.

IIMT College of Medical Sciences (Allied Health Sciences)

ACADEMIC HANDBOOK



**Master of Physiotherapy
(Orthopaedics)
(Ordinance, Evaluation Scheme & Syllabus)**

Chapter-1

General

- 1- This ordinance may be called the “Ordinance Relating to Master of Physiotherapy Course”.
- 2- The ordinance shall come in to force from session 2018-19.

Chapter-2

TITLE, & ELIGIBILITY OF ADMISSION

- 1- **OBJECTIVE:** To Train Physiotherapists who will be able to:
 - Assume leadership roles in departments.
 - Assume enhanced patient care responsibilities.
 - Formulate and implement educational Programs.
 - Analyze and undertake research.
- 2- The name of Degree to be awarded shall be Master of Physiotherapy (MPT) .
- 3- Course Program & duration –
 - a. **Name:** Master’s of Physiotherapy
(Orthopaedics).
 Master’s of Physiotherapy
(Neurology).
 Master’s of Physiotherapy
(Cardiopulmonary).
 Master’s of Physiotherapy
(Sports Medicine).
 - b. **Nature:** Regular and full time.
 - c. **Duration:** Two Years course, designated as;
First year MPT
Second Year MPT
 - d. **Pattern:** Annual System
- 4- The medium of Teaching/Instruction and examination will be in English.
- 5- (a) A student seeking admission to the Master of Physiotherapy must have passed regular full time Bachelor of Physiotherapy (B.P.T.) course from any recognized institute/ University by U.G.C. .
 (b) The eligible students may be called for an Entrance test prescribed by the University.

Chapter-3

THE CURRICULUM

- 6- **Academic Calendar -**
 I & II year = Session = August of every year
 Annual examination = every year in July .

7- **Teaching Hours –**

The following shall be the distribution of teaching hours for the course of study.

MPT (ORTHOPEDICS) – FIRST YEAR

Subject	Hours
Medical and Surgical Management of Disorders of the Musculoskeletal System	100
Physiotherapy Management in Disorders of the Musculoskeletal System-I	125
Physiotherapy Management in Disorders of the Musculoskeletal System-II	125
Research Methodology and Biostatistics	100
Physiotherapy Management in Disorders of the Musculoskeletal System (Lab. Hours)	50
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1700 Hrs.

SECOND YEAR

Subject	Hours
Pedagogy in Physiotherapy Education	100
Management, Administration and Ethical Issues	75
Biomechanics	150
Biomechanics (Lab. Hours)	25
Dissertation	200
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1750 Hrs.

MPT (NEUROLOGY) – FIRST YEAR

Subject	Hours
Medical and Surgical Management of Disorders of the Nervous System	100
Physiotherapy Management in Disorders of the Nervous System-I	125
Physiotherapy Management in Disorders of the Nervous System-II	125
Research Methodology and Biostatistics	100
Physiotherapy Management in Disorders of the Nervous System (Lab. Hours)	50

Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1700 Hrs.

SECOND YEAR

Subject	Hours
Pedagogy in Physiotherapy Education	100
Management, Administration and Ethical Issues	75
Biomechanics	150
Biomechanics (Lab. Hours)	25
Dissertation	200
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1750 Hrs.

MPT (CARDIOPULMONARY) – FIRST YEAR

Subject	Hours
Medical and Surgical Management of Disorders of the Cardiopulmonary System	100
Physiotherapy Management in Disorders of the Cardiopulmonary System-I	125
Physiotherapy Management in Disorders of the Cardiopulmonary System-II	125
Research Methodology and Biostatistics	100
Physiotherapy Management in Disorders of the Cardiopulmonary System (Lab. Hours)	50
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1700 Hrs.

SECOND YEAR

Subject	Hours
Pedagogy in Physiotherapy Education	100
Management, Administration and Ethical Issues	75
Biomechanics	150
Biomechanics (Lab. Hours)	25
Dissertation	200
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1750 Hrs.

MPT (SPORTS MEDICINE) – FIRST YEAR

Subject	Hours
Medical and Surgical Management of Sports Injuries	100
Physiotherapy Management in Disorders of the Sports Injuries- I	125
Physiotherapy Management in Disorders of the Sports Injuries-II	125
Methodology and Biostatistics	100
Physiotherapy Management in Disorders of the sports Injuries (Lab. Hours)	50
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1700 Hrs.

SECOND YEAR

Subject	Hours
Pedagogy in Physiotherapy Education	100
Management, Administration and Ethical Issues	75
Biomechanics	150
Biomechanics in Sports (Lab. Hours)	25
Dissertation	200
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1750 Hrs.

Chapter – 4

EXAMINATIONS

8- Examination

(A) Total papers:

Total theory papers	:	7
Total Practical	:	2
Total Viva Voce	:	2
Dissertation	:	1

Mode of Curriculum delivery and execution includes classroom teaching, assignment, tests, lab, work, project, case studies, participation in relevant events, Group Discussion, etc.

- (i) The students admitted to the course shall attend lectures, practical classes, clinical training/ attachments and seminars as prescribed by the College/University.
- (ii) Every student shall be required to appear in the written house test in various subjects and/or practicals as may be prescribed by the College/University.
- (vi) The last date of receipt of admission forms and fees in the college office for the University Examination shall be fixed by the University from time to time.
- (v) The student shall be examined in such theory papers and practical examinations as may be prescribed in the syllabus.

(B) INTERNAL ASSESSMENT:

- (a) There shall be tests in each subject in each academic year. These will carry weightage in the total marks. Marks shall be notified within one week of the test.
- (b) These tests could be in the form of written tests, quizzes, symposia assignment, group discussion, etc.
- (c) A promoted student who has to reappear in the annual examination of the paper will retain internal assessment marks of the previous year.
- (e) In Internal Assessment a maximum of **10 marks** in each subject shall be awarded for attending classes (theory / practical) as per the following norms:

85% or more attendance	-	10 Marks
80% or more but less than 85% attendance	-	9 Marks
75% or more but less than 80% attendance	-	8 Marks
70% or more but less than 75% attendance	-	7 Marks
65% or more but less than 70% attendance	-	5 Marks
60% or more but less than 65% attendance	-	3 Marks
51% or more but less than 60% attendance	-	2 Marks
50% attendance	-	1 Mark
Less than 50% attendance	-	0 Mark

(C) ANNUAL EXAMINATIONS :

Annual examination of theory and practical shall be conducted at the end of each session as outlined below:

- a. Mode: Theory Papers Written Only

- | | | |
|----|---|--|
| | Lab Hours | Written, Demonstration and Viva Voce |
| | Viva Voce | Viva Voce |
| b- | Duration: | 3 hours |
| | Theory | Upto three hours per student |
| | Practical | |
| c- | Examiner | 01 (either internal or external) from the panel |
| | Theory | 02 (1 internal and 1 external) from the panel |
| | Practical | * Panel to be prepared by the Board of Studies and approved by the Vice Chancellor |
| | Viva Voce | 02 (1 internal and 1 external from the panel) |
| d- | Moderation of Theory Papers: | For papers set by external examiners only.
Change cannot be more than 30% after consultation with the teacher who has taught the paper. |
| e- | Dissertation evaluation | There will be an internal & an external evaluator for each Dissertation and a viva voce will be conducted after Dissertation approval by both. |
| f- | A special examination may be held in the month of December for the students of the first year of the course to enable them to reappear in those papers in which they had failed or could not appear due to any reason other than shortage of attendance . | |

(D) PROMOTION:

- (i) A candidate is declared passed in an examination in subject, if he/she secures 50% of marks in theory and 50% in practical separately.
- (a) If a candidate fails in only one head/subject and having passed in all other head/subject of the given examination of the year than his/her deficiency of maximum five (05) marks may be fulfilled by grace marks after fulfilling the conditions given below:
- (A) If a candidate fails in only one head/subject and having passed in all other heads/subjects of the given examination of a **semester*/year**, then his/her deficiency of marks may be fulfilled by grace marks under the following conditions:-
- (i) Grace mark is not a matter of right of the student but is the discretion of the University.
 - (ii) Provided that the candidate has appeared in the main examination of the concerned course and falls short of pass marks by not more than five (05) marks in theory paper only. Benefit of above mentioned shall not be given to the candidate who had appeared in supplementary/special examination/carry over examination.
 - (iii) Further, benefit of grace marks may be given only to the candidate who will pass the entire concerned examination of the **semester*/year** after awarding the grace marks and not for the purpose of promoting the student to next year with back papers or for improvement of division or percentage.
 - (iv) If in a head/subject of an examination passing in Theory, Practical or sessional exams separately is mandatory, then the benefit of grace marks shall be given only in Theory examination of the University examination.

(v) The award of grace marks permissible shall be on the basis of 1 grace mark for every 05 marks secured by an examinee over and above the minimum passing aggregate marks of all subjects of the year.

(ii) **I Year: (iii)** A student will not be promoted from I year to II year if he / she fails in more than 2 theory papers and any practical exam failing which this student shall reappear for the failed examinations.

II year: (iv) A student will be declared Pass in the II year if he / she cleared all the papers of the II year and whose thesis has been approved and has passed in the viva voce of the thesis failing which this student shall reappear for the failed examination.

(v) A student will appear in supplementary examination for all failed subjects and who has failed only in theory or practical/viva of Biomechanics shall have to appear in both theory & practical/viva of the concern subject in the supplementary examination.

(E) CLINICAL PRACTICE:

Students engage in clinical practice in Physiotherapy Departments in the Orthopedics/ Neurology/Cardiopulmonary/Sports Physiotherapy setting to enhance their clinical skills and apply theoretical knowledge gained during teaching sessions.

(F) THESIS / DISSERTATION:

A Research Dissertation should be compulsory and should embody the student's own work carried in the elective area under the supervision of a recognised guide qualified for the purpose and as recommended by the Indian Association of Physiotherapists (IAP).

A Research proposal should be submitted to the University for Approval within six (6) months of admission to the course.

The completed Research Dissertation should be submitted three (3) months in advance of the written, oral, clinic and practical examination.

(G) PG TEACHERS:

A PG Teacher/Guide must have at- least 5 years of full time teaching and clinical experience in Physiotherapy subjects.

For other specific qualification of teachers please refer to the recommendations on the qualifications of Teachers prescribed by the Indian Association of Physiotherapists (IAP).

(H) EXAMINERS:

A PG teacher as defined above is eligible to be appointed as an examiner.

There shall be at least two examiners in each thesis and clinical examinations out of which, at-least one shall be an external examiner. The external examiners who fulfill the conditions should ordinarily be invited from another recognised Institution / University, preferably from outside the state.

Chapter – 5 **AWARD OF DEGREE**

9- Award of Degree

- i) A student will be awarded a MPT Degree only on successful completion of the course including clinical practice for both the years.
- ii) The entire course of study in MPT for first and second year must be completed within 4 years of the date of admission.

Chapter – 6 **ATTENDANCE**

10- Attendance –

The students are expected to attend all the classes and should not have less than 75 % attendance in theory as well as in practical classes, wherever held, to become eligible to appear for the university examination. Short fall in attendance can, however be condoned in deserving cases to the extent of 10% by the Principal. If the short fall is more than 10% but not more than 15%, the Principal may recommend deserving cases to the Vice Chancellor for condonation. The order of the Vice Chancellor in this regard shall be final.

Chapter – 7
Power to Modify

- 11.** In the event of any emergent situation, if any deviation is considered necessary, the Vice Chancellor is authorised to modify the Ordinance. Subject to subsequent ratification by the Executive Council.

Chapter-8
SCHEME OF EXAMINATIONS

13- Marks Distribution

Note: **IA** : Internal Assessment, **AE** : Annual Exam

MPT (ORTHOPEDECS)

First Year

Subject	IA	AE	Total
Basic of Computer Application	-	-	P / F
Medical & Surgical Management in Disorder of the Musculoskeletal System	50	100	150
P.T. Management in Disorder of the Musculoskeletal System-I	50	100	150
P.T. Management in Disorder of the Musculoskeletal System-II	50	100	150
P.T. Management in Disorder of the Musculoskeletal System-Practical	100	400	500
Research Methodology & Biostatistics	50	100	150
Seminars on Clinical Issues	100	-	100
		Total	1200

Second Year

Subject	IA	AE	Total
Pedagogy in Physiotherapy Education	50	100	150
Management, Administration & Ethical Issues	50	100	150
Biomechanics	50	100	150
Biomechanics-Viva	50	100	150
Dissertation	-	-	P / F
Seminars on Clinical Issues	100	-	100
	Total		700
GRAND TOTAL I and II	:		1900

MPT

Note: **IA** : Internal Assessment, **AE** : Annual Exam

MPT (NEUROLOGY)

First Year

Subject	IA	AE	Total
Basic of Computer Application	-	-	P / F
Medical & Surgical Management in Disorder of the Nervous System	50	100	150
P.T. Management in Disorder of the Nervous System-I	50	100	150
P.T. Management in Disorder of the Nervous System-II	50	100	150
P.T. Management in Disorder of the Nervous System-Practical	100	400	500
Research Methodology & Biostatistics	50	100	150
Seminars on Clinical Issues	100	-	100
		Total	1200

Second Year

Subject	IA	AE	Total
Pedagogy in Physiotherapy Education	50	100	150
Management, Administration & Ethical Issues	50	100	150
Biomechanics	50	100	150
Biomechanics-Viva	50	100	150
Dissertation	-	-	P / F
Seminars on Clinical Issues	100	-	100
		Total	700

GRAND TOTAL I and II : 1900

MPT

Assessment, Note: IA : Internal
AE : Annual Exam

MPT

(CARDIOPULMONARY CONDITION)

First Year

Subject	IA	AE	Total
Basic of Computer Application	-	-	P / F
Medical & Surgical Management in Disorder of the Cardiopulmonary System	50	100	150
P.T. Management in Disorder of the Cardiopulmonary System-I	50	100	150
P.T. Management in Disorder of the Cardiopulmonary System-II	50	100	150

P.T. Management in Disorder of the Cardiopulmonary System-Practical	100	400	500
Research Methodology & Biostatistics	50	100	150
Seminars on Clinical Issues	100	-	100
		Total	1200

Second Year

Subject	IA	AE	Total
Pedagogy in Physiotherapy Education	50	100	150
Management, Administration & Ethical Issues	50	100	150
Biomechanics	50	100	150
Biomechanics-Viva	50	100	150
Dissertation	-	-	P / F
Seminars on Clinical Issues	100	-	100
		Total	700

GRAND TOTAL I and II : **1900**

MPT

Assessment, Exam

Note: IA : Internal
AE : Annual

MPT

(SPORTS PHYSIOTHERAPY)

First Year

Subject	IA	AE	Total
Basic of Computer Application	-	-	P / F
Medical & Surgical Management in Disorder of the Sports Injuries	50	100	150
P.T. Management in Disorder of the Sports Injuries -I	50	100	150
P.T. Management in Disorder of the Sports Injuries -II	50	100	150
P.T. Management in Disorder of the Sports Injuries -Practical	100	400	500
Research Methodology & Biostatistics	50	100	150
Seminars on Clinical Issues	100	-	100
		Total	1200

Second Year

Subject	IA	AE	Total
Pedagogy in Physiotherapy Education	50	100	150
Management, Administration & Ethical Issues	50	100	150
Biomechanics	50	100	150

Biomechanics-Viva	50	100	150
Dissertation	-	-	P / F
Seminars on Clinical Issues	100	-	100
		Total	700
GRAND TOTAL I and II		:	1900

**First Year & Second Year
MPT 1st year (ORTHOPAEDICS)
Evaluation Scheme**

S. NO.	SUBJECT CODE	SUBJECT	PERIODS			INTERNAL				EXTERNAL		TOTAL	CREDIT
			L	T	P	CA	TA	Total	IP	ET	EP		
1.	MPT(O)-101	Medical And Surgical Management Of Disorders Of The Musculoskeletal System	2	1	0	10	10	20	-	80	-	100	4
2.	MPT(O)-102	Physiotherapy Management in disorders of the Musculoskeletal system – I	3	1	0	10	10	20	-	80	-	100	4
3.	MPT(O)-103	Physiotherapy Management in disorders of the Musculoskeletal system – II	3	1	0	10	10	20	-	80	-	100	4
4.	MPT-104	Research Methodology and Biostatistics	2	1	0	10	10	20	-	80	-	100	4
5.	MPT(O)-105P	Physiotherapy Management in disorders of the Musculoskeletal system	0	0	2	0	0	0	20	0	80	100	4
6.	MPT-106	Seminars on Clinical Issues	0	3	0	0	0	200	0	0	0	200	8
Grand Total												700	28

L- Lecture, T- tutorials, P- Practical (Labs), CT- Class Test (Sessionals), TA- Teacher's Assessment (Assignments, Tutorials), IP- Internal Practical, ET- External Theory, EP- external Practical.

**MPT 2nd year (ORTHOPAEDICS)
Evaluation Scheme**

S.NO.	SUBJECT CODE	SUBJECT	PERIODS			INTERNAL				EXTERNAL		TOTAL	CREDIT
			L	T	P	CA	TA	Total	IP	ET	EP		
1.	MPT-201	Pedagogy in Physiotherapy Education	2	1	0	10	10	20	-	80	-	100	4
2.	MPT-202	Management, Administration and Ethical Issues	2	1	0	10	10	20	-	80	-	100	4
3.	MPT-203	Biomechanics	4	1	0	10	10	20	-	80	-	100	4
4.	MPT-204P	Biomechanics (Lab Hours)	0	0	2	-	-	-	20	-	80	100	4
5.	MPT-205	Dissertation	PASS/ FAIL										-
6.	MPT-206	Seminars on Clinical Issues	0	3	0	0	0	200	0	0	0	200	8
Grand Total											600	24	
<i>L- Lecture, T- tutorials, P- Practical (Labs), CT- Class Test (Sessionals), TA- Teacher's Assessment (Assignments, Tutorials), IP- Internal Practical, ET- External Theory, EP- external Practical.</i>													

1ST YEAR

MEDICAL AND SURGICAL MANAGEMENT OF DISORDERS OF THE MUSCULOSKELETAL SYSTEM			
Course Code MPT(O)-101	THEORY COURSE(100 Hours)	L-T-P-C	2-1-0-4
	Topic	Hours	
Unit 1	GENERAL (ORTHOPAEDICS) Metabolic disorders of the bone and joints	5	
Unit 2	Infectious disorders of the bone and joints.	5	
Unit 3	Congenital disorders of the bone and joints.	5	
Unit 4	Inflammatory disorders of the bones and joints.	5	
Unit 5	Myopathies	5	
Unit 6	Neurological disorders.	5	
Unit 7	Bone and joint tumors.	5	
Unit 8	Complex regional pain syndromes.	5	
Unit 9	REGIONAL (ORTHOPAEDICS) Disorders of upper limb	8	
Unit 10	Disorders of lower limb	8	
Unit 11	Disorders of the spine	8	
Unit 12	Traumatology	8	
Unit 13	Trauma of the upper limb	8	
Unit 14	Trauma of the lower limb	8	
Unit 15	Trauma of the spine	7	
Unit 16	Trauma of the peripheral nerves	5	

PHYSIOTHERAPY MANAGEMENT IN DISORDERS OF THE MUSCULOSKELETAL SYSTEM-I			
Course Code MPT(O)-102	THEORY COURSE(125 Hours)	L-T-P-C	3-1-0-4
	Topic	Hours	
Unit 1	GENERAL PRINCIPLES P.T. Assessment	5	
Unit 2	Manipulation and Mobilisation Techniques.	5	
Unit 3	Critical Analysis of Electrotherapeutic Modalities	5	
Unit 4	Exercise Training Programmes	5	
Unit 5	Various stretching Techniques	5	
Unit 6	Disability Evaluation	5	
Unit 7	Assessment and Management of Pain	5	
Unit 8	Soft Tissue Mobilisations	5	
Unit 9	Muscle Energy Techniques	2	
Unit 10	PT in home setting	3	
Unit 11	GENERAL (ORTHOPAEDICS) Metabolic disorders of the bone and joints	10	
Unit 12	Infectious disorders of the bone and joints.	10	
Unit 13	Congenital disorders of the bone and joints.	10	
Unit 14	Inflammatory disorders of the bones and joints.	10	
Unit 15	Myopathies	10	
Unit 16	Neurological disorders.	10	
Unit 17	Bone and joint tumors.	10	
Unit 18	Complex regional pain syndromes.	10	

P.T. MANAGEMENT IN DISORDERS OF THE MUSCULOSKELETAL SYSTEM-II			
Course Code MPT(O)-103	THEORY COURSE(125 Hours)	L-T-P-C	3-1-0-4
	Topic		Hours
Unit 1	REGIONAL (ORTHOPAEDICS) Disorders of upper limb		15
Unit 2	Disorders of lower limb		15
Unit 3	Disorders of the spine		20
Unit 4	Traumatology		15
Unit 5	Trauma of the upper limb		15
Unit 6	Trauma of the lower limb		15
Unit 7	Trauma of the spine		15
Unit 8	Trauma of the peripheral nerves		15

RESEARCH METHODOLOGY AND BIOSTATISTICS			
Course Code MPT-104	THEORY COURSE(100 Hours)	L-T-P-C	3-1-0-4
	Topic	Hours	
Unit 1	RESEARCH METHODOLOGY- How are read and critique research.	2	
Unit 2	Introduction to research: framework; levels of measurement; variables.	3	
Unit 3	Basic research concepts; validity and reliability	5	
Unit 4	Design, instrumentation and analysis for qualitative research	5	
Unit 5	Design, instrumentation and analysis for quasi- experimental research	5	
Unit 6	How to write a research proposal The use and protection of Human and Animal Subjects	5	
Unit 7	BIOSTATISTICS Descriptive and Inferential statistics	5	
Unit 8	Types of data: Qualitative and Quantitative	4	
Unit 9	Frequency distributions	6	
Unit 10	Describing data with Graphs	5	
Unit 12	Describing data with Averages Mode, Median, Mean	2	
Unit 13	Describing variability Variance, Standard deviation, etc	3	
Unit 14	Normal Distributions	5	
Unit 15	Interpretation of r	2	
Unit 16	Hypothesis testing	3	
Unit 17	T tests	5	
Unit 18	ANOVA	2	
Unit 19	Probability	3	
Unit 20	Type I and Type II errors	5	
Unit 21	Parametric and Non- Parametric tests	5	
Unit 22	Which tests to use	5	
Unit 23	Basic of computers – Hardware and Software	5	
Unit 24	Basic of Computer Applications – Windows, MS Word, Power Point, etc.	5	
Unit 25	Simple statistical Analysis using available software.	5	

PHYSIOTHERAPY MANAGEMENT IN DISORDERS OF THE MUSCULOSKELETAL SYSTEM (LAB HOURS)			
Course Code MPT(O)-105P	LAB COURSE(50 Hours)	L-T-P-C	0-0-2-4
	Topic	Hours	
LAB	Students will be instructed via demonstration, hand of techniques, field visits and case conferences on specific techniques used in management of patients with neurological disorders. Students will on their experiences at the clinical posting to formulate a treatment plan for cases presented at the case conference.	50	

MPT ORTHOPAEDICS 2ND YEAR

PEDAGOGY OF PHYSIOTHERAPY EDUCATION			
Course Code MPT-201	THEORY COURSE(100 Hours)	L-T-P-C	2-1-0-4
	Topic	Hours	
Unit 1	Philosophy of education and Emerging Issues in Education Need for Education Philosophy :Some Major Philosophies, Idealism, Naturalism, Pragmatism and their Implications for Education. Meaning, Functions and Aims of Education Formal, Informal and Non- formal Education. Agencies of Education Current Issues and trends in Higher Education Issue of Quality in Higher education, Autonomy and Accountability, Privatization, Professional Development of Teachers, Education of persons with Disabilities.	15	
Unit 2	Concept of Teaching and Learning Meaning scope of Educational Psychology Meaning and Relationship between Teaching and Learning Learning Theories Dynamics of Behaviour Individuals Differences	10	
Unit 3	Curriculum Meaning and concept Basis of curriculum Formulation & Development Framing Objectives for Curriculum Process of Curriculum Development and Factors Affecting Curriculum Developmental Evaluation of Curriculum	10	
Unit 4	Method and Techniques of Teaching Lecture, Demonstration, Discussion, Seminar, Assignment, Project and Case Study.	10	
Unit 5	Planning for Teaching Bloom's Taxonomy of Instructional Objectives, Writing Instructional Objectives in Behavioural terms, Unit planning and Lesson Planning.	10	
Unit 6	Teaching Aids Types of Teaching Aides Principles of Selection, Preparation, and Use of Audio-Visual aids.	10	
Unit 7	Measurement and Evaluation Nature of Educational Measurement: Meaning, Process, Types of tests. Construction of an Achievement test and analysis. Standardized Test. Introduction of some standardized tools, important tests of Intelligence, Aptitude, and Personality. Continuous and Comprehensive Evaluation.	15	
Unit 8	Guidance and Counseling Meaning and concepts of Guidance and Counseling , principles. Guidance and Counseling Services of Students and Faculty members Faculty Development and Development of Personnel for P.T. Services	10	

Unit 9	Clinical Education Awareness and Guidance to the Common people about Health and Diseases and Available professional Services. Patient Education Education of the Practitioners	10
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MANAGEMENT, ADMINISTRATION AND ETHICAL ISSUES			
Course Code MPT-202	THEORY COURSE(75 Hours)	L-T-P-C	2-1-0-4
	Topic	Hours	
Unit 1	Management Functions of management,	5	
Unit 2	Evaluation of management through scientific management theory, Classical theory System Approach Contingency approach	10	
Unit 3	Management process Planning, Organization, Direction, Controlling, Decision making	5	
Unit 4	Introduction to personnel management. Staffing, Recruitment, Selection, Performance appraisal, Collective bargaining, discipline, Job satisfaction.	5	
Unit 5	Quantitative methods of management Relevance of statistical and/ or technique in management.	10	
Unit 6	Marketing Market segmentation, marketing research production planning pricing, channels of distribution, promotion consumer behaviour, licensor.	5	
Unit 7	Total quality management Basis of quality management – acid for quality control quality assurance program in hospitals, medical audit, and international quality system.	5	
Unit 8	ADMINISTRATION Hospital as an organization Functions and types of hospitals selected clinical supportive ancillary services of a hospital, emergency department, nursing, physical medicine & rehabilitation, clinical supportive and ancillary services of a hospital, emergency department nursing physical medicine & rehabilitation, clinical laboratory, pharmacy and dietary dept. Roles of Physiotherapist, Physiotherapy Director, Physiotherapy Supervisor, Physiotherapy Assistant, Physiotherapy Aide, Occupational Therapist, Home health Aide, Volunteer. Directed care and referral relationship and confidentially.	15	
Unit 9	LEGAL PROFESSIONAL ETHICAL ISSUES Physical therapy: Definition and development The implications & confirmation to the rules of professional conduct. Legal responsibility for their actions in the professional context and understanding the physiotherapist liability and obligations in the case of medical legal action. Code of ethics A wider knowledge of ethics relating to current social and medical policy in the provisions of health care. Functions of the relevant professional associations education body and trade union. The role of the international health agencies such as the world health	15	

	organizations. Standards of practice for physical therapies. Current issues.	
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BIOMECHANICS			
Course Code MPT-203	THEORY COURSE(150 Hours)	L-T-P-C	4-1-0-4
	Topic	Hours	
Unit 1	FUNDAMENTAL MECHANICS Forces Moments Newton's laws Composition and Resolution of forces. Static Equilibrium Dynamic Equilibrium Force systems Levers Pulley Systems Density & Mass Segmental Dimensions	15	
Unit 2	KINEMATICS Types of Motion Location of Motion Magnitude of Motion Direction of Motion Angular motion and its various parameters Linear motion and its various parameters. Projectile motions.	15	
Unit 3	KINETICS 1. Definition of forces 2. Force vectors 3. Naming of Force 4. Force of gravity & Cog 5. Stability 6. Reaction forces 7. Equilibrium 8. Linear forces system 9. Friction and its various parameters 10. Parallel force system 11. Concurrent force systems 12. Work powers & energy 13. Moment arms of force 14. Force components 15. Equilibrium	15	
Unit 4	FLUID MECHANICS Various laws governing the flow of fluids Various laws governing the volume of fluids Various laws governing the pressure of fluids Various laws governing the energy of fluids	10	

	<p>Various parameters explaining the flow</p> <p>Various parameters describing the fluids</p> <p>Clinical applications</p>	
Unit 5	<p>BONE MECHANICS</p> <p>Structure & composition of bone</p> <p>Stress</p> <p>Strain</p> <p>Modules of rigidity & modular of elasticity</p> <p>Poisson's effect</p> <p>Strain energy</p> <p>Static & cyclic load behaviors</p> <p>Load</p> <p>Mechanical properties of trabecular bone</p> <p>Mechanical properties of cortical bone</p> <p>Bone remodeling</p> <p>Response of the bone to aging & exercise & immobilization</p> <p>Mechanisms to prevent fracture present in bone</p> <p>Fracture of prediction</p> <p>Behavior of bone under load</p> <p>Clinical applications</p> <p>Failure criteria</p>	10
Unit 6	<p>MUSCLES MECHANICS</p> <p>Structure & composition of muscle</p> <p>Fiber length & cross section area</p> <p>Mechanical properties</p> <p>EMG changes during fatigue & contraction</p> <p>Changes in mechanical properties because of aging and exercised & immobilization</p> <p>Clinical applications</p>	10
Unit 7	<p>LIGAMENT & TENDON MECHANICS</p> <p>Structure and composition</p> <p>Mechanical properties</p> <p>Cross sectional area measurements</p> <p>Muscle tendon properties</p> <p>Temperature sensitivity</p> <p>Changes in mechanical properties because of aging exercise and immobilization</p> <p>Mechanoreceptors</p> <p>Clinical applications</p>	10
Unit 8	<p>JOINT MECHANICS</p> <p>Joint Design</p> <p>Joint categories</p> <p>Joint functions</p> <p>Arthrokinematics</p> <p>Osteokinematics</p> <p>Kinematics chairs</p>	10

	<p>Joint forces, equilibrium & distribution of these forces Joint stability & its mechanism Articular Cartilage Mechanics Clinical applications</p>	
Unit 9	<p>MEASUREMENT INSTRUMENTS Goniometer Accelerometer Photo optical devices Pressure transducers and force plates Gait analyzer Isokinetic device EMG Electro physiology of muscle contraction Recording Processing Relationship between EMG and bio-mechanical variables.</p>	15
Unit 10	<p>MECHANICAL ENERGY, WORK AND POWER Definitions Positive and Negative work of muscle Muscle of mechanical power Causes of inefficient movement Co-contraction Isometric contraction Energy generation at one joint and absorption at another Energy flow Energy storage ERGONOMICS</p>	15
Unit 11	<p>APPLICATION OF BONE AND JOINT MECHANICS Load sharing & load transfer Prosthetic design criteria Bio-mechanical analysis of implants internal fixations Degenerative changes in weight bearing joints & compensatory actions</p>	10
Unit 12	<p>GAIT Gait parameter Kinetic Kinematic Time- Space Pathological gait Running Stair climbing Changes in gait following various surgeries/ diseases/ disorders</p>	10
Unit 13	<p>ORTHOSIS & PROSTHOSIS Orthosis of spine Orthosis of upper limb Orthosis of lower limb</p>	10

	Prescription checkouts & proper fittings Bio-mechanical principles governing them Aids used in management of disability	
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BIOMECHANICS			
Course Code	MPT-	LAB COURSE(50 Hours)	L-T-P-C
204P			0-0-2-4
Topic			Hours
Unit 1	This involves application of topics in MPT 2.4 via demonstrations, field visits and case presentations.		50

MPT-205 THESIS (DISSERTATION)

As part of the requirement for the Master's degree the student is required to undertake a research study under the guidance of a guide.

MPT-206 SEMINARS ON CLINICAL ISSUES

These will serve as a platform for students to integrate various components of patient management. Students will give presentations on topics provided to them.

IIMT College of Medical Sciences (Allied Health Sciences)

ACADEMIC HAND BOOK



**Master of Physiotherapy
(CARDIO PULMONARY)
(Ordinance, Evaluation Scheme & Syllabus)**



Chapter-1

General

- 1- This ordinance may be called the “Ordinance Relating to Master of Physiotherapy Course”.
- 2- The ordinance shall come in to force from session 2018-19.

Chapter-2

TITLE, & ELIGIBILITY OF ADMISSION

- 1- **OBJECTIVE:** To Train Physiotherapists who will be able to:
 - Assume leadership roles in departments.
 - Assume enhanced patient care responsibilities.
 - Formulate and implement educational Programs.
 - Analyze and undertake research.
- 2- The name of Degree to be awarded shall be Master of Physiotherapy (MPT) .
- 3- Course Program & duration –
 - a. **Name:** Master's of Physiotherapy
(Orthopaedics).
Master's of Physiotherapy
(Neurology).
Master's of Physiotherapy
(Cardiopulmonary) .
Master's of Physiotherapy
(Sports Medicine) .
 - b. **Nature:** Regular and full time.
 - c. **Duration:** Two Years course, designated as;
First year MPT
Second Year MPT
 - d. **Pattern:** Annual System
- 4- The medium of Teaching/Instruction and examination will be in English.
- 5- (a) A student seeking admission to the Master of Physiotherapy must have passed regular full time Bachelor of Physiotherapy (B.P.T.) course from any recognized institute/ University by U.G.C. .
(b) The eligible students may be called for an Entrance test prescribed by the University.

Chapter-3

THE CURRICULUM

- 6- **Academic Calendar -**
I & II year = Session = August of every year
Annual examination = every year in July .
- 7- **Teaching Hours -**
The following shall be the distribution of teaching hours for the course of study.

MPT (ORTHOPEDICS) – FIRST YEAR

Subject	Hours
Medical and Surgical Management of Disorders of the Musculoskeletal System	100
Physiotherapy Management in Disorders of the Musculoskeletal System-I	125
Physiotherapy Management in Disorders of the Musculoskeletal System-II	125
Research Methodology and Biostatistics	100
Physiotherapy Management in Disorders of the Musculoskeletal System (Lab. Hours)	50
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1700 Hrs.

SECOND YEAR

Subject	Hours
Pedagogy in Physiotherapy Education	100
Management, Administration and Ethical Issues	75
Biomechanics	150
Biomechanics (Lab. Hours)	25
Dissertation	200
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1750 Hrs.

MPT (NEUROLOGY) – FIRST YEAR

Subject	Hours
Medical and Surgical Management of Disorders of the Nervous System	100
Physiotherapy Management in Disorders of the Nervous System-I	125
Physiotherapy Management in Disorders of the Nervous System-II	125
Research Methodology and Biostatistics	100
Physiotherapy Management in Disorders of the Nervous System (Lab. Hours)	50
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1700 Hrs.

SECOND YEAR

Subject	Hours
Pedagogy in Physiotherapy Education	100
Management, Administration and Ethical Issues	75

Biomechanics	150
Biomechanics (Lab. Hours)	25
Dissertation	200
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1750 Hrs.

MPT (CARDIOPULMONARY) – FIRST YEAR

Subject	Hours
Medical and Surgical Management of Disorders of the Cardiopulmonary System	100
Physiotherapy Management in Disorders of the Cardiopulmonary System-I	125
Physiotherapy Management in Disorders of the Cardiopulmonary System-II	125
Research Methodology and Biostatistics	100
Physiotherapy Management in Disorders of the Cardiopulmonary System (Lab. Hours)	50
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1700 Hrs.

SECOND YEAR

Subject	Hours
Pedagogy in Physiotherapy Education	100
Management, Administration and Ethical Issues	75
Biomechanics	150
Biomechanics (Lab. Hours)	25
Dissertation	200
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1750 Hrs.

MPT (SPORTS MEDICINE) – FIRST YEAR

Subject	Hours
Medical and Surgical Management of Sports Injuries	100
Physiotherapy Management in Disorders of the Sports Injuries- I	125
Physiotherapy Management in Disorders of the Sports Injuries-II	125
Methodology and Biostatistics	100
Physiotherapy Management in Disorders of the sports Injuries (Lab. Hours)	50
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1700 Hrs.

SECOND YEAR

Subject	Hours
Pedagogy in Physiotherapy Education	100
Management, Administration and Ethical Issues	75
Biomechanics	150
Biomechanics in Sports (Lab. Hours)	25
Dissertation	200
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1750 Hrs.

Chapter – 4

EXAMINATIONS

8- Examination

(A) Total papers:

Total theory papers	:	7
Total Practical	:	2
Total Viva Voce	:	2
Dissertation	:	1

Mode of Curriculum delivery and execution includes classroom teaching, assignment, tests, lab, work, project, case studies, participation in relevant events, Group Discussion, etc.

- (i) The students admitted to the course shall attend lectures, practical classes, clinical training/ attachments and seminars as prescribed by the College/University.
- (ii) Every student shall be required to appear in the written house test in various subjects and/or practicals as may be prescribed by the College/University.
- (vi) The last date of receipt of admission forms and fees in the college office for the University Examination shall be fixed by the University from time to time.
- (v) The student shall be examined in such theory papers and practical examinations as may be prescribed in the syllabus.

(B) INTERNAL ASSESSMENT:

- (a) There shall be tests in each subject in each academic year. These will carry weightage in the total marks. Marks shall be notified within one week of the test.
- (b) These tests could be in the form of written tests, quizzes, symposia assignment, group discussion, etc.
- (c) A promoted student who has to reappear in the annual examination of the paper will retain internal assessment marks of the previous year.
- (e) In Internal Assessment a maximum of **10 marks** in each subject shall be awarded for attending classes (theory / practical) as per the following norms:

85% or more attendance	-	10 Marks
80% or more but less than 85% attendance	-	9 Marks
75% or more but less than 80% attendance	-	8 Marks
70% or more but less than 75% attendance	-	7 Marks
65% or more but less than 70% attendance	-	5 Marks
60% or more but less than 65% attendance	-	3 Marks
51% or more but less than 60% attendance	-	2 Marks
50% attendance	-	1 Mark
Less than 50% attendance	-	0 Mark

(C) ANNUAL EXAMINATIONS :

Annual examination of theory and practical shall be conducted at the end of each session as outlined below:

- a. Mode: Theory Papers Written Only
 Lab Hours Written, Demonstration and Viva Voce
 Viva Voce Viva Voce

- b- Duration: Theory 3 hours
Practical Upto three hours per student
- c- Examiner Theory 01 (either internal or external) from the panel
Practical 02 (1 internal and 1 external) from the panel
* Panel to be prepared by the Board of Studies and approved by the Vice Chancellor
- Viva Voce 02 (1 internal and 1 external from the panel)
- d- Moderation of Theory Papers: For papers set by external examiners only.
Change cannot be more than 30% after consultation with the teacher who has taught the paper.
- e- Dissertation evaluation There will be an internal & an external evaluator for each Dissertation and a viva voce will be conducted after Dissertation approval by both.
- f- A special examination may be held in the month of December for the students of the first year of the course to enable them to reappear in those papers in which they had failed or could not appear due to any reason other than shortage of attendance .

(D) PROMOTION:

(i) A candidate is declared passed in an examination in subject, if he/she secures 50% of marks in theory and 50% in practical separately.

(a) If a candidate fails in only one head/subject and having passed in all other head/subject of the given examination of the year than his/her deficiency of maximum five (05) marks may be fulfilled by grace marks after fulfilling the conditions given below:

(A) If a candidate fails in only one head/subject and having passed in all other heads/subjects of the given examination of a **semester*/year**, then his/her deficiency of marks may be fulfilled by grace marks under the following conditions:-

- (i) Grace mark is not a matter of right of the student but is the discretion of the University.
- (ii) Provided that the candidate has appeared in the main examination of the concerned course and falls short of pass marks by not more than five (05) marks in theory paper only. Benefit of above mentioned shall not be given to the candidate who had appeared in supplementary/special examination/carry over examination.
- (iii) Further, benefit of grace marks may be given only to the candidate who will pass the entire concerned examination of the **semester*/year** after awarding the grace marks and not for the purpose of promoting the student to next year with back papers or for improvement of division or percentage.
- (iv) If in a head/subject of an examination passing in Theory, Practical or sessional exams separately is mandatory, then the benefit of grace marks shall be given only in Theory examination of the University examination.
- (v) The award of grace marks permissible shall be on the basis of 1 grace mark for every 05 marks secured by an examinee over and above the minimum passing aggregate marks of all subjects of the year.

(ii) **I Year: (iii)** A student will not be promoted from I year to II year if he / she fails in more than 2 theory papers and any practical exam failing which this student shall reappear for the failed examinations.

II year: (iv) A student will be declared Pass in the II year if he / she cleared all the papers of the II year and whose thesis has been approved and has passed in the viva voce of the thesis failing which this student shall reappear for the failed examination.

(v) A student will appear in supplementary examination for all failed subjects and who has failed only in theory or practical/viva of Biomechanics shall have to appear in both theory & practical/viva of the concern subject in the supplementary examination.

(E) CLINICAL PRACTICE:

Students engage in clinical practice in Physiotherapy Departments in the Orthopedics/ Neurology/Cardiopulmonary/Sports Physiotherapy setting to enhance their clinical skills and apply theoretical knowledge gained during teaching sessions.

(F) THESIS / DISSERTATION:

A Research Dissertation should be compulsory and should embody the student's own work carried in the elective area under the supervision of a recognised guide qualified for the purpose and as recommended by the Indian Association of Physiotherapists (IAP).

A Research proposal should be submitted to the University for Approval within six (6) months of admission to the course.

The completed Research Dissertation should be submitted three (3) months in advance of the written, oral, clinic and practical examination.

(G) PG TEACHERS:

A PG Teacher/Guide must have at- least 5 years of full time teaching and clinical experience in Physiotherapy subjects.

For other specific qualification of teachers please refer to the recommendations on the qualifications of Teachers prescribed by the Indian Association of Physiotherapists (IAP).

(H) EXAMINERS:

A PG teacher as defined above is eligible to be appointed as an examiner.

There shall be at least two examiners in each thesis and clinical examinations out of which, at-least one shall be an external examiner. The external examiners who fulfill the conditions should ordinarily be invited from another recognised Institution / University, preferably from outside the state.

Chapter – 5

AWARD OF DEGREE

9- Award of Degree

- i) A student will be awarded a MPT Degree only on successful completion of the course including clinical practice for both the years.
- ii) The entire course of study in MPT for first and second year must be completed within 4 years of the date of admission.

Chapter – 6

ATTENDANCE

10- Attendance –

The students are expected to attend all the classes and should not have less than 75 % attendance in theory as well as in practical classes, wherever held, to become eligible to appear for the university examination. Short fall in attendance can, however be condoned in deserving cases to the extent of 10% by the Principal. If the short fall is more than 10% but not more than 15%, the Principal may recommend deserving cases to the Vice Chancellor for condonation. The order of the Vice Chancellor in this regard shall be final.

Chapter – 7

Power to Modify

- 11.** In the event of any emergent situation, if any deviation is considered necessary, the Vice Chancellor is authorised to modify the Ordinance. Subject to subsequent ratification by the Executive Council.

Chapter-8

SCHEME OF EXAMINATIONS

13- Marks Distribution

Note: **IA** : Internal Assessment, **AE** : Annual Exam

MPT (ORTHOPEDECS)

First Year

Subject	IA	AE	Total
Basic of Computer Application	-	-	P / F
Medical & Surgical Management in Disorder of the Musculoskeletal System	50	100	150
P.T. Management in Disorder of the Musculoskeletal System-I	50	100	150
P.T. Management in Disorder of the Musculoskeletal System-II	50	100	150
P.T. Management in Disorder of the Musculoskeletal System-Practical	100	400	500
Research Methodology & Biostatistics	50	100	150
Seminars on Clinical Issues	100	-	100
		Total	1200

Second Year

Subject	IA	AE	Total
Pedagogy in Physiotherapy Education	50	100	150
Management, Administration & Ethical Issues	50	100	150
Biomechanics	50	100	150
Biomechanics-Viva	50	100	150
Dissertation	-	-	P / F
Seminars on Clinical Issues	100	-	100
		Total	700
GRAND TOTAL I and II	:		1900
	MPT		

Note: **IA** : Internal Assessment, **AE** : Annual Exam

MPT (NEUROLOGY)

First Year

Subject	IA	AE	Total
Basic of Computer Application	-	-	P / F
Medical & Surgical Management in Disorder of the Nervous System	50	100	150
P.T. Management in Disorder of the Nervous System-I	50	100	150
P.T. Management in Disorder of the Nervous System-II	50	100	150
P.T. Management in Disorder of the Nervous System-Practical	100	400	500
Research Methodology & Biostatistics	50	100	150
Seminars on Clinical Issues	100	-	100
		Total	1200

Second Year

Subject	IA	AE	Total
Pedagogy in Physiotherapy Education	50	100	150
Management, Administration & Ethical Issues	50	100	150
Biomechanics	50	100	150
Biomechanics-Viva	50	100	150
Dissertation	-	-	P / F
Seminars on Clinical Issues	100	-	100
		Total	700

GRAND TOTAL I and II : 1900

MPT

Assessment, Note: **IA :** Internal
AE : Annual Exam

MPT

(CARDIOPULMONARY CONDITION)

First Year

Subject	IA	AE	Total
Basic of Computer Application	-	-	P / F
Medical & Surgical Management in Disorder of the Cardiopulmonary System	50	100	150
P.T. Management in Disorder of the Cardiopulmonary System-I	50	100	150
P.T. Management in Disorder of the Cardiopulmonary System-II	50	100	150
P.T. Management in Disorder of the Cardiopulmonary System-Practical	100	400	500
Research Methodology & Biostatistics	50	100	150
Seminars on Clinical Issues	100	-	100
		Total	1200

Second Year

Subject	IA	AE	Total
Pedagogy in Physiotherapy Education	50	100	150
Management, Administration & Ethical Issues	50	100	150
Biomechanics	50	100	150
Biomechanics-Viva	50	100	150
Dissertation	-	-	P / F
Seminars on Clinical Issues	100	-	100
		Total	700

GRAND TOTAL I and II MPT : **1900**

Assessment, Exam
Note: IA : Internal
AE : Annual

MPT

(SPORTS PHYSIOTHERAPY)

First Year

Subject	IA	AE	Total
Basic of Computer Application	-	-	P / F
Medical & Surgical Management in Disorder of the Sports Injuries	50	100	150
P.T. Management in Disorder of the Sports Injuries -I	50	100	150
P.T. Management in Disorder of the Sports Injuries -II	50	100	150
P.T. Management in Disorder of the Sports Injuries -Practical	100	400	500
Research Methodology & Biostatistics	50	100	150
Seminars on Clinical Issues	100	-	100
		Total	1200

Second Year

Subject	IA	AE	Total
Pedagogy in Physiotherapy Education	50	100	150
Management, Administration & Ethical Issues	50	100	150
Biomechanics	50	100	150
Biomechanics-Viva	50	100	150
Dissertation	-	-	P / F
Seminars on Clinical Issues	100	-	100
		Total	700

GRAND TOTAL I and II : **1900**

**First Year & Second Year
MPT 1st year (CARDIO PULMONARY)
Evaluation Scheme**

S.NO.	SUBJECT CODE	SUBJECT	PERIODS			INTERNAL				EXTERNAL		TOTAL	CREDIT
			L	T	P	CA	TA	Total	IP	ET	EP		
1.	MPT(C)-101	Medical And Surgical Management Of Disorders Of The Cardiopulmonary System	2	1	0	10	10	20	-	80	-	100	4
2.	MPT(C)-102	Physiotherapy Management in disorders of the Cardiopulmonary system – I	3	1	0	10	10	20	-	80	-	100	4
3.	MPT(C)-103	Physiotherapy Management in disorders of the Cardiopulmonary system – II	3	1	0	10	10	20	-	80	-	100	4
4.	MPT-104	Research Methodology and Biostatistics	2	1	0	10	10	20	-	80	-	100	4
5.	MPT(C)-105P	Physiotherapy Management in disorders of the Cardiopulmonary system	0	0	2	0	0	0	20	0	80	100	4
6.	MPT-106	Seminars on Clinical Issues	0	3	0	0	0	200	0	0	0	200	8
Grand Total											700	28	
L- Lecture, T- tutorials, P- Practical (Labs), CT- Class Test (Sessionals), TA- Teacher's Assessment (Assignments, Tutorials), IP- Internal Practical, ET- External Theory, EP- external Practical.													

**MPT 2nd year (CARDIOPULMONARY
Evaluation Scheme**

S.NO.	SUBJECT CODE	SUBJECT	PERIODS			INTERNAL				EXTERNAL		TOTAL	CREDIT
			L	T	P	CA	TA	Total	IP	ET	EP		
1.	MPT(C)-201	Pedagogy in Physiotherapy Education	2	1	0	10	10	20	-	80	-	100	4
2.	MPT(C)-202	Management, Administration and Ethical Issues	2	1	0	10	10	20	-	80	-	100	4
3.	MPT(C)-203	Biomechanics	4	1	0	10	10	20	-	80	-	100	4
4.	MPT(C)-204P	Biomechanics (Lab Hours)	0	0	2	-	-	-	20	-	80	100	4
5.	MPT(C)-205	Dissertation	PASS/ FAIL									-	-
6.	MPT(C)-206	Seminars on Clinical Issues	0	3	0	0	0	200	0	0	0	200	8
Grand Total											600	24	
<p>L- Lecture, T- tutorials, P- Practical (Labs), CT- Class Test (Sessionals), TA- Teacher's Assessment (Assignments, Tutorials), IP- Internal Practical, ET- External Theory, EP- external Practical.</p>													

MEDICAL AND SURGICAL MANAGEMENT OF DISORDERS OF THE CARDIOPULMONARY SYSTEM			
Course Code MPT(C)-101	THEORY COURSE (100 Hours)	L-T-P-C	2-1-0-4
	Topic	Hours	
UNIT 1	CARDIOLOGY-Epidemiology, Pathomechanics, clinical presentation, relevant diagnostic test (ECG, Echo cardiography, cardiac catheterization, Radionuclide scanning, stress testing, ABG, Labs etc.) and medical management of disorders of the cardiac system. Assessment of symptoms of heart disease	2	
UNIT 2	DISORDER OF CARDIAC RATE, RHYTHM AND CONDITION	2	
UNIT 3	CARDIAC ARREST	2	
UNIT 4	CARDIAC FAILURE	2	
UNIT 5	SHOCK	1	
UNIT 6	RHEUMATIC FEVER	2	
UNIT 7	CONGENITAL HEART DISEASE	2	
UNIT 8	DISEASE OF THE HEART VALVE	2	
UNIT 9	INFECTIVE ENDOCARDITIS	2	
UNIT 10	ISCHEMIC HEART DISEASE	1	
UNIT 11	HYPERTENSION	2	
UNIT 12	ORTHOSTATIC HYPOTENSION	2	
UNIT 13	CPR	1	
UNIT 14	PERICARDITIS	2	
UNIT 15	HEART DISEASE IN PREGNANCY	2	
UNIT 16	DEGENERATIVE ARTERIAL DISEASE	1	
UNIT 17	INFLAMMATORY ARTERIAL DISEASE	2	
UNIT 18	RAYNAUD'S DISEASE	2	
UNIT 19	VENOUS THROMBOSIS	1	
UNIT 20	PERIPHERAL VASCULAR DISEASE	2	
UNIT 21	CARDIO MYOPATHY	2	
UNIT 22	DISEASE OF THE PERICARDIUM	1	
UNIT 23	PULMONOLOGY-EPIDEMIOLOGY, PATHOMECHANICS, CLINICAL PRESENTATION, RELEVANT DIAGNOSTIC TESTS (PFT, LABS ETC.) AND MEDICAL MANAGEMENT OF DISORDERS OF THE PULMONARY SYSTEM. OBSTRUCTIVE PULMONARY DISEASE	2	
UNIT 24	INFECTION OF THE RESPIRATORY SYSTEM	2	
UNIT 25	INTERSTITIAL AND INFILTRATIVE PULMONARY DISORDERS	2	
UNIT 26	PULMONARY DISORDERS DUE TO EXPOSURE TO ORGANIC AND INORGANIC POLLUTANTS.	1	
UNIT 27	PULMONARY DISORDERS DUE TO SYSTEMIC INFLAMMATORY DISEASE	2	

UNIT 28	<i>PULMONARY VASCULAR DISEASE</i>	2
UNIT 29	<i>DISEASE OF PLEURA</i>	1
UNIT 30	<i>RESPIRATORY FAILURE</i>	2
UNIT 31	<i>SUPPLEMENTAL OXYGEN AND OXYGEN DELIVERY DEVICES IN CHRONIC RESPIRATORY DISEASE.</i>	2
UNIT 32	<i>NEUROMUSCULAR AND SKELETAL DISORDERS LEADING TO GLOBAL ALVEOLAR</i>	2
UNIT 33	<i>HYPOVENTILATION MYOPATHIES</i>	2
UNIT 34	<i>SPINAL MUSCULAR ATROPHIES</i>	2
UNIT 35	<i>POLIOMYELITIS</i>	2
UNIT 36	<i>MOTOR NEURON DISEASE</i>	2
UNIT 37	<i>HSMN</i>	2
UNIT 38	<i>KYPHOSCOLIOSIS</i>	2
UNIT 39	<i>PECTUS CARINATUM</i>	2
UNIT 40	<i>PECTUS EXCAVATUM</i>	2
UNIT 41	<i>PATHOPHYSIOLOGY OF PARALYTIC – RESTRICTIVE PULMONARY SYNDROMES</i>	2
UNIT 42	<i>CONVENTIONAL APPROACHES TO MANAGING N-M-VENTILATORY FAILURE</i>	2
UNIT 43	<i>MECHANICAL VENTILATION: CONCEPT, PHYSIOLOGICAL EFFECT AND COMPLICATIONS</i>	2
UNIT 44	<i>CARDIOTHORACIC SURGERY-Surgical management of the above conditions, indication, contra-indications for surgery, precautions after surgery. Also included:Close v/s open heart surgery</i>	2
UNIT 45	<i>INCISIONS</i>	2
UNIT 46	<i>PREOPERATIVE ASSESSMENT OF PATIENT</i>	1
UNIT 47	<i>PRE AND POST OP BLOOD GAS EXCHANGE</i>	2
UNIT 48	<i>HAEMODYNAMIC PERFORMANCE OF CTVS PATIENTS</i>	2
UNIT 49	<i>EMERGENCIES IN CTVS</i>	2
UNIT 50	<i>A-V SHUNT</i>	1
UNIT 51	<i>HEART TRANSPLANT</i>	2
UNIT 52	<i>LEFT VENTRICULAR ASSISTIVE DEVICES</i>	2
UNIT 53	<i>PROCEDURE ON STERNUM, CHEST WALL, DIAPHRAGM, MEDIASTINUM, OESOPHAGUS</i>	2
UNIT 54	<i>CARDIOPULMONARY BYPASS</i>	2
UNIT 55	<i>MAINTAINING AND REMOVING ARTIFICIAL AIRWAYS</i>	2

PHYSIOTHERAPY MANAGEMENT IN DISORDERS OF THE CARDIOPULMONARY SYSTEM-I			
Course Code MPT(C))-102	THEORY COURSE(125 Hours)	L-T-P-C	3-1-0-4
	Topic	Hours	
UNIT 1	GENERAL PRINCIPAL-P.T. Assessment	2	
UNIT 2	MOBILIZATION AND EXERCISES (STRENGTHENING CONDITIONING AND ENDURANCE)	3	
UNIT 3	BODY POSITIONING	3	
UNIT 4	AIRWAY CLEARANCE TECHNIQUES	3	
UNIT 5	POSTURAL DRAINAGE	3	
UNIT 6	FORCED EXPIRATORY TECHNIQUE	3	
UNIT 7	BREATHING EXERCISE	3	
UNIT 8	PERCUSSION AND VIBRATION	3	
UNIT 9	EXERCISE TRAINING AND EXERCISE TESTING	3	
UNIT 10	BIO FEED BACK	2	
UNIT 11	RESPIRATORY MUSCLE TRAINING	3	
UNIT 12	VENTILATOR	3	
UNIT 13	HUMIDIFICATION AND AEROSOL THERAPY	3	
UNIT 14	APPLYING AND EVALUATING BRONCHIAL HYGIENE THERAPY	3	
UNIT 15	OUTCOMES OF PULMONARY REHABILITATION	3	
UNIT 16	FUNCTIONAL ADAPTATIONS	3	
UNIT 17	PREVENTION OF MORBIDITY AND MORTALITY WITH THE USE OF PHYSICAL AIDS	2	
UNIT 18	PT IN ICU	3	
UNIT 19	TECHNIQUES FOR FACILITATING VENTILATORY PATTERN	3	
UNIT 20	RESPIRATORY THERAPY EQUIPMENT AND ADJUNCTS TO CARDIOPULMONARY THERAPY	2	
UNIT 21	PRINCIPAL AND PRESCRIPTION OF CARDIAC REHABILITATION	3	
UNIT 22	PRINCIPAL AND PRESCRIPTION OF PULMONARY REHABILITATION	3	
UNIT 23	PT IN NEONATAL ICU	2	
UNIT 24	DIABETES AND EXERCISE	3	
UNIT 25	PHYSIOTHERAPY MANAGEMENT IN SPECIFIC CONDITIONS DISORDER OF CARDIAC RATE, RHYTHM AND CONDITION	3	
UNIT 26	CARDIAC ARREST	2	
UNIT 27	CARDIAC FAILURE	3	
UNIT 28	SHOCK	3	
UNIT 29	RHEUMATIC FEVER	2	
UNIT 30	CONGENITAL HEART DISEASE	3	
UNIT 31	DISEASE OF THE HEART VALVE	3	
UNIT 32	INFECTIVE ENDOCARDITIS	2	
UNIT 33	ISCHEMIC HEART DISEASE	3	

UNIT 34	HYPERTENSION	2
UNIT 35	ORTHOSTATIC HYPOTENSION	3
UNIT 36	CPR	3
UNIT 37	PERICARDITIS	2
UNIT 38	HEART DISEASE IN PREGNANCY	3
UNIT 39	DEGENERATIVE ARTERIAL DISEASE	3
UNIT 40	INFLAMMATORY ARTERIAL DISEASE	3
UNIT 41	RAYNAUD'S DISEASE	3
UNIT 42	VENOUS THROMBOSIS	3
UNIT 43	PERIPHERAL VASCULAR DISEASE	3
UNIT 44	CARDIO MYOPATHY	3
UNIT 45	DISEASE OF THE PERICARDIUM	3

P.T. MANAGEMENT IN DISORDERS OF THE CARDIOPULMONARY SYSTEM- II			
Course Code MPT(C)-103	THEORY COURSE(125 Hours)	L-T-P-C	3-1-0-4
	Topic	Hours	
UNIT 1	OBSTRUCTIVE PULMONARY DISEASE	5	
UNIT 2	INFECTION OF THE RESPIRATORY SYSTEM	5	
UNIT 3	INTERSTITIAL AND INFILTRATIVE PULMONARY DISORDERS	5	
UNIT 4	PULMONARY DISORDERS DUE TO EXPOSURE TO ORGANIC AND INORGANIC POLLUTANTS.	5	
UNIT 5	PULMONARY DISORDERS DUE TO SYSTEMIC INFLAMMATORY DISEASE	5	
UNIT 6	PULMONARY VASCULAR DISEASE	5	
UNIT 7	DISEASE OF PLEURA	5	
UNIT 8	RESPIRATORY FAILURE	5	
UNIT 9	SUPPLEMENTAL OXYGEN AND OXYGEN DELIVERY DEVICES IN CHRONIC RESPIRATORY DISEASE.	5	
UNIT 10	NEUROMUSCULAR AND SKELETAL DISORDERS LEADING TO GLOBAL ALVEOLAR HYPOVENTILATION MYOPATHIES SPINAL MUSCULAR ARTROPHIES POLIOMYELITIS MOTOR NEURON DISEASE HSMN KYPHOSCOLIOSIS PECTUS CARINATUM PECTUS EXCAVATUM	10	
UNIT 11	PATHOPHYSIOLOGY OF PARALYTIC – RESTRICTIVE PULMONARY SYNDROMES	5	
UNIT 12	CONVENTIONAL APPROACHES TO MANAGING N-M-VENTILATORY FAILURE	5	
UNIT 13	MECHANICAL VENTILATION: CONCEPT, PHYSIOLOGICAL EFFECT AND COMPLICATIONS	5	
UNIT 14	CLOSE V/S OPEN HEART SURGERY INCISIONS	5	
UNIT 15	PREOPERATIVE ASSESSMENT OF PATIENT	5	
UNIT 16	PRE AND POST OP BLOOD GAS EXCHANGE	5	
UNIT 17	HAEMODYNAMIC PERFORMANCE OF CTVS PATIENTS	5	
UNIT 18	EMERGENCIES IN CTVS	5	
UNIT 19	A-V SHUNT	5	
UNIT 20	HEART TRANSPLANT	5	
UNIT 21	LEFT VENTRICULAR ASSISTIVE DEVICES	5	
UNIT 22	PROCEDURE ON STERNUM, CHEST WALL, DIAPHRAGM, MEDIASTINUM, OESOPHAGUS	5	

UNIT 23	CARDIOPULMONARY BYPASS	5
UNIT 24	MAINTAINING AND REMOVING ARTIFICIAL AIRWAYS	5

RESEARCH METHODOLOGY AND BIOSTATISTICS				
Course	Code	THEORY COURSE(100 Hours)	L-T-P-C	3-1-0-4
Topic				Hours
UNIT 1	RESEARCH METHODOLOGY- <i>How are read and critique research.</i>			2
UNIT 2	INTRODUCTION TO RESEARCH: FRAMEWORK; LEVELS OF MEASUREMENT; VARIABLES.			3
UNIT 3	BASIC RESEARCH CONCEPTS; VALIDITY AND RELIABILITY			5
UNIT 4	DESIGN, INSTRUMENTATION AND ANALYSIS FOR QUALITATIVE RESEARCH			5
UNIT 5	DESIGN, INSTRUMENTATION AND ANALYSIS FOR QUASI-EXPERIMENTAL RESEARCH			5
UNIT 6	HOW TO WRITE A RESEARCH PROPOSAL THE USE AND PROTECTION OF HUMAN AND ANIMAL SUBJECTS			5
UNIT 7	BIOSTATISTICS <i>Descriptive and Inferential statistics</i>			5
UNIT 8	TYPES OF DATA: QUALITATIVE AND QUANTITATIVE			4
UNIT 9	FREQUENCY DISTRIBUTIONS			6
UNIT 10	DESCRIBING DATA WITH GRAPHS			5
UNIT 12	DESCRIBING DATA WITH AVERAGES MODE, MEDIAN, MEAN			2
UNIT 13	DESCRIBING VARIABILITY VARIANCE, STANDARD DEVIATION, ETC			3
UNIT 14	NORMAL DISTRIBUTIONS			5
UNIT 15	INTERPRETATION OF R			2
UNIT 16	HYPOTHESIS TESTING			3
UNIT 17	T TESTS			5
UNIT 18	ANOVA			2
UNIT 19	PROBABILITY			3
UNIT 20	TYPE I AND TYPE II ERRORS			5
UNIT 21	PARAMETRIC AND NON- PARAMETRIC TESTS			5
UNIT 22	WHICH TESTS TO USE			5
UNIT 23	BASIC OF COMPUTERS – HARDWARE AND SOFTWARE			5
UNIT 24	BASIC OF COMPUTER APPLICATIONS – WINDOWS, MS WORD, POWER POINT, ETC.			5
UNIT 25	SIMPLE STATISTICAL ANALYSIS USING AVAILABLE SOFTWARE.			5

PHYSIOTHERAPY MANAGEMENT IN DISORDERS OF THE CARDIOPULMONARY SYSTEM (LAB HOURS)			
Course Code MPTC- 105P	LAB COURSE(50 Hours)	L-T-P-C	0-0-2-4
	Topic		Hours
LAB	<i>Students will be instructed via demonstration, hand of techniques, field visits and case conferences on specific techniques used in management of patients with neurological disorders. Students will on their experiences at the clinical posting to formulate a treatment plan for cases presented at the case conference.</i>		50

MPT 2nd year (CARDIO PULMONARY)

PEDAGOGY OF PHYSIOTHERAPY EDUCATION			
Course Code MPT(C)-201	THEORY COURSE(100 Hours)	L-T-P-C	2-1-0-4
	Topic	Hours	
UNIT 1	PHILOSOPHY OF EDUCATION AND EMERGING ISSUES IN EDUCATION <i>Need for Education Philosophy :Some Major Philosophies, Idealism, Naturalism, Pragmatism and their Implications for Education. Meaning, Functions and Aims of Education Formal, Informal and Non-formal Education. Agencies of Education Current Issues and trends in Higher Education Issue of Quality in Higher education, Autonomy and Accountability, Privatization, Professional Development of Teachers, Education of persons with Disabilities.</i>	15	
UNIT 2	CONCEPT OF TEACHING AND LEARNING <i>Meaning scope of Educational Psychology Meaning and Relationship between Teaching and Learning Learning Theories Dynamics of Behaviour Individuals Differences</i>	10	
UNIT 3	CURRICULUM <i>Meaning and concept Basis of curriculum Formulation & Development Framing Objectives for Curriculum Process of Curriculum Development and Factors Affecting Curriculum Developmental Evaluation of Curriculum</i>	10	
UNIT 4	METHOD AND TECHNIQUES OF TEACHING <i>Lecture, Demonstration, Discussion, Seminar, Assignment, Project and Case Study.</i>	10	
UNIT 5	PLANNING FOR TEACHING <i>Bloom's Taxonomy of Instructional Objectives, Writing Instructional Objectives in Behavioural terms, Unit planning and Lesson Planning.</i>	10	
UNIT 6	TEACHING AIDS <i>Types of Teaching Aides Principles of Selection, Preparation, and Use of Audio-Visual aids.</i>	10	
UNIT 7	MEASUREMENT AND EVALUATION <i>Nature of Educational Measurement: Meaning, Process, Types of tests. Construction of an Achievement test and analysis. Standardized Test Introduction of some standardized tools, important tests of Intelligence, Aptitude, and Personality Continuous and Comprehensive Evaluation.</i>	15	
UNIT 8	GUIDANCE AND COUNSELING <i>Meaning and concepts of Guidance and Counseling, principles. Guidance and Counseling Services of Students and Faculty members Faculty Development and Development of Personnel for P.T. Services</i>	10	
UNIT 9	CLINICAL EDUCATION <i>Awareness and Guidance to the Common people about Health and Diseases and Available professional Services. Patient Education Education of the Practitioners</i>	10	

MANAGEMENT, ADMINISTRATION AND ETHICAL ISSUES			
COURSE CODE MPT(C)-202	THEORYCOURSE 100 HOURS	L-T-P-C	2-1-0-4
	Topic	Hours	
UNIT 1	MANAGEMENT FUNCTIONS OF MANAGEMENT,	5	
UNIT 2	EVALUATION OF MANAGEMENT THROUGH SCIENTIFIC MANAGEMENT THEORY, <i>Classical theory</i> <i>System Approach</i> <i>Contingency approach</i>	10	
UNIT 3	MANAGEMENT PROCESS <i>Planning, Organization, Direction, Controlling, Decision making</i>	5	
UNIT 4	INTRODUCTION TO PERSONNEL MANAGEMENT. <i>Staffing, Recruitment, Selection, Performance appraisal, Collective bargaining, discipline, Job satisfaction.</i>	5	
UNIT 5	QUANTITATIVE METHODS OF MANAGEMENT <i>Relevance of statistical and/ or technique in management.</i>	10	
UNIT 6	MARKETING <i>Market segmentation, marketing research production planning pricing, channels of distribution, promotion consumer behaviour, licensor.</i>	5	
UNIT 7	TOTAL QUALITY MANAGEMENT <i>Basis of quality management – acid for quality control quality assurance program in hospitals, medical audit, and international quality system.</i>	5	
UNIT 8	ADMINISTRATION <i>Hospital as an organization</i> <i>Functions and types of hospitals selected clinical supportive ancillary services of a hospital, emergency department, nursing, physical medicine & rehabilitation, clinical supportive and ancillary services of a hospital, emergency department nursing physical medicine & rehabilitation, clinical laboratory, pharmacy and dietary dept.</i> <i>Roles of Physiotherapist, Physiotherapy Director, Physiotherapy Supervisor, Physiotherapy Assistant, Physiotherapy Aide, Occupational Therapist, Home health Aide, Volunteer.</i> <i>Directed care and referral relationship and confidentiality.</i>	15	
UNIT 9	LEGAL PROFESSIONAL ETHICAL ISSUES <i>Physical therapy: Definition and development</i> <i>The implications & confirmation to the rules of professional conduct.</i> <i>Legal responsibility for their actions in the professional context and understanding the physiotherapist liability and obligations in the case of medical legal action.</i> <i>Code of ethics</i> <i>A wider knowledge of ethics relating to current social and medical policy in the provisions of health care.</i> <i>Functions of the relevant professional associations education body and trade union.</i> <i>The role of the international health agencies such as the world health organizations.</i>	15	

	<p><i>Standards of practice for physical therapies.</i> <i>Current issues.</i></p>	
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BIOMECHANICS			
Course Code MPT-203	THEORY COURSE(150 Hours)	L-T-P-C	4-1-0-4
	Topic	Hours	
UNIT 1	FUNDAMENTAL MECHANICS <i>Forces</i> <i>Moments</i> <i>Newton's laws</i> <i>Composition and Resolution of forces.</i> <i>Static Equilibrium</i> <i>Dynamic Equilibrium</i> <i>Force systems</i> <i>Levers</i> <i>Pulley Systems</i> <i>Density & Mass</i> <i>Segmental Dimensions</i>	15	
UNIT 2	KINEMATICS <i>types of motion</i> <i>location of motion</i> <i>magnitude of motion</i> <i>direction of motion</i> <i>angular motion and its various parameters</i> <i>linear motion and its various parameters.</i> <i>projectile motions.</i>	15	
UNIT 3	KINETICS <i>1. definition of forces</i> <i>2. force vectors</i> <i>3. naming of force</i> <i>4. force of gravity & cog</i> <i>5. stability</i> <i>6. reaction forces</i> <i>7. equilibrium</i> <i>8. linear forces system</i> <i>9. friction and its various parameters</i> <i>10. parallel force system</i> <i>11. concurrent force systems</i> <i>12. work powers & energy</i> <i>13. moment arms of force</i> <i>14. force components</i> <i>15. equilibrium</i>	15	
UNIT 4	FLUID MECHANICS <i>Various laws governing the flow of fluids</i> <i>Various laws governing the volume of fluids</i> <i>Various laws governing the pressure of fluids</i> <i>Various laws governing the energy of fluids</i> <i>Various parameters explaining the flow</i> <i>Various parameters describing the fluids</i> <i>Clinical applications</i>	10	

UNIT 5	<p>BONE MECHANICS</p> <p><i>Strain</i></p> <p><i>Modules of rigidity & modular of elasticity</i></p> <p><i>Poisson's effect</i></p> <p><i>Structure & composition of bone</i></p> <p><i>Stress</i></p> <p><i>Strain energy</i></p> <p><i>Static & cyclic load behaviors</i></p> <p><i>Load</i></p> <p><i>Mechanical properties of trabecular bone</i></p> <p><i>Mechanical properties of cortical bone</i></p> <p><i>Bone remodeling</i></p> <p><i>Response of the bone to aging & exercise & immobilization</i></p> <p><i>Mechanisms to prevent fracture present in bone</i></p> <p><i>Fracture of prediction</i></p> <p><i>Behavior of bone under load</i></p> <p><i>Clinical applications</i></p> <p><i>Failure criteria</i></p>	10
Unit 6	<p>MUSCLES MECHANICS</p> <p><i>Structure & composition of muscle</i></p> <p><i>Fiber length & cross section area</i></p> <p><i>Mechanical propertied</i></p> <p><i>EMG changes during fatigue & contraction</i></p> <p><i>Changes in mechanical properties because of aging and exercised & immobilization</i></p> <p><i>Clinical applications</i></p>	10
UNIT 7	<p>LIGAMENT & TENDON MECHANICS</p> <p><i>Structure and composition</i></p> <p><i>Mechanical properties</i></p> <p><i>Cross sectional area measurements</i></p> <p><i>Muscle tendon properties</i></p> <p><i>Temperature sensitivity</i></p> <p><i>Changes in mechanical properties because of aging exercise and immobilization</i></p> <p><i>Mechanoreceptors</i></p> <p><i>Clinical applications</i></p>	10
UNIT 8	<p>JOINT MECHANICS</p> <p><i>Joint Design</i></p> <p><i>Joint categories</i></p> <p><i>Joint functions</i></p> <p><i>Arthrokinematics</i></p> <p><i>Osteokinematics</i></p> <p><i>Kinematics chairs</i></p> <p><i>Joint forces, equilibrium & distribution of these forces</i></p> <p><i>Joint stability & its mechanism</i></p> <p><i>Articular Cartilage Mechanics</i></p> <p><i>Clinical applications</i></p>	10
UNIT 9	<p>MEASUREMENT INSTRUMENTS</p> <p><i>Goniometer</i></p>	15

	<p><i>Accelerometer</i> <i>Photo optical devices</i> <i>Pressure transducers and force plates</i> <i>Gait analyzer</i> <i>Isokinetic device</i> <i>EMG</i> <i>Electro physiology of muscle contraction</i> <i>Recording</i> <i>Processing</i> <i>Relationship between EMG and bio-mechanical variables.</i></p>	
UNIT 10	<p>MECHANICAL ENERGY, WORK AND POWER <i>Definitions</i> <i>Positive and Negative work of muscle</i> <i>Muscle of mechanical power</i> <i>Causes of inefficient movement</i> <i>Co-contraction</i> <i>Isometric contraction</i> <i>Energy generation at one joint and absorption at another</i> <i>Energy flow</i> <i>Energy storage</i> ERGONOMICS</p>	15
UNIT 11	<p>APPLICATION OF BONE AND JOINT MECHANICS <i>Load sharing & load transfer</i> <i>Prosthetic design criteria</i> <i>Bio-mechanical analysis of implants internal fixations</i> <i>Degenerative changes in weight bearing joints & compensatory actions</i></p>	10
UNIT 12	<p>GAIT <i>Gait parameter</i> <i>Kinetic</i> <i>Kinematic</i> <i>Time- Space</i> <i>Pathological gait</i> <i>Running</i> <i>Stair climbing</i> <i>Changes in gait following various surgeries/ diseases/ disorders</i></p>	10
UNIT 13	<p>ORTHOISIS & PROTHOSIS <i>Orthosis of spine</i> <i>Orthosis of upper limb</i> <i>Orthosis of lower limb</i> <i>Prescription checkouts & proper fittings</i> <i>Bio-mechanical principles governing them</i> <i>Aids used in management of disability</i></p>	10

BIOMECHANICS			
Course Code MPT(C)-204P	LAB COURSE(50 Hours)	L-T-P-C	0-0-2-4
	Topic		Hours
UNIT 1	<i>This involves application of topics in MPT 2.3 via demonstrations, field visits and case presentations.</i>		50
THESIS			
<i>As part of the requirement for the Master's degree the student is required to undertake a research study under the guidance of a guide.</i>			
<i>Issues of Cardiopulmonary disorders may be studied on patients or normal individuals.</i>			
SEMINARS			
<i>These will serve as a platform for students to integrate various components of patient management. Students will give presentations on topics provided to them.</i>			

IIMT College of Medical Sciences (Allied Health Sciences)

ACADEMIC HAND BOOK



**Master of Physiotherapy
(Neurology)
(Ordinance, Evaluation Scheme & Syllabus)**

Chapter-1

General

- 1- This ordinance may be called the “Ordinance Relating to Master of Physiotherapy Course”.
- 2- The ordinance shall come in to force from session 2018-19.

Chapter-2

TITLE, & ELIGIBILITY OF ADMISSION

- 1- **OBJECTIVE:** To Train Physiotherapists who will be able to:
 - Assume leadership roles in departments.
 - Assume enhanced patient care responsibilities.
 - Formulate and implement educational Programs.
 - Analyze and undertake research.
- 2- The name of Degree to be awarded shall be Master of Physiotherapy (MPT) .
- 3- Course Program & duration –
 - a. **Name:** Master's of Physiotherapy
(Orthopaedics).
Master's of Physiotherapy
(Neurology).
Master's of Physiotherapy
(Cardiopulmonary).
Master's of Physiotherapy
(Sports Medicine).
 - b. **Nature:** Regular and full time.
 - c. **Duration:** Two Years course, designated as;
First year MPT
Second Year MPT
 - d. **Pattern:** Annual System
- 4- The medium of Teaching/Instruction and examination will be in English.
- 5- (a) A student seeking admission to the Master of Physiotherapy must have passed regular full time Bachelor of Physiotherapy (B.P.T.) course from any recognized institute/ University by U.G.C. .
(b) The eligible students may be called for an Entrance test prescribed by the University.

Chapter-3

THE CURRICULUM

- 6- Academic Calendar -
I & II year = Session = August of every year
Annual examination = every year in July .
- 7- Teaching Hours –
The following shall be the distribution of teaching hours for the course of study.

MPT (ORTHOPEDICS) – FIRST YEAR

Subject	Hours
Medical and Surgical Management of Disorders of the Musculoskeletal System	100
Physiotherapy Management in Disorders of the Musculoskeletal System-I	125
Physiotherapy Management in Disorders of the Musculoskeletal System-II	125
Research Methodology and Biostatistics	100
Physiotherapy Management in Disorders of the Musculoskeletal System (Lab. Hours)	50
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1700 Hrs.

SECOND YEAR

Subject	Hours
Pedagogy in Physiotherapy Education	100
Management, Administration and Ethical Issues	75
Biomechanics	150
Biomechanics (Lab. Hours)	25
Dissertation	200
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1750 Hrs.

MPT (NEUROLOGY) – FIRST YEAR

Subject	Hours
Medical and Surgical Management of Disorders of the Nervous System	100
Physiotherapy Management in Disorders of the Nervous System-I	125
Physiotherapy Management in Disorders of the Nervous System-II	125
Research Methodology and Biostatistics	100
Physiotherapy Management in Disorders of the Nervous System (Lab. Hours)	50
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1700 Hrs.

SECOND YEAR

Subject	Hours
Pedagogy in Physiotherapy Education	100
Management, Administration and Ethical Issues	75
Biomechanics	150
Biomechanics (Lab. Hours)	25
Dissertation	200
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1750 Hrs.

MPT (CARDIOPULMONARY) – FIRST YEAR

Subject	Hours
Medical and Surgical Management of Disorders of the Cardiopulmonary System	100
Physiotherapy Management in Disorders of the Cardiopulmonary System-I	125
Physiotherapy Management in Disorders of the Cardiopulmonary System-II	125
Research Methodology and Biostatistics	100
Physiotherapy Management in Disorders of the Cardiopulmonary System (Lab. Hours)	50
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1700 Hrs.

SECOND YEAR

Subject	Hours
Pedagogy in Physiotherapy Education	100
Management, Administration and Ethical Issues	75
Biomechanics	150
Biomechanics (Lab. Hours)	25
Dissertation	200
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1750 Hrs.

MPT (SPORTS MEDICINE) – FIRST YEAR

Subject	Hours
Medical and Surgical Management of Sports Injuries	100
Physiotherapy Management in Disorders of the Sports Injuries- I	125
Physiotherapy Management in Disorders of the Sports Injuries-II	125
Methodology and Biostatistics	100
Physiotherapy Management in Disorders of the sports Injuries (Lab. Hours)	50
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1700 Hrs.

SECOND YEAR

Subject	Hours
Pedagogy in Physiotherapy Education	100
Management, Administration and Ethical Issues	75
Biomechanics	150
Biomechanics in Sports (Lab. Hours)	25
Dissertation	200
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1750 Hrs.

Chapter – 4

EXAMINATIONS

8- Examination

(A) Total papers:

Total theory papers	:	7
Total Practical	:	2
Total Viva Voce	:	2
Dissertation	:	1

Mode of Curriculum delivery and execution includes classroom teaching, assignment, tests, lab, work, project, case studies, participation in relevant events, Group Discussion, etc.

- (i) The students admitted to the course shall attend lectures, practical classes, clinical training/ attachments and seminars as prescribed by the College/University.
- (ii) Every student shall be required to appear in the written house test in various subjects and/or practicals as may be prescribed by the College/University.
- (vi) The last date of receipt of admission forms and fees in the college office for the University Examination shall be fixed by the University from time to time.
- (v) The student shall be examined in such theory papers and practical examinations as may be prescribed in the syllabus.

(B) INTERNAL ASSESSMENT:

- (a) There shall be tests in each subject in each academic year. These will carry weightage in the total marks. Marks shall be notified within one week of the test.
- (b) These tests could be in the form of written tests, quizzes, symposia assignment, group discussion, etc.
- (c) A promoted student who has to reappear in the annual examination of the paper will retain internal assessment marks of the previous year.
- (e) In Internal Assessment a maximum of **10 marks** in each subject shall be awarded for attending classes (theory / practical) as per the following norms:

85% or more attendance	-	10 Marks
80% or more but less than 85% attendance	-	9 Marks
75% or more but less than 80% attendance	-	8 Marks
70% or more but less than 75% attendance	-	7 Marks
65% or more but less than 70% attendance	-	5 Marks
60% or more but less than 65% attendance	-	3 Marks
51% or more but less than 60% attendance	-	2 Marks
50% attendance	-	1 Mark
Less than 50% attendance	-	0 Mark

(C) ANNUAL EXAMINATIONS :

Annual examination of theory and practical shall be conducted at the end of each session as outlined below:

- a. Mode: Theory Papers Written Only

- | | | |
|----|---|--|
| | Lab Hours | Written, Demonstration and Viva Voce |
| | Viva Voce | Viva Voce |
| b- | Duration: | Theory
Practical |
| | | 3 hours
Upto three hours per student |
| c- | Examiner | Theory
Practical |
| | | 01 (either internal or external) from the panel
02 (1 internal and 1 external) from the panel
* Panel to be prepared by the Board of
Studies and approved by the Vice Chancellor
02 (1 internal and 1 external from the panel) |
| d- | Moderation of Theory Papers: | Viva Voce
For papers set by external examiners only.
Change cannot be more than 30% after consultation
with the teacher who has taught the paper. |
| e- | Dissertation evaluation | There will be an internal & an external evaluator for
each Dissertation and a viva voce will be conducted
after Dissertation approval by both. |
| f- | A special examination may be held in the month of December for the students of the first
year of the course to enable them to reappear in those papers in which they had failed or
could not appear due to any reason other than shortage of attendance . | |

(D) PROMOTION:

- (i) A candidate is declared passed in an examination in subject, if he/she secures 50% of marks in theory and 50% in practical separately.
- (a)** If a candidate fails in only one head/subject and having passed in all other head/subject of the given examination of the year than his/her deficiency of maximum five (05) marks may be fulfilled by grace marks after fulfilling the conditions given below:
- (A)** If a candidate fails in only one head/subject and having passed in all other heads/subjects of the given examination of a **semester*/year**, then his/her deficiency of marks may be fulfilled by grace marks under the following conditions:-
- (i) Grace mark is not a matter of right of the student but is the discretion of the University.
 - (ii) Provided that the candidate has appeared in the main examination of the concerned course and falls short of pass marks by not more than five (05) marks in theory paper only. Benefit of above mentioned shall not be given to the candidate who had appeared in supplementary/special examination/carry over examination.
 - (iii) Further, benefit of grace marks may be given only to the candidate who will pass the entire concerned examination of the **semester*/year** after awarding the grace marks and not for the purpose of promoting the student to next year with back papers or for improvement of division or percentage.
 - (iv) If in a head/subject of an examination passing in Theory, Practical or sessional exams separately is mandatory, then the benefit of grace marks shall be given only in Theory examination of the University examination.
 - (v) The award of grace marks permissible shall be on the basis of 1 grace mark for every 05 marks secured by an examinee over and above the minimum passing aggregate marks of all subjects of the year.

- (ii) **I Year: (iii)** A student will not be promoted from I year to II year if he / she fails in more than 2 theory papers and any practical exam failing which this student shall reappear for the failed examinations.

II year: (iv) A student will be declared Pass in the II year if he / she cleared all the papers of the II year and whose thesis has been approved and has passed in the viva voce of the thesis failing which this student shall reappear for the failed examination.

- (v) A student will appear in supplementary examination for all failed subjects and who has failed only in theory or practical/viva of Biomechanics shall have to appear in both theory & practical/viva of the concern subject in the supplementary examination.

(E) CLINICAL PRACTICE:

Students engage in clinical practice in Physiotherapy Departments in the Orthopedics/ Neurology/Cardiopulmonary/Sports Physiotherapy setting to enhance their clinical skills and apply theoretical knowledge gained during teaching sessions.

(F) THESIS / DISSERTATION:

A Research Dissertation should be compulsory and should embody the student's own work carried in the elective area under the supervision of a recognised guide qualified for the purpose and as recommended by the Indian Association of Physiotherapists (IAP).

A Research proposal should be submitted to the University for Approval within six (6) months of admission to the course.

The completed Research Dissertation should be submitted three (3) months in advance of the written, oral, clinic and practical examination.

(G) PG TEACHERS:

A PG Teacher/Guide must have at- least 5 years of full time teaching and clinical experience in Physiotherapy subjects.

For other specific qualification of teachers please refer to the recommendations on the qualifications of Teachers prescribed by the Indian Association of Physiotherapists (IAP).

(H) EXAMINERS:

A PG teacher as defined above is eligible to be appointed as an examiner.

There shall be at least two examiners in each thesis and clinical examinations out of which, at-least one shall be an external examiner. The external examiners who fulfill the conditions should ordinarily be invited from another recognised Institution / University, preferably from outside the state.

Chapter – 5

AWARD OF DEGREE

9- Award of Degree

- i) A student will be awarded a MPT Degree only on successful completion of the course including clinical practice for both the years.
- ii) The entire course of study in MPT for first and second year must be completed within 4 years of the date of admission.

Chapter – 6

ATTENDANCE

10- Attendance –

The students are expected to attend all the classes and should not have less than 75 % attendance in theory as well as in practical classes, wherever held, to become eligible to appear for the university examination. Short fall in attendance can, however be condoned in deserving cases to the extent of 10% by the Principal. If the short fall is more than 10% but not more than 15%, the Principal may recommend deserving cases to the Vice Chancellor for condonation. The order of the Vice Chancellor in this regard shall be final.

Chapter – 7

Power to Modify

- 11.** In the event of any emergent situation, if any deviation is considered necessary, the Vice Chancellor is authorised to modify the Ordinance. Subject to subsequent ratification by the Executive Council.

Chapter-8

SCHEME OF EXAMINATIONS

13- Marks Distribution

Note: **IA** : Internal Assessment, **AE** : Annual Exam

MPT (ORTHOPEDECS)

First Year

Subject	IA	AE	Total
Basic of Computer Application	-	-	P / F
Medical & Surgical Management in Disorder of the Musculoskeletal System	50	100	150
P.T. Management in Disorder of the Musculoskeletal System-I	50	100	150
P.T. Management in Disorder of the Musculoskeletal System-II	50	100	150
P.T. Management in Disorder of the Musculoskeletal System-Practical	100	400	500
Research Methodology & Biostatistics	50	100	150
Seminars on Clinical Issues	100	-	100
		Total	1200

Second Year

Subject	IA	AE	Total
Pedagogy in Physiotherapy Education	50	100	150
Management, Administration & Ethical Issues	50	100	150
Biomechanics	50	100	150
Biomechanics-Viva	50	100	150
Dissertation	-	-	P / F
Seminars on Clinical Issues	100	-	100
	Total		700
GRAND TOTAL I and II	:		1900

MPT

Note: **IA** : Internal Assessment, **AE** : Annual Exam

MPT (NEUROLOGY)

First Year

Subject	IA	AE	Total
Basic of Computer Application	-	-	P / F
Medical & Surgical Management in Disorder of the Nervous System	50	100	150
P.T. Management in Disorder of the Nervous System-I	50	100	150
P.T. Management in Disorder of the Nervous System-II	50	100	150
P.T. Management in Disorder of the Nervous System-Practical	100	400	500
Research Methodology & Biostatistics	50	100	150
Seminars on Clinical Issues	100	-	100
		Total	1200

Second Year

Subject	IA	AE	Total
Pedagogy in Physiotherapy Education	50	100	150
Management, Administration & Ethical Issues	50	100	150
Biomechanics	50	100	150
Biomechanics-Viva	50	100	150
Dissertation	-	-	P / F
Seminars on Clinical Issues	100	-	100
		Total	700

GRAND TOTAL I and II : 1900

MPT

Assessment, Note: **IA :** Internal
AE : Annual Exam

MPT

(CARDIOPULMONARY CONDITION)

First Year

Subject	IA	AE	Total
Basic of Computer Application	-	-	P / F
Medical & Surgical Management in Disorder of the Cardiopulmonary System	50	100	150
P.T. Management in Disorder of the Cardiopulmonary System-I	50	100	150
P.T. Management in Disorder of the Cardiopulmonary System-II	50	100	150
P.T. Management in Disorder of the Cardiopulmonary System-Practical	100	400	500

Research Methodology & Biostatistics	50	100	150
Seminars on Clinical Issues	100	-	100
		Total	1200

Second Year

Subject	IA	AE	Total
Pedagogy in Physiotherapy Education	50	100	150
Management, Administration & Ethical Issues	50	100	150
Biomechanics	50	100	150
Biomechanics-Viva	50	100	150
Dissertation	-	-	P / F
Seminars on Clinical Issues	100	-	100
		Total	700

GRAND TOTAL I and II MPT : **1900**

Note:

IA : Internal

Assessment,
Exam

AE : Annual

MPT

(SPORTS PHYSIOTHERAPY)

First Year

Subject	IA	AE	Total
Basic of Computer Application	-	-	P / F
Medical & Surgical Management in Disorder of the Sports Injuries	50	100	150
P.T. Management in Disorder of the Sports Injuries -I	50	100	150
P.T. Management in Disorder of the Sports Injuries -II	50	100	150
P.T. Management in Disorder of the Sports Injuries -Practical	100	400	500
Research Methodology & Biostatistics	50	100	150
Seminars on Clinical Issues	100	-	100
		Total	1200

Second Year

Subject	IA	AE	Total
Pedagogy in Physiotherapy Education	50	100	150
Management, Administration & Ethical Issues	50	100	150
Biomechanics	50	100	150
Biomechanics-Viva	50	100	150
Dissertation	-	-	P / F
Seminars on Clinical Issues	100	-	100
		Total	700
GRAND TOTAL I and II		:	1900

**First Year & Second Year
MPT 1st year (Neurology)
Evaluation Scheme**

S. NO.	SUBJECT CODE	SUBJECT	PERIODS			INTERNAL				EXTERNAL		TOTAL	CREDIT
			L	T	P	CA	TA	Total	IP	ET	EP		
1.	MPT(N)-101	Medical and surgical Management of disorders of the Nervous system	2	1	0	10	10	20	-	80	-	100	4
2.	MPT(N) - 102	Physiotherapy Management in Disorders of the Nervous system – I	3	1	0	10	10	20	-	80	-	100	4
3.	MPT(N) -103	Physiotherapy Management in Disorders of the Nervous system - II	3	1	0	10	10	20	-	80	-	100	4
4.	MPT(N)- 104	Research Methodology and Biostatistics	2	1	0	10	10	20	-	80	-	100	4
5.	MPT(N)-105P	Physiotherapy Management in Disorder of the Nervous system	0	0	2	0	0	0	20	0	80	100	4
6.	MPT(N)-106	Seminars on Clinical Issues	0	3	0	0	0	200	0	0	0	200	8
Grand Total											700	28	
<p>L- Lecture, T- tutorials, P- Practical (Labs), CT- Class Test (Sessionals), TA- Teacher's Assessment (Assignments, Tutorials), IP- Internal Practical, ET- External Theory, EP- external Practical.</p>													

**MPT 2nd year (Neurology)
Evaluation Scheme**

S. NO.	SUBJECT CODE	SUBJECT	PERIODS			INTERNAL				EXTERNAL		TOTAL	CREDIT
			L	T	P	CA	TA	Total	IP	ET	EP		
1.	MPT(N)-201	Pedagogy in Physiotherapy Education	2	1	0	10	10	20	-	80	-	100	4
2.	MPT(N)-202	Management, Administration and Ethical Issues	2	1	0	10	10	20	-	80	-	100	4
3.	MPT(N) -203	Biomechanics	4	1	0	10	10	20	-	80	-	100	4
4.	MPT(N)-204P	Biomechanics (Lab Hours)	0	0	2	-	-	-	20	-	80	100	4
5.	MPT(N)-205	Dissertation	PASS/ FAIL										-
6.	MPT(N)-206	Seminars on Clinical Issues	0	3	0	0	0	200	0	0	0	200	8
Grand Total												600	24

L- Lecture, T- tutorials, P- Practical (Labs), CT- Class Test (Sessionals), TA- Teacher's Assessment (Assignments, Tutorials), IP- Internal Practical, ET- External Theory, EP- external Practical.

MPT 1ST YEAR (NEUROLOGY)

MEDICAL AND SURGICAL MANAGEMENT OF DISORDERS OF THE NERVOUS SYSTEM			
Course Code MPT(N)-101	THEORY COURSE(100 Hours)	L-T-P-C	2-1-0-4
	Topic	Hours	
UNIT 1	<i>NEUROLOGY-Following are the topics to be included but not limited to: Epidemiology, Pathomechanics, clinical presentation, relevant diagnostic test and medical management of disorders of the Nervous system. Congenital and hereditary disorders</i>	5	
UNIT 2	DISORDERS OF CEREBRAL CIRCULATION	5	
UNIT 3	HEAD INJURY	5	
UNIT 4	INFECTIOUS DISORDERS	5	
UNIT 5	DISORDERS OF SPINAL CORD AND CAUDA EQUINE	5	
UNIT 6	DISORDERS OF PERIPHERAL NERVES	5	
UNIT 7	DISORDER OF MUSCLE	5	
UNIT 8	CEREBELLAR DISORDERS	5	
UNIT 9	RSD, EPILEPSY, DEMENTIA, ALZHEIMER'S	5	
UNIT 10	DISORDERS OF THE VESTIBULAR SYSTEM.	5	
UNIT 11	EXTRAPYRAMIDAL DISORDERS ETC.	5	
UNIT 12	NEUROSURGERY SURGERY MANAGEMENT OF THE ABOVE CONDITIONS, INDICATIONS, CONTRA-INDICATION; FOR SURGERY, PRECAUTIONS AFTER SURGERY. ALSO INCLUDED: GENERAL PRINCIPLES TUMOURS	5	
UNIT 13	INTRACRANIAL ABSCESS	5	
UNIT 14	HYDROCEPHALUS	5	
UNIT 15	STEREOSTASTICS MALFORMATIONS	5	
UNIT 16	OPERATIONS ON THE DISC-CERVICAL & LUMBAR DISC OPERATION	5	
UNIT 17	MALFORMATION OF THE SPINE AND SPINAL CORD	5	
UNIT 18	LUMBAR AND CISTERNAL PUNCTURES TECHNIQUE AND COMPLICATIONS.	3	
UNIT 19	GENERAL RULES OF SURGICAL REPAIR OF THE PERIPHERAL NERVES	5	
UNIT 20	MUSCLE LENGTHENING / RELEASE.	2	
UNIT 21	SPASTICITY ICU MANAGEMENT OF THE NEUROLOGICALLY IMPAIRED PATIENTS.	5	

PHYSIOTHERAPY MANAGEMENT IN DISORDERS OF THE NERVOUS SYSTEM - I			
Course Code	MPT(N)-102	THEORY COURSE(125 Hours)	L-T-P-C
			3-1-0-4
	Topic		Hours
UNIT 1	SECTION 1 GENERAL PRINCIPLES <i>Development of a child</i>		10
UNIT 2	NEURO DEVELOPMENTAL TECHNIQUES.		5
UNIT 3	PRINCIPLES AND TECHNIQUE OF MRP		5
UNIT 4	PRINCIPLES AND TECHNIQUE OF PNF		10
UNIT 5	MOTOR CONTROL AND LEARNING.		5
UNIT 6	BALANCE AND COORDINATION		5
UNIT 7	ASSESSMENT AND MANAGEMENT OF PAIN		5
UNIT 8	GROUP EXERCISES		5
UNIT 9	P.T. IN HOME SETTING		5
UNIT 10	BIO-FEEDBACK		5
UNIT 11	CRITICAL ANALYSIS OF EXERCISE AND ELECTRO THERAPEUTIC MODALITIES		5
UNIT 12	DISABILITY EVALUATION.		5
UNIT 13	SECTION – II PHYSIOTHERAPY MANAGEMENT IN SPECIFIC CONDITIONS ASSESSMENT AND MANAGEMENT OF CONGENITAL AND HEREDITARY DISORDERS		5
UNIT 14	DISORDERS OF CEREBRAL CIRCULATION		5
UNIT 15	HEAD INJURY		5
UNIT 16	INFECTIOUS DISORDER		5
UNIT 17	DISORDERS OF SPINAL CORD AND CAUDA EQUINE		5
UNIT 18	DISORDERS OF PERIPHERAL NERVES		5
UNIT 19	DISORDER OF MUSCLE		5
UNIT 20	CEREBELLAR DISORDERS		5
UNIT 21	RSD, EPILEPSY, DEMENTIA, ALZHEIMER'S		5
UNIT 22	DISORDERS OF THE VESTIBULAR SYSTEM.		5
UNIT 23	EXTRAPYRAMIDAL DISORDERS ETC.		5

MANAGEMENT IN DISORDERS OF THE NERVOUS SYSTEM - II			
Course Code MPT(N)-103	THEORY COURSE(125 Hours)	L-T-P-C	3-1-0-4
	Topic		Hours
UNIT 1	TUMOURS		15
UNIT 2	INTRACRANIAL ABSCESS		10
UNIT 3	HYDROCEPHALUS		10
UNIT 4	STEREOTACTICS MALFORMATIONS		10
UNIT 5	OPERATIONS ON THE DISC-CERVICAL & LUMBAR DISC OPERATION		15
UNIT 6	MALFORMATION OF THE SPINE AND SPINAL CORD		10
UNIT 7	LUMBAR AND CISTERNAL PUNCTURES TECHNIQUE AND COMPLICATIONS.		10
UNIT 8	GENERAL RULES OF SURGICAL REPAIR OF THE PERIPHERAL NERVES		10
UNIT 9	MUSCLE LENGTHENING / RELEASE.		10
UNIT 10	SPASTICITY		10
UNIT 11	ICU MANAGEMENT OF THE NEUROLOGICALLY IMPAIRED PATIENTS.		15

RESEARCH METHODOLOGY AND BIOSTATISTICS			
Course Code MPT-104	THEORY COURSE(100 Hours)	L-T-P-C	3-1-0-4
	Topic		Hours
UNIT 1	RESEARCH METHODOLOGY- <i>How are read and critique research.</i>		2
UNIT 2	INTRODUCTION TO RESEARCH: FRAMEWORK; LEVELS OF MEASUREMENT; VARIABLES.		3
UNIT 3	BASIC RESEARCH CONCEPTS; VALIDITY AND RELIABILITY		5
UNIT 4	DESIGN, INSTRUMENTATION AND ANALYSIS FOR QUALITATIVE RESEARCH DESIGN, INSTRUMENTATION AND ANALYSIS FOR QUALITATIVE RESEARCH		5
UNIT 5	DESIGN, INSTRUMENTATION AND ANALYSIS FOR QUASI-EXPERIMENTAL RESEARCH		5
UNIT 6	HOW TO WRITE A RESEARCH PROPOSAL THE USE AND PROTECTION OF HUMAN AND ANIMAL SUBJECTS		5
UNIT 7	BIOSTATISTICS <i>Descriptive and Inferential statistics</i>		5
UNIT 8	TYPES OF DATA: QUALITATIVE AND QUANTITATIVE		4
UNIT 9	FREQUENCY DISTRIBUTIONS		6
UNIT 10	DESCRIBING DATA WITH GRAPHS		5
UNIT 12	DESCRIBING DATA WITH AVERAGES MODE, MEDIAN, MEAN		2
UNIT 13	DESCRIBING VARIABILITY VARIANCE, STANDARD DEVIATION, ETC		3
UNIT 14	NORMAL DISTRIBUTIONS		5
UNIT 15	INTERPRETATION OF R		2
UNIT 16	HYPOTHESIS TESTING		3
UNIT 17	T TESTS		5
UNIT 18	ANOVA		2
UNIT 19	PROBABILITY		3
UNIT 20	TYPE I AND TYPE II ERRORS		5
UNIT 21	PARAMETRIC AND NON- PARAMETRIC TESTS		5
UNIT 22	WHICH TESTS TO USE		5
UNIT 23	BASIC OF COMPUTERS – HARDWARE AND SOFTWARE		5
UNIT 24	BASIC OF COMPUTER APPLICATIONS – WINDOWS, MS WORD, POWER POINT, ETC.		5
UNIT 25	SIMPLE STATISTICAL ANALYSIS USING AVAILABLE SOFTWARE.		5

Course Code MPT(N)-105P	LAB COURSE(50 Hours)	L-T-P-C	0-0-2-4
	Topic		Hours
LAB	<p><i>Students will be instructed via demonstrations, hands of techniques, field visits and case conferences on specific techniques used in management of patients with neurological disorders.</i></p> <p><i>Students will on their experiences at the clinical postings to formulate a treatment plan for cases presented at the case conference.</i></p>		50

MPT 2nd YEAR (NEUROLOGY)

PEDAGOGY IN PHYSIOTHERAPY EDUCATION

Course Code MPT(N)-201	THEORY COURSE(100 Hours)	L-T-P-C	2-1-0-4
	Topic		Hours
UNIT 1	<p>PHILOSOPHY OF EDUCATION AND EMERGING ISSUES IN EDUCATION <i>Need for Education Philosophy : Some Major Philosophies, Idealism, Naturalism, Pragmatism and their Implications for Education.</i> <i>Meaning, Functions and Aims of Education Formal, Informal and Non-formal Education. Agencies of Education Current Issues and trends in Higher Education</i> <i>Issue of Quality in Higher education, Autonomy and Accountability, Privatization, Professional Development of Teachers, Education of persons with Disabilities.</i></p>		15
UNIT 2	<p>CONCEPT OF TEACHING AND LEARNING <i>Meaning scope of Educational Psychology</i> <i>Meaning and Relationship between Teaching and Learning Learning Theories Dynamics of Behaviour Individuals Differences</i></p>		10
UNIT 3	<p>CURRICULUM <i>Meaning and concept</i> <i>Basis of curriculum Formulation & Development Framing Objectives for Curriculum</i> <i>Process of Curriculum Development and Factors Affecting Curriculum Developmental Evaluation of Curriculum</i></p>		10
UNIT 4	<p>METHOD AND TECHNIQUES OF TEACHING <i>Lecture, Demonstration, Discussion, Seminar, Assignment, Project and Case Study.</i></p>		10
UNIT 5	<p>PLANNING FOR TEACHING <i>Bloom's Taxonomy of Instructional Objectives, Writing Instructional Objectives in Behavioural terms, Unit planning and Lesson Planning.</i></p>		10
UNIT 6	<p>TEACHING AIDS <i>Types of Teaching Aides</i> <i>Principles of Selection, Preparation, and Use of Audio-Visual aids.</i></p>		10
UNIT 7	<p>MEASUREMENT AND EVALUATION <i>Nature of Educational Measurement: Meaning, Process, Types of tests. Construction of an Achievement test and analysis.</i> <i>Standardized Test.</i> <i>Introduction of some standardized tools, important tests of Intelligence, Aptitude, and Personality Continuous and Comprehensive Evaluation.</i></p>		15
UNIT 8	<p>GUIDANCE AND COUNSELING <i>Meaning and concepts of Guidance and Counseling , principles. Guidance and Counseling Services of Students and Faculty members Faculty Development and Development of Personnel for P.T. Services</i></p>		10
UNIT 9	<p>CLINICAL EDUCATION <i>Awareness and Guidance to the Common people about Health and Diseases and Available professional Services. Patient Education Education of the Practitioners</i></p>		10

MANAGEMENT, ADMINISTRATION AND ETHICAL ISSUES			
Course Code	MPT(N)-202	THEORY COURSE(75 Hours)	L-T-P-C
Topic			2-1-0-4
			Hours
UNIT 1	Management Functions of management,		5
UNIT 2	EVALUATION OF MANAGEMENT THROUGH SCIENTIFIC MANAGEMENT THEORY, <i>Classical theory</i> <i>System Approach</i> <i>Contingency approach</i>		10
UNIT 3	MANAGEMENT PROCESS <i>Planning, Organization, Direction, Controlling, Decision making</i>		5
UNIT 4	INTRODUCTION TO PERSONNEL MANAGEMENT. <i>Staffing, Recruitment, Selection, Performance appraisal, Collective bargaining, discipline, Job satisfaction.</i>		5
UNIT 5	QUANTITATIVE METHODS OF MANAGEMENT <i>Relevance of statistical and/ or technique in management.</i>		10
UNIT 6	MARKETING <i>Market segmentation, marketing research production planning pricing, channels of distribution, promotion consumer behaviour, licensor.</i>		5
UNIT 7	TOTAL QUALITY MANAGEMENT <i>Basis of quality management – acid for quality control quality assurance program in hospitals, medical audit, and international quality system.</i>		5
UNIT 8	ADMINISTRATION <i>Hospital as an organization</i> <i>Functions and types of hospitals selected clinical supportive ancillary services of a hospital, emergency department, nursing, physical medicine & rehabilitation, clinical supportive and ancillary services of a hospital, emergency department nursing physical medicine & rehabilitation, clinical laboratory, pharmacy and dietary dept.</i> <i>Roles of Physiotherapist, Physiotherapy Director, Physiotherapy Supervisor, Physiotherapy Assistant, Physiotherapy Aide, Occupational Therapist, Home health Aide, Volunteer.</i> <i>Directed care and referral relationship and confidentially.</i>		15
UNIT 9	LEGAL PROFESSIONAL ETHICAL ISSUES <i>Physical therapy: Definition and development</i> <i>The implications & confirmation to the rules of professional conduct.</i> <i>Legal responsibility for their actions in the professional context and understanding the physiotherapist liability and obligations in the case of medical legal action.</i> <i>Code of ethics</i> <i>A wider knowledge of ethics relating to current social and medical policy in the provisions of health care.</i> <i>Functions of the relevant professional associations education body and</i>		15

	<p><i>trade union</i> <i>The role of the international health agencies such as the world health organizations</i> <i>Standards of practice for physical therapies.</i> <i>Current issues.</i></p>	
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BIOMECHANICS			
Course Code	MPT(N)-203	THEORY COURSE(150 Hours)	L-T-P-C
			4-1-0-4
	Topic		Hours
UNIT 1	FUNDAMENTAL MECHANICS <i>Forces</i> <i>Moments</i> <i>Newton's laws</i> <i>Composition and Resolution of forces.</i> <i>Static Equilibrium</i> <i>Dynamic Equilibrium</i> <i>Force systems</i> <i>Lever</i> <i>Pulley Systems</i> <i>Density & Mass</i> <i>Segmental Dimensions</i>		15
UNIT 2	KINEMATICS <i>Types of Motion</i> <i>Location of Motion</i> <i>Magnitude of Motion</i> <i>Direction of Motion</i> <i>Angular motion and its various parameters</i> <i>Linear motion and its various parameters.</i> <i>Projectile motions.</i>		15
UNIT 3	KINETICS <i>Definition of forces</i> <i>Force vectors</i> <i>Naming of Force</i> <i>Force of gravity & Cog</i> <i>Stability</i> <i>Reaction forces</i> <i>Equilibrium</i> <i>Linear forces system</i> <i>Friction and its various parameters</i> <i>Parallel force system</i> <i>Concurrent force systems</i> <i>Work powers & energy</i> <i>Moment arms of force</i> <i>Force components</i> <i>Equilibrium</i>		15
UNIT 4	FLUID MECHANICS <i>Various laws governing the flow of fluids</i> <i>Various laws governing the volume of fluids</i> <i>Various laws governing the pressure of fluids</i> <i>Various laws governing the energy of fluids</i>		10

	<p><i>Various parameters explaining the flow</i> <i>Various parameters describing the fluids</i> <i>Clinical applications</i></p>	
UNIT 5	<p>BONE MECHANICS <i>Structure & composition of bone</i> <i>Stress</i> <i>Strain</i> <i>Modules of rigidity & modular of elasticity</i> <i>Poisson's effect</i> <i>Strain energy</i> <i>Static & cyclic load behaviors</i> <i>Load</i> <i>Mechanical properties of trabecular bone</i> <i>Mechanical properties of cortical bone</i> <i>Bone remodeling</i> <i>Response of the bone to aging & exercise & immobilization</i> <i>Mechanisms to prevent fracture present in bone</i> <i>Fracture of prediction</i> <i>Behavior of bone under load</i> <i>Clinical applications</i> <i>Failure criteria</i></p>	10
UNIT 6	<p>MUSCLES MECHANICS <i>Structure & composition of muscle</i> <i>Fiber length & cross section area</i> <i>Mechanical propertied</i> <i>EMG changes during fatigue & contraction</i> <i>Changes in mechanical properties because of aging and exercised & immobilization</i> <i>Clinical applications</i></p>	10
UNIT 7	<p>LIGAMENT & TENDON MECHANICS <i>Structure and composition</i> <i>Mechanical properties</i> <i>Cross sectional area measurements</i> <i>Muscle tendon properties</i> <i>Temperature sensitivity</i> <i>Changes in mechanical properties because of aging exercise and immobilization</i> <i>Mechanoreceptors</i> <i>Clinical applications</i></p>	10
UNIT 8	<p>JOINT MECHANICS <i>Joint Design</i> <i>Joint categories</i> <i>Joint functions</i> <i>Arthrokinematics</i> <i>Osteokinematics</i></p>	10

	<p><i>Kinematics chairs</i> <i>Joint forces, equilibrium & distribution of these forces</i> <i>Joint stability & its mechanism</i> <i>Articular Cartilage Mechanics</i> <i>Clinical applications</i></p>	
UNIT 9	<p>MEASUREMENT INSTRUMENTS <i>Goniometer</i> <i>Accelerometer</i> <i>Photo optical devices</i> <i>Pressure transducers and force plates</i> <i>Gait analyzer</i> <i>Isokinetic device</i> <i>EMG</i> <i>Electro physiology of muscle contraction</i> <i>Recording</i> <i>Processing</i> <i>Relationship between EMG and bio-mechanical variables.</i></p>	15
UNIT 10	<p>MECHANICAL ENERGY, WORK AND POWER <i>Definitions</i> <i>Positive and Negative work of muscle</i> <i>Muscle of mechanical power</i> <i>Causes of inefficient movement</i> <i>Co-contraction</i> <i>Isometric contraction</i> <i>Energy generation at one joint and absorption at another</i> <i>Energy flow</i> <i>Energy storage</i> <i>Ergonomics</i></p>	15
UNIT 11	<p>APPLICATION OF BONE AND JOINT MECHANICS <i>Load sharing & load transfer</i> <i>Prosthetic design criteria</i> <i>Bio-mechanical analysis of implants internal fixations</i> <i>Degenerative changes in weight bearing joints & compensatory actions</i></p>	10
UNIT 12	<p>GAIT <i>Gait parameter</i> <i>Kinetic</i> <i>Kinematic</i> <i>Time- Space</i> <i>Pathological gait</i> <i>Running</i> <i>Stair climbing</i> <i>Changes in gait following various surgeries/ diseases/ disorders</i></p>	10
UNIT 13	<p>ORTHOSIS & PROSTHOSIS <i>Orthosis of spine</i> <i>Orthosis of upper limb</i></p>	10

	<p><i>Orthosis of lower limb</i> <i>Prescription checkouts & proper fittings</i> <i>Bio-mechanical principles governing them</i> <i>Aids used in management of disability</i></p>	
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BIOMECHANICS			
Course Code MPT-204P	LAB COURSE(50 Hours)	L-T-P-C	0-0-2-4
	Topic		Hours
UNIT 1	<i>This involves application of topics in MPT 2.3 via demonstrations, field visits and case presentations.</i>		50
MPT(N)-205	THESIS		
	<i>As part of the requirement for the Master's degree the student is required to undertake a research study under the guidance of a guide. Issues of Neuro disorders may be studied on patients or normal individuals.</i>		
MPT(N)-206	SEMINARS ON CLINICAL ISSUES		
	<i>These will serve as a platform for students to integrate various components of patient management. Students will give presentations on topics provided to them.</i>		

IIMT College of Medical Sciences (Allied Health Sciences)

ACADEMIC HAND BOOK



**Master of Physiotherapy
(Sports Medicine)
(Evaluation Scheme & Syllabus)**

Chapter-1

General

- 1- This ordinance may be called the “Ordinance Relating to Master of Physiotherapy Course”.
- 2- The ordinance shall come in to force from session 2018-19.

Chapter-2

TITLE, & ELIGIBILITY OF ADMISSION

- 1- **OBJECTIVE:** To Train Physiotherapists who will be able to:
 - Assume leadership roles in departments.
 - Assume enhanced patient care responsibilities.
 - Formulate and implement educational Programs.
 - Analyze and undertake research.
- 2- The name of Degree to be awarded shall be Master of Physiotherapy (MPT) .
- 3- Course Program & duration –
 - a. **Name:** Master’s of Physiotherapy
(Orthopaedics).
Master’s of Physiotherapy
(Neurology).
Master’s of Physiotherapy
(Cardiopulmonary) .
Master’s of Physiotherapy
(Sports Medicine) .
 - b. **Nature:** Regular and full time.
 - c. **Duration:** Two Years course, designated as;
First year MPT
Second Year MPT
 - d. **Pattern:** Annual System
- 4- The medium of Teaching/Instruction and examination will be in English.
- 5-
 - (a) A student seeking admission to the Master of Physiotherapy must have passed regular full time Bachelor of Physiotherapy (B.P.T.) course from any recognized institute/ University by U.G.C. .
 - (b) The eligible students may be called for an Entrance test prescribed by the University.

Chapter-3

THE CURRICULUM

- 6- Academic Calendar -
I & II year = Session = August of every year
Annual examination = every year in July .
- 7- Teaching Hours –
The following shall be the distribution of teaching hours for the course of study.

MPT (ORTHOPEDICS) – FIRST YEAR

Subject	Hours
Medical and Surgical Management of Disorders of the Musculoskeletal System	100
Physiotherapy Management in Disorders of the Musculoskeletal System-I	125
Physiotherapy Management in Disorders of the Musculoskeletal System-II	125
Research Methodology and Biostatistics	100
Physiotherapy Management in Disorders of the Musculoskeletal System (Lab. Hours)	50
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1700 Hrs.

SECOND YEAR

Subject	Hours
Pedagogy in Physiotherapy Education	100
Management, Administration and Ethical Issues	75
Biomechanics	150
Biomechanics (Lab. Hours)	25
Dissertation	200
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1750 Hrs.

MPT (NEUROLOGY) – FIRST YEAR

Subject	Hours
Medical and Surgical Management of Disorders of the Nervous System	100
Physiotherapy Management in Disorders of the Nervous System-I	125
Physiotherapy Management in Disorders of the Nervous System-II	125
Research Methodology and Biostatistics	100
Physiotherapy Management in Disorders of the Nervous System (Lab. Hours)	50
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1700 Hrs.

SECOND YEAR

Subject	Hours
Pedagogy in Physiotherapy Education	100
Management, Administration and Ethical Issues	75
Biomechanics	150
Biomechanics (Lab. Hours)	25
Dissertation	200
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1750 Hrs.

MPT (CARDIOPULMONARY) – FIRST YEAR

Subject	Hours
Medical and Surgical Management of Disorders of the Cardiopulmonary System	100
Physiotherapy Management in Disorders of the Cardiopulmonary System-I	125
Physiotherapy Management in Disorders of the Cardiopulmonary System-II	125
Research Methodology and Biostatistics	100
Physiotherapy Management in Disorders of the Cardiopulmonary System (Lab. Hours)	50
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1700 Hrs.

SECOND YEAR

Subject	Hours
Pedagogy in Physiotherapy Education	100
Management, Administration and Ethical Issues	75
Biomechanics	150
Biomechanics (Lab. Hours)	25
Dissertation	200
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1750 Hrs.

MPT (SPORTS MEDICINE) – FIRST YEAR

Subject	Hours
Medical and Surgical Management of Sports Injuries	100
Physiotherapy Management in Disorders of the Sports Injuries- I	125
Physiotherapy Management in Disorders of the Sports Injuries-II	125 Research
Methodology and Biostatistics	100
Physiotherapy Management in Disorders of the sports Injuries (Lab. Hours)	50
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1700 Hrs.

SECOND YEAR

Subject	Hours
Pedagogy in Physiotherapy Education	100
Management, Administration and Ethical Issues	75
Biomechanics	150
Biomechanics in Sports (Lab. Hours)	25
Dissertation	200
Seminars on Clinical Issues	100
Clinical Practice	1100
Total	1750 Hrs.

Chapter – 4

EXAMINATIONS

8- Examination

(A) Total papers:

Total theory papers	:	7
Total Practical	:	2
Total Viva Voce	:	2
Dissertation	:	1

Mode of Curriculum delivery and execution includes classroom teaching, assignment, tests, lab, work, project, case studies, participation in relevant events, Group Discussion, etc.

- (i) The students admitted to the course shall attend lectures, practical classes, clinical training/ attachments and seminars as prescribed by the College/University.
- (ii) Every student shall be required to appear in the written house test in various subjects and/or practicals as may be prescribed by the College/University.
- (vi) The last date of receipt of admission forms and fees in the college office for the University Examination shall be fixed by the University from time to time.
- (v) The student shall be examined in such theory papers and practical examinations as may be prescribed in the syllabus.

(B) INTERNAL ASSESSMENT:

- (a) There shall be tests in each subject in each academic year. These will carry weightage in the total marks. Marks shall be notified within one week of the test.
- (b) These tests could be in the form of written tests, quizzes, symposia assignment, group discussion, etc.
- (c) A promoted student who has to reappear in the annual examination of the paper will retain internal assessment marks of the previous year.
- (e) In Internal Assessment a maximum of **10 marks** in each subject shall be awarded for attending classes (theory / practical) as per the following norms:

85% or more attendance	-	10 Marks
80% or more but less than 85% attendance	-	9 Marks
75% or more but less than 80% attendance	-	8 Marks
70% or more but less than 75% attendance	-	7 Marks
65% or more but less than 70% attendance	-	5 Marks
60% or more but less than 65% attendance	-	3 Marks
51% or more but less than 60% attendance	-	2 Marks
50% attendance	-	1 Mark
Less than 50% attendance	-	0 Mark

(C) ANNUAL EXAMINATIONS :

Annual examination of theory and practical shall be conducted at the end of each session as outlined below:

- a. Mode: Theory Papers Written Only
 Lab Hours Written, Demonstration and Viva Voce

- | | | |
|----|---|--|
| | Viva Voce | Viva Voce |
| b- | Duration: | 3 hours |
| | Theory | |
| | Practical | Upto three hours per student |
| c- | Examiner | 01 (either internal or external) from the panel |
| | Theory | 02 (1 internal and 1 external) from the panel |
| | Practical | * Panel to be prepared by the Board of Studies and approved by the Vice Chancellor |
| | Viva Voce | 02 (1 internal and 1 external from the panel) |
| d- | Moderation of Theory Papers: | For papers set by external examiners only. |
| | | Change cannot be more than 30% after consultation with the teacher who has taught the paper. |
| e- | Dissertation evaluation | There will be an internal & an external evaluator for each Dissertation and a viva voce will be conducted after Dissertation approval by both. |
| f- | A special examination may be held in the month of December for the students of the first year of the course to enable them to reappear in those papers in which they had failed or could not appear due to any reason other than shortage of attendance . | |

(D) PROMOTION:

- (i) A candidate is declared passed in an examination in subject, if he/she secures 50% of marks in theory and 50% in practical separately.
- (a) If a candidate fails in only one head/subject and having passed in all other head/subject of the given examination of the year than his/her deficiency of maximum five (05) marks may be fulfilled by grace marks after fulfilling the conditions given below:

(A) If a candidate fails in only one head/subject and having passed in all other heads/subjects of the given examination of a **semester*/year**, then his/her deficiency of marks may be fulfilled by grace marks under the following conditions:-

- (i) Grace mark is not a matter of right of the student but is the discretion of the University.
 - (ii) Provided that the candidate has appeared in the main examination of the concerned course and falls short of pass marks by not more than five (05) marks in theory paper only. Benefit of above mentioned shall not be given to the candidate who had appeared in supplementary/special examination/carry over examination.
 - (iii) Further, benefit of grace marks may be given only to the candidate who will pass the entire concerned examination of the **semester*/year** after awarding the grace marks and not for the purpose of promoting the student to next year with back papers or for improvement of division or percentage.
 - (iv) If in a head/subject of an examination passing in Theory, Practical or sessional exams separately is mandatory, then the benefit of grace marks shall be given only in Theory examination of the University examination.
 - (v) The award of grace marks permissible shall be on the basis of 1 grace mark for every 05 marks secured by an examinee over and above the minimum passing aggregate marks of all subjects of the year.
- (ii) **I Year: (iii)** A student will not be promoted from I year to II year if he / she fails in more than 2 theory papers and any practical exam failing which this student shall reappear for the failed examinations.

II year: (iv) A student will be declared Pass in the II year if he / she cleared all the papers of the II year and whose thesis has been approved and has passed in the viva voce of the thesis failing which this student shall reappear for the failed examination.

- (v) A student will appear in supplementary examination for all failed subjects and who has failed only in theory or practical/viva of Biomechanics shall have to appear in both theory & practical/viva of the concern subject in the supplementary examination.

(E) CLINICAL PRACTICE:

Students engage in clinical practice in Physiotherapy Departments in the Orthopedics/ Neurology/Cardiopulmonary/Sports Physiotherapy setting to enhance their clinical skills and apply theoretical knowledge gained during teaching sessions.

(F) THESIS / DISSERTATION:

A Research Dissertation should be compulsory and should embody the student's own work carried in the elective area under the supervision of a recognised guide qualified for the purpose and as recommended by the Indian Association of Physiotherapists (IAP).

A Research proposal should be submitted to the University for Approval within six (6) months of admission to the course.

The completed Research Dissertation should be submitted three (3) months in advance of the written, oral, clinic and practical examination.

(G) PG TEACHERS:

A PG Teacher/Guide must have at- least 5 years of full time teaching and clinical experience in Physiotherapy subjects.

For other specific qualification of teachers please refer to the recommendations on the qualifications of Teachers prescribed by the Indian Association of Physiotherapists (IAP).

(H) EXAMINERS:

A PG teacher as defined above is eligible to be appointed as an examiner.

There shall be at least two examiners in each thesis and clinical examinations out of which, at-least one shall be an external examiner. The external examiners who fulfill the conditions should ordinarily be invited from another recognised Institution / University, preferably from outside the state.

Chapter – 5

AWARD OF DEGREE

9- Award of Degree

- i) A student will be awarded a MPT Degree only on successful completion of the course including clinical practice for both the years.
- ii) The entire course of study in MPT for first and second year must be completed within 4 years of the date of admission.

Chapter – 6

ATTENDANCE

10- Attendance –

The students are expected to attend all the classes and should not have less than 75 % attendance in theory as well as in practical classes, wherever held, to become eligible to appear for the university examination. Short fall in attendance can, however be condoned in deserving cases to the extent of 10% by the Principal. If the short fall is more than 10% but not more than 15%, the Principal may recommend deserving cases to the Vice Chancellor for condonation. The order of the Vice Chancellor in this regard shall be final.

Chapter – 7

Power to Modify

11. In the event of any emergent situation, if any deviation is considered necessary, the Vice Chancellor is authorised to modify the Ordinance. Subject to subsequent ratification by the Executive Council.

Chapter-8

SCHEME OF EXAMINATIONS

13- Marks Distribution

Note: **IA** : Internal Assessment, **AE** : Annual Exam

MPT (ORTHOPEDECS)

First Year

Subject	IA	AE	Total
Basic of Computer Application	-	-	P / F
Medical & Surgical Management in Disorder of the Musculoskeletal System	50	100	150
P.T. Management in Disorder of the Musculoskeletal System-I	50	100	150
P.T. Management in Disorder of the Musculoskeletal System-II	50	100	150
P.T. Management in Disorder of the Musculoskeletal System-Practical	100	400	500
Research Methodology & Biostatistics	50	100	150
Seminars on Clinical Issues	100	-	100
		Total	1200

Second Year

Subject	IA	AE	Total
Pedagogy in Physiotherapy Education	50	100	150
Management, Administration & Ethical Issues	50	100	150
Biomechanics	50	100	150
Biomechanics-Viva	50	100	150
Dissertation	-	-	P / F
Seminars on Clinical Issues	100	-	100
		Total	700

GRAND TOTAL I and II : 1900

MPT

Note: **IA** : Internal Assessment, **AE** : Annual Exam

MPT (NEUROLOGY)

First Year

Subject	IA	AE	Total
Basic of Computer Application	-	-	P / F
Medical & Surgical Management in Disorder of the Nervous System	50	100	150
P.T. Management in Disorder of the Nervous System-I	50	100	150
P.T. Management in Disorder of the Nervous System-II	50	100	150
P.T. Management in Disorder of the Nervous System-Practical	100	400	500
Research Methodology & Biostatistics	50	100	150
Seminars on Clinical Issues	100	-	100
		Total	1200

Second Year

Subject	IA	AE	Total
Pedagogy in Physiotherapy Education	50	100	150
Management, Administration & Ethical Issues	50	100	150
Biomechanics	50	100	150
Biomechanics-Viva	50	100	150
Dissertation	-	-	P / F
Seminars on Clinical Issues	100	-	100
		Total	700

GRAND TOTAL I and II : 1900

MPT

Note: IA : Internal Assessment,
AE : Annual Exam

MPT

(CARDIOPULMONARY CONDITION)

First Year

Subject	IA	AE	Total
Basic of Computer Application	-	-	P / F
Medical & Surgical Management in Disorder of the Cardiopulmonary System	50	100	150
P.T. Management in Disorder of the Cardiopulmonary System-I	50	100	150
P.T. Management in Disorder of the Cardiopulmonary System-II	50	100	150
P.T. Management in Disorder of the Cardiopulmonary System-Practical	100	400	500

Research Methodology & Biostatics	50	100	150
Seminars on Clinical Issues	100	-	100
		Total	1200

Second Year

Subject	IA	AE	Total
Pedagogy in Physiotherapy Education	50	100	150
Management, Administration & Ethical Issues	50	100	150
Biomechanics	50	100	150
Biomechanics-Viva	50	100	150
Dissertation	-	-	P / F
Seminars on Clinical Issues	100	-	100
		Total	700

GRAND TOTAL I and II : **1900**

MPT

Assessment, MPT

Note: IA : Internal
AE : Annual Exam

(SPORTS PHYSIOTHERAPY)

First Year

Subject	IA	AE	Total
Basic of Computer Application	-	-	P / F
Medical & Surgical Management in Disorder of the Sports Injuries	50	100	150
P.T. Management in Disorder of the Sports Injuries -I	50	100	150
P.T. Management in Disorder of the Sports Injuries -II	50	100	150
P.T. Management in Disorder of the Sports Injuries -Practical	100	400	500
Research Methodology & Biostatics	50	100	150
Seminars on Clinical Issues	100	-	100
		Total	1200

Second Year

Subject	IA	AE	Total
Pedagogy in Physiotherapy Education	50	100	150
Management, Administration & Ethical Issues	50	100	150
Biomechanics	50	100	150
Biomechanics-Viva	50	100	150
Dissertation	-	-	P / F
Seminars on Clinical Issues	100	-	100
		Total	700
GRAND TOTAL I and II		:	1900

**First Year & Second Year
MPT 1st year (Sports Medicine)
Evaluation Scheme**

S. NO.	SUBJECT CODE	SUBJECT	PERIODS			INTERNAL				EXTERNAL		TOTAL	CREDIT
			L	T	P	CA	TA	Total	IP	ET	EP		
1.	MPT(S)-101	Medical And Surgical Management Of Sports Injuries	2	1	0	10	10	20	-	80	-	100	4
2.	MPT(S) - 102	Physiotherapy Management In Disorder Of The Sports Injuries – I	3	1	0	10	10	20	-	80	-	100	4
3.	MPT(S) – 103	Physiotherapy Management In Disorder Of The Sports Injuries – II	3	1	0	10	10	20	-	80	-	100	4
4.	MPT(S)- 104	Research Methodology And Biostatistics	2	1	0	10	10	20	-	80	-	100	4
5.	MPT(S)-105P	Physiotherapy Management In Disorder Of The Sports Injuries	0	0	2	0	0	0	20	0	80	100	4
6.	MPT(S)-106	Seminars On Clinical Issues	0	3	0	0	0	200	0	0	0	200	8
Grand Total												700	28
L- Lecture, T- Tutorials, P- Practical (Labs), CT- Class Test (Sessionals), TA- Teacher's Assessment (Assignments, Tutorials), IP- Internal Practical, ET- External Theory, EP- External Practical.													

**MPT 2nd year (Sports Medicine)
Evaluation Scheme**

S.NO.	SUBJECT CODE	SUBJECT	PERIODS			INTERNAL				EXTERNAL		TOTAL	CREDIT
			L	T	P	CA	TA	Total	IP	ET	EP		
1.	MPT(S)-201	Pedagogy in Physiotherapy Education	2	1	0	10	10	20	-	80	-	100	4
2.	MPT (S)- 202	Management, Administration and Ethical Issues	2	1	0	10	10	20	-	80	-	100	4
3.	MPT(S)- 203	Biomechanics	4	1	0	10	10	20	-	80	-	100	4
4.	MPT(S)- 204P	Biomechanics	0	0	2	-	-	-	20	-	80	100	4
5.	MPT(S)-205	Dissertation	PASS/ FAIL										-
6.	MPT(S)-206	Seminars on Clinical Issues	0	3	0	0	0	200	0	0	0	200	8
Grand Total												600	24
L- Lecture, T- tutorials, P- Practical (Labs), CT- Class Test (Sessionals), TA- Teacher's Assessment (Assignments, Tutorials), IP- Internal Practical, ET- External Theory, EP- external Practical.													

MPT 1ST YEAR (SPORTS MEDICINE)

MEDICAL AND SURGICAL MANAGEMENT OF SPORTS INJURIES			
Course Code MPT(S)-101	THEORY COURSE(100 Hours)	L-T-P-C	2-1-0-4
	Topic		Hours
UNIT 1	SPORTS INJURIES OF THE UPPER LIMB.		10
UNIT 2	SPORTS INJURIES OF THE LOWER LIMB.		10
UNIT 3	SPORTS INJURIES OF THE SPINE		10
UNIT 4	SPORTS INJURIES OF THE HEAD AND NECK		10
UNIT 5	MEDICAL PROBLEMS OF THE ATHLETE		10
UNIT 6	EMERGENCY CARE		10
UNIT 7	Sports psychology- Definition of the term Sports psychology <i>Role of sports -psychology in sports performance</i> <i>Dynamics of human behavior</i> <i>Instincts</i> <i>Attention, interest and motivation</i> <i>Personality in the sports person</i> <i>Learning</i> <i>Nature and meaning of learning and maturation</i> <i>Characteristics of learning</i> <i>Laws of learning maturation</i> <i>Transfer of training</i> <i>Group behaviours & leadership</i> <i>Nature of group behaviours</i> <i>Types, quality, training and function of leadership</i> <i>Anxiety, model stress and its implications on performance</i> <i>Isolated training</i> <i>Sudden change in opponent</i> <i>Audience stresses</i> <i>Strategy changes</i> <i>Cognitive stress modeling.</i> <i>Contemporary stress reduction strategies</i> <i>Biofeedback</i> <i>Mental coping strategies</i> <i>Visual imagery</i> <i>Meditation</i> <i>Performance factors</i> <i>Stress and performance</i> <i>Motivation & performance</i>		20
UNIT 8	DIET AND NUTRITION <i>Nutrition for sports person</i> <i>Nutritional assessment in different sports</i> <i>Nutritional recommendations in various sports</i> <i>Weight management</i> <i>Body composition analysis</i> <i>Uses & importance of various micro & macro NutrieNTS</i>		10

UNIT 9	SURGICAL MANAGEMENT OF SPORTS RELATED INJURIES <i>Surgical management of the above conditions, indications, contraindications for surgery, precautions after surgery.</i>	10
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PHYSIOTHERAPY MANAGEMENT IN DISORDERS OF SPORTS INJURIES – I				
Course Code	MPT(S)-102	THEORY COURSE(125 Hours)	L-T-P-C	3-1-0-4
	Topic			Hours
UNIT 1	SECTION – 1 GENERAL PRINCIPLES P.T. ASSESSMENT			10
UNIT 2	PHYSIOLOGY OF REHABILITATION			10
UNIT 3	APPLIED BIO-MECHANICS IN SPORTS REHABILITATION			10
UNIT 4	PROTECTIVE EQUIPMENT CONSIDERATIONS			10
UNIT 5	SPECIAL CONSIDERATION LIKE FEMALE ATHLETE, ADOLESCENT ATHLETE. DISABLED ATHLETE, DOPING, ETC.			10
UNIT 6	EMERGENCY CARE			10
UNIT 7	SPECIAL EXERCISE PROGRAMMES FOR SPORTS PERSON			10
UNIT 8	SPORTS FOR DISABLED			10
UNIT 9	SPORTS MASSAGE			10
UNIT 10	TAPING			20
UNIT 11	PNF TECHNIQUES IN SPORTS			15

PHYSIOTHERAPY MANAGEMENT IN DISORDERS OF SPORTS INJURIES – II			
Course Code MPT(S)-103	THEORY COURSE(125 Hours)	L-T-P-C	3-1-0-4
	Topic		Hours
UNIT 1	INJURIES RELATED TO CRICKET		15
UNIT 2	INJURIES RELATED TO JUDO		10
UNIT 3	INJURIES RELATED TO THROW BALL		10
UNIT 4	INJURIES RELATED TO BASKET BALL		10
UNIT 5	INJURIES RELATED TO DISCUSS THROW		10
UNIT 6	INJURIES RELATED TO BASE- BALL		10
UNIT 7	INJURIES RELATED TO BADMINTON		10
UNIT 8	INJURIES RELATED TO TENNIS		15
UNIT 9	INJURIES RELATED TO GYMNASTICS		10
UNIT 10	INJURIES RELATED TO JAVELIN		10
UNIT 11	INJURIES RELATED TO FOOTBALL		15

RESEARCH METHODOLOGY AND BIOSTATISTICS			
Course Code	MPT(S)-104	THEORY COURSE(100 Hours)	L-T-P-C
	Topic		3-1-0-4
			Hours
UNIT 1	RESEARCH METHODOLOGY- <i>How are read and critique research.</i>		2
UNIT 2	INTRODUCTION TO RESEARCH: FRAMEWORK; LEVELS OF MEASUREMENT; VARIABLES.		3
UNIT 3	BASIC RESEARCH CONCEPTS; VALIDITY AND RELIABILITY		5
UNIT 4	DESIGN, INSTRUMENTATION AND ANALYSIS FOR QUALITATIVE RESEARCH DESIGN, INSTRUMENTATION AND ANALYSIS FOR QUALITATIVE RESEARCH		5
UNIT 5	DESIGN, INSTRUMENTATION AND ANALYSIS FOR QUASI-EXPERIMENTAL RESEARCH		5
UNIT 6	HOW TO WRITE A RESEARCH PROPOSAL THE USE AND PROTECTION OF HUMAN AND ANIMAL SUBJECTS		5
UNIT 7	BIOSTATISTICS <i>Descriptive and Inferential statistics</i>		5
UNIT 8	TYPES OF DATA: QUALITATIVE AND QUANTITATIVE		4
UNIT 9	FREQUENCY DISTRIBUTIONS		6
UNIT 10	DESCRIBING DATA WITH GRAPHS		5
UNIT 12	DESCRIBING DATA WITH AVERAGES MODE, MEDIAN, MEAN		2
UNIT 13	DESCRIBING VARIABILITY VARIANCE, STANDARD DEVIATION, ETC		3
UNIT 14	NORMAL DISTRIBUTIONS		5
UNIT 15	INTERPRETATION OF R		2
UNIT 16	HYPOTHESIS TESTING		3
UNIT 17	T TESTS		5
UNIT 18	ANOVA		2
UNIT 19	PROBABILITY		3
UNIT 20	TYPE I AND TYPE II ERRORS		5
UNIT 21	PARAMETRIC AND NON- PARAMETRIC TESTS		5
UNIT 22	WHICH TESTS TO USE		5
UNIT 23	BASIC OF COMPUTERS – HARDWARE AND SOFTWARE		5
UNIT 24	BASIC OF COMPUTER APPLICATIONS – WINDOWS, MS WORD, POWER POINT, ETC.		5
UNIT 25	SIMPLE STATISTICAL ANALYSIS USING AVAILABLE SOFTWARE.		5

PHYSIOTHERAPY MANAGEMENT IN DISORDERS OF THE SPORTS INJURIES			
Course Code MPT(S)-105P	LAB COURSE(50 Hours)	L-T-P-C	0-0-2-4
	Topic		Hours
LAB	<i>Students will be instructed via demonstration, hands of techniques, field visits and case conference on specific techniques used in management of patients with sports injuries. Students will on their experience at the clinical postings to formulate a treatment plan for cases presented at the case conference.</i>		50

MPT 2ND YEAR (SPORTS MEDICINE)

PEDAGOGY IN PHYSIOTHERAPY EDUCATION			
Course Code MPT(S)-201	THEORY COURSE(100 Hours)	L-T-P-C	2-1-0-4
	Topic		Hours
UNIT 1	PHILOSOPHY OF EDUCATION AND EMERGING ISSUES IN EDUCATION <i>Need for Education Philosophy : Some Major Philosophies, Idealism, Naturalism, Pragmatism and their Implications for Education. Meaning, Functions and Aims of Education Formal, Informal and Non- formal Education. Agencies of Education Current Issues and trends in Higher Education Issue of Quality in Higher education, Autonomy and Accountability, Privatization, Professional Development of Teachers, Education of persons with Disabilities.</i>		15
UNIT 2	CONCEPT OF TEACHING AND LEARNING <i>Meaning scope of Educational Psychology Meaning and Relationship between Teaching and Learning Learning Theories Dynamics of Behaviour Individuals Differences</i>		10
UNIT 3	Curriculum <i>Meaning and concept Basis of curriculum Formulation & Development Framing Objectives for Curriculum Process of Curriculum Development and Factors Affecting Curriculum Developmental Evaluation of Curriculum</i>		10
UNIT 4	METHOD AND TECHNIQUES OF TEACHING <i>Lecture, Demonstration, Discussion, Seminar, Assignment, Project and Case Study.</i>		10
UNIT 5	PLANNING FOR TEACHING <i>Bloom's Taxonomy of Instructional Objectives, Writing Instructional Objectives Behavioural terms, Unit planning and Lesson Planning.</i>		10
UNIT 6	TEACHING AIDS <i>Types of Teaching Aides Principles of Selection, Preparation, and Use of Audio-Visual aids.</i>		10
UNIT 7	MEASUREMENT AND EVALUATION <i>Nature of Educational Measurement: Meaning, Process, Types of tests. Construction of an Achievement test and analysis. Standardized Test. Introduction of some standardized tools, important tests of Intelligence, Aptitude, and Personality. Continuous and Comprehensive Evaluation.</i>		15
UNIT 8	GUIDANCE AND COUNSELING <i>Meaning and concepts of Guidance and Counseling, principles. Guidance and Counseling Services of Students and Faculty members Faculty Development and Development of Personnel for P.T. Services</i>		10
UNIT 9	CLINICAL EDUCATION <i>Awareness and Guidance to the Common people about Health and Diseases and Available professional Services. Patient Education Education of the Practitioners</i>		10

MANAGEMENT, ADMINISTRATION AND ETHICAL ISSUES				
Course code	MPT(S)-202	THEORY COURSE(75 Hours)	L-T-P-C	2-1-0-4
	Topic			Hours
UNIT 1	MANAGEMENT FUNCTIONS OF MANAGEMENT,			5
UNIT 2	EVALUATION OF MANAGEMENT THROUGH SCIENTIFIC MANAGEMENT theory, <i>Classical theory</i> <i>System Approach</i> <i>Contingency approach</i>			10
UNIT 3	MANAGEMENT PROCESS <i>Planning, Organization, Direction, Controlling, Decision making</i>			5
UNIT 4	INTRODUCTION TO PERSONNEL MANAGEMENT. <i>Staffing, Recruitment, Selection, Performance appraisal, Collective bargaining, discipline, Job satisfaction.</i>			5
UNIT 5	QUANTITATIVE METHODS OF MANAGEMENT <i>Relevance of statistical and/ or technique in management.</i>			10
UNIT 6	MARKETING <i>Market segmentation, marketing research production planning pricing, channels of distribution, promotion consumer behaviour, licensor.</i>			5
UNIT 7	TOTAL QUALITY MANAGEMENT <i>Basis of quality management – acid for quality control quality assurance program in hospitals, medical audit, and international quality system.</i>			5
UNIT 8	ADMINISTRATION <i>Hospital as an organization</i> <i>Functions and types of hospitals selected clinical supportive ancillary services of hospital, emergency department, nursing, physical medicine & rehabilitation, clinical supportive and ancillary services of a hospital, emergency department nursing physical medicine & rehabilitation, clinical laboratory, pharmacy and dietary dept. Roles of Physiotherapist, Physiotherapy Director, Physiotherapy Supervisor, Physiotherapy Assistant, Physiotherapy Aide, Occupational Therapist, Home health Aide, Volunteer. Directed care and referral relationship and confidentially.</i>			15
UNIT 9	LEGAL PROFESSIONAL ETHICAL ISSUES <i>Physical therapy: Definition and development</i> <i>The implications & confirmation to the rules of professional conduct. Legal responsibility for their actions in the professional contex Code of ethics</i> <i>A wider knowledge of ethics relating to current social and medical policy in the provisions of health care. Functions of the relevant professional associations education body and trade union. The role of the international health agencies such as the world health organizations. Standards of practice for physical therapies. Current issues.</i>			15

BIOMECHANICS			
Course Code	MPT(S)-203	THEORY COURSE(150 Hours)	L-T-P-C
Topic			4-1-0-4
	Topic		Hours
UNIT 1	FUNDAMENTAL MECHANICS <i>Forces</i> <i>Moments</i> <i>Newton's laws</i> <i>Composition and Resolution of forces.</i> <i>Static Equilibrium</i> <i>Dynamic Equilibrium</i> <i>Force systems</i> <i>Levers</i> <i>Pulley Systems</i> <i>Density & Mass</i> <i>Segmental Dimensions</i>		15
UNIT 2	KINEMATICS <i>Types of Motion</i> <i>Location of Motion</i> <i>Magnitude of Motion</i> <i>Direction of Motion</i> <i>Angular motion and its various parameters</i> <i>Linear motion and its various parameters.</i> <i>Projectile motions.</i>		15
UNIT 3	KINETICS <i>Definition of forces</i> <i>Force vectors</i> <i>Naming of Force</i> <i>Force of gravity & Cog</i> <i>Stability</i> <i>Reaction forces</i> <i>Equilibrium</i> <i>Linear forces system</i> <i>Friction and its various parameters</i> <i>Parallel force system</i> <i>Concurrent force systems</i> <i>Work powers & energy</i> <i>Moment arms of force</i> <i>Force components</i> <i>Equilibrium</i>		15
UNIT 4	FLUID MECHANICS <i>Various laws governing the flow of fluids</i> <i>Various laws governing the volume of fluids</i> <i>Various laws governing the pressure of fluids</i> <i>Various laws governing the energy of fluids</i> <i>Various parameters explaining the flow</i> <i>Various parameters describing the fluids</i> <i>Clinical applications</i>		10

UNIT 5	<p>BONE MECHANICS <i>Structure & composition of bone</i> <i>Stress</i> <i>Strain</i> <i>Modules of rigidity & modular of elasticity</i> <i>Poisson's effect</i> <i>Strain energy</i> <i>Static & cyclic load behaviors</i> <i>Load</i> <i>Mechanical properties of trabecular bone</i> <i>Mechanical properties of cortical bone</i> <i>Bone remodeling</i> <i>Response of the bone to aging & exercise & immobilization</i> <i>Mechanisms to prevent fracture present in bone</i> <i>Fracture of prediction</i> <i>Behavior of bone under load</i> <i>Clinical applications</i> <i>Failure criteria</i></p>	10
UNIT 6	<p>MUSCLES MECHANICS <i>Structure & composition of muscle</i> <i>Fiber length & cross section area</i> <i>Mechanical propertied</i> <i>EMG changes during fatigue & contraction</i> <i>Changes in mechanical properties because of aging and exercised & immobilization</i> <i>Clinical applications</i></p>	10
UNIT 7	<p>LIGAMENT & TENDON MECHANICS <i>Structure and composition</i> <i>Mechanical properties</i> <i>Cross sectional area measurements</i> <i>Muscle tendon properties</i> <i>Temperature sensitivity</i> <i>Changes in mechanical properties because of aging exercise and immobilization</i> <i>Mechanoreceptors</i> <i>Clinical applications</i></p>	10
UNIT 8	<p>JOINT MECHANICS <i>Joint Design</i> <i>Joint categories</i> <i>Joint functions</i> <i>Arthrokinematics</i> <i>Osteokinematics</i> <i>Kinematics chairs</i> <i>Joint forces, equilibrium & distribution of these forces</i> <i>Joint stability & its mechanism</i> <i>Articular Cartilage Mechanics</i> <i>Clinical applications</i></p>	10
UNIT 9	MEASUREMENT INSTRUMENTS	15

	<p><i>Goniometer</i> <i>Accelerometer</i> <i>Photo optical devices</i> <i>Pressure transducers and force plates</i> <i>Gait analyzer</i> <i>Isokinetic device</i> <i>EMG</i> <i>Electro physiology of muscle contraction</i> <i>Recording</i> <i>Processing</i> <i>Relationship between EMG and bio-mechanical variables.</i></p>	
UNIT 10	<p>MECHANICAL ENERGY, WORK AND POWER <i>Definitions</i> <i>Positive and Negative work of muscle</i> <i>Muscle of mechanical power</i> <i>Causes of inefficient movement</i> <i>Co-contraction</i> <i>Isometric contraction</i> <i>Energy generation at one joint and absorption at another</i> <i>Energy flow</i> <i>Energy storage</i> ERGONOMICS</p>	15
UNIT 11	<p>APPLICATION OF BONE AND JOINT MECHANICS <i>Load sharing & load transfer</i> <i>Prosthetic design criteria</i> <i>Bio-mechanical analysis of implants internal fixations</i> <i>Degenerative changes in weight bearing joints & compensatory actions</i></p>	10
UNIT 12	<p>GAIT <i>Gait parameter</i> <i>Kinetic</i> <i>Kinematic</i> <i>Time- Space</i> <i>Pathological gait</i> <i>Running</i> <i>Stair climbing</i> <i>Changes in gait following various surgeries/ diseases/ disorders</i></p>	10
UNIT 13	<p>ORTHOSIS & PROTHOSIS <i>Orthosis of spine</i> <i>Orthosis of upper limb</i> <i>Orthosis of lower limb</i> <i>Prescription checkouts & proper fittings</i> <i>Bio-mechanical principles governing them</i> <i>Aids used in management of disability</i></p>	10

BIOMECHANICS			
Course Code MPT(S)-204P	LAB COURSE(50 Hours)	L-T-P-C	0-0-2-4
	Topic	Hours	
UNIT 1	<i>This involves application of topics in MPT 2.3 via demonstrations, field visits and case presentations.</i>	50	
	THESIS		
	<i>As part of the requirement for the Master's degree the student is required to undertake a research study under the guidance of a guide. Issues of sports disorders may be studied on patients or normal individuals.</i>		
	SEMINARS AND CLINICAL ISSUES		
	<i>-These will serve as a platform for students to integrate various components of patient management. Students will give presentations on topics provided to them.</i>		