Bachelor Of Physiotherapy (BPT)1St Year

SUBJECT: HUMAN ANATOMY (Subject Code BPT- 101)

Goal – To provide the student with the necessary Anatomical knowledge & skills to practice as a qualified Physiotherapist

Subject Title & Code	**HUMAN ANATOMY (BPT- 101)**
Duration **Total Hours** **Theory** **Practical**	**New: 210 Hours** **135** **75**
Total Hrs/week **Lectures** **Practicals** **Seminars**	**8** **5hrs/week** **3hrs/week**
Method of Assessment	**Theory and Practical**

Syllabus

1]-GENERAL Anatomy----------10hours

Including Histology – Basic tissues like epithelial, Connective, muscular, nervous, system.

2. Musculo Skeletal Anatomy - (General)…….. (10 hrs)

a) Anatomical positions of body, axes, planes, common anatomical terminologies (Groove, tuberosity, trochanters etc). b) Connective tissue classification.
c) Bones- Composition & functions, classification and types according to morphology and development. d) Joints-definition-classification, structure of fibrous, cartilaginous joints, blood supply and nerve supply of joints. e) Muscles – origin, insertion, nerve supply and actions

A. Upper Extremity : (35 hrs)

a. Osteology : Clavicles, Scapula, Humerus, Radius, Ulna, Carpals, Metacarpals, Phalanges.
b. Soft parts: Breast, 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.
c. Joints : Shoulder girdle, shoulder joint, elbow joints, radio ulnar joint, wrist joint and joints of the hand.
d. Arches of hand, skin of the palm and dorsum of hand.

B. Lower Extremity…….(25 hrs)

a. Osteology : Hip bone, femur, tibia, fibula, patella, tarsals, metartarsals and phalanges.

b. 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, sole 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.
c. Joints: Hip Joint, Knee joint, Ankle joint, joints of the foot.

C. Trunk & Pelvis …….. (20 Hrs)
a. Osteology: Cervical, thoracic, lumbar, sacral and coccygeal vertebrae and ribs
b. Soft tissue: Pre and Para vertebral muscles, intercostals muscles, anterior abdominal wall muscles, Inter-vertebral disc.
c. Pelvic girdle and muscles of the pelvic floor

3. Regional Anatomy …… (80 Hrs)

Following is region-wise distribution

Thorax:
a) Cardio – Vascular System ……..(10hrs)
Mediastinum: Divisions and contents
Pericardium: Thoracic Wall: position, shape and parts of the heart; conducting System; blood Supply and nerve supply of the heart; names of the blood vessels and their distribution in the body – region wise.
b) Respiratory system(15 hrs)
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 supplyand action.

Abdomen: ……..(8 Hrs)

Peritoneum: Parietal peritoneum, visceral peritoneum, folds of peritoneum, functions of peritoneum. Large blood vessels of the gut Location, size, shape, features, blood supply, nerve supply and functions of the following: stomach, liver, spleen, pancreas, kidney, urinary bladder, intestines, gall bladder.
Pelvis:Position, shape, size, features, blood supply and nerve supply of the male and female reproductive system.

Endocrine glands: …….. (5hrs)

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.

Head and Neck: ……..(20 hrs)
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, Gross anatomy of eyeball, nose, ears and tongue.Facial muscles & T.M. joint

5. Neuro Anatomy …….(50 hrs)

Organization of Central Nervous system - Spinal nerves and autonomic nervous system mainly pertaining to cardiovascular, respiratory and urogenital system, Cranial nerves, Peripheral nervous system, Peripheral nerve, Neuromuscular junction , Sensory end organs , 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

SCHEME OF EXAMINATION
THEORY – 80 MARKS + Int. assessment – 20 marks Total …..... 100 Marks
Model question paper – 80 Marks
Section A) Q1) M.C.Q.
-based on Single best response …… [20 x 1] --- 20 marks – [20 minutes]
This question should include topics covered in syllabus –
Section B) S.A.Q.
Q2) Answer any Five out of Six -……. [3 x 5] ---------- 15 marks
This question should include
i] Digestive ii] /uro-genital iii] reproductive system iv] special senses – eye /ear/skin v] circulatory system.
Q3) Answer any 3 out of 4 …… [5 x 3] ---------- 15 marks
This question should include i] Thorax ii] soft parts upper limb iii] soft part lower limb iv] soft parts Thorax /spine / neck
Section C) L.A.Q.
Q4) Compulsory – based Musculo Skeletal system [including Kinesiology] 15marks
Q5) should be based on Neuro-Anatomy [including cranial nerves with emphasis to V,VII, VIII, IX & XII nerves ……..…….……. 15 marks
OR
Q5) ……15 marks
PRACTICAL – 80 MARKS + Internal assessment – 20 marks = Total 100 marks
should include
1] Spots ---------- 60 marks
2] Viva ---------- 15 marks
Journal ---------- 05 marks

INTERNAL ASSESSMENT
THEORY:
Two exams – Terminal and prelims of 80 marks each TOTAL 160 marks
Section A) Q1) M.C.Q.-based on Single best response – [20 x 1] -- 20marks

This question should include topics covered in syllabus-
Section B) S.A.Q.- Q.2)-Answer any Five out of Six [3 X 5]---------- 15marks
This question should include
i]-Digestive ii]-uro-genital iii]-reproductive system
iv] - special senses-eye/ear/skin v]-circulatory system
Q.3) - Answer any 3 out of 4 [5 X 3] ---------- 15 marks
This question should include
i]-Thorax
ii]-soft parts upper limb
iii]-soft part-lower limb
iv]-soft parts Thorax/ spine / neck
Section C) L.A.Q-Q.4) based Musculo Skeletal system [including Kinesiology]--- 15 marks
Q.5) should be based on Neuro-Anatomy [including cranial nerves with
Emphasis to V, VII, VIII, IX & XII nerves ---------- 15 marks
OR
Q.5) ---------- 15 marks
I.A. to be calculated out of 20 marks
PRACTICAL:
Two exams – Terminal and prelims of 80 marks each TOTAL 160 marks
1. SPOTS ---------- 60 MARKS
2. Viva ---------- 15 marks
3. Journal ---------- 05 marks
I.A. to be calculated out of 20

TEXT BOOKS
1. Human Anatomy – by Snell
2. Anatomy by Chaurasia all 3 volumes
3. Neuro anatomy by Inderbir Singh
4. Human Anatomy by Kadasne (All three volumes)

REFERENCE BOOKS
1. Gray's Anatomy
2. Extremities by Quining Wasb
3. Atlas of Histology by Mariano De Fiore
4. Anatomy & Physiology by Smout and McDowell
5. Kinesiology by Katherine Wells
6. Neuroanatomy by Snell
7. Neuroanatomy by Vishram Singh

SUBJECT: HUMAN PHYSIOLOGY (Subject Code BPT- 102)

Subject Title & Code	**HUMAN PHYSIOLOGY (BPT- 102)**
Duration **Total Hours** **Theory**	**New: 200 Hours** **150**

Practical	**50**
Total Hrs/week **Lectures** **Practicals** **Seminars**	**7** **5hrs/week** **2hrs/week**
Method of Assessment	**Theory and Practical**

Syllabus:

1) **GENERAL Physiology** [4Hours]

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

2) **BLOOD**- ---------- 12hrs

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. Lymph: Composition, formation, circulation and functions.

3) **NERVE** Neuron AHC ---------- 7hrs

i) Structure, classification & Properties; ii)- R.M.P. iii)- action potential;
iv) Propagation of nerve impulse; Nerve: Structure and functions of neurons. Classification, Properties and impulse transmission of nerve fibres. Nerve injury – degeneration and regeneration**.**

4) **MUSCLE** ---------- 10hrs

i) Structure- properties-classification-excitation/contraction coupling
ii) Motor unit- E.M.G.- factors affecting muscle transmission)
iii) Neuro-muscular transmission

5) **C.N.S.** ---------- 25hrs

i) Receptor physiology-classification & properties ii) Synapse-structure, properties, & transmission; iii) Reflexes-classification & properties;
iv) Sensory & Motor Tracts-effect of transaction (complete & incomplete) at various levels v) Physiology of Touch, Pain, Temperature & Proprioception;
vi) Physiology of Muscle Tone (muscle spindle); Stretch vii) Vestibular Appralus mainly otolith organ Anatomy viii) Connection & function of Basal ganglia, Thalamus, Hypo-Thalamus, lobes of the brain, Cerebellum, Peripheral Nervous System ix) Sensory / motor cortex; x) Limbic system; xi) Learning, memory & condition reflex, xii) Physiology of Voluntary movement

6) **EXCRETARY** system ---------- 7 hrs
 Introduction: Physiological anatomy. Nephrons– cortical and juxtamedullary. Juxtaglomerular 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, HCO_3 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. Diuretics. Micturition: Mechanism of micturition. Cystometrogram. Atonic bladder, automatic bladder. Acid-Base balance (very brief) Artificial Kidney: Principle of haemodialysis. Skin and temperature regulation.

7) **TEMPERATURE REGULATION** ---------- 2hrs
Circulation of the skin- body fluid- electrolyte balance

8) **ENDOCRINE** ---------- 10hrs
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 hormnes: 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: Phoechromocytoma. Endocrine Pancreas:Secretory cells, action, regulation of secretion of insulin and glucagon. Glucose metabolism and its regulation. Disorder: Diabetes mellitus.

9) **REPRODUCTIVE** system ---------- 6 hrs
Introduction: Physiological anatomy reproductive organs. Sex determination. Sex differentiation. Disorder, 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. Mentrual 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
Eye-Errors of refraction-accommodation-reflexes-dark & light adaptation photosensitivity
Ear, Skin ---------- 5hrs

11) **Gastrointestinal** system ---------- 9 hrs
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. Mechanism of Defaecation.

12)- **RESPIRATORY** system ---------- 20hrs
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 Respirtation: Neural Regulation. Hering-breuer's reflex. Voluntary control. Chemical Regulation. Hypoxia: Effects of hypoxia. Types of hypoxia. Hyperbaric oxygen therapy. Acclimatization
Hypercapnoea. Asphyxia. Cyanosis – types and features. Dysbarism
Disorders of Respiration: Dyspnoea. Orthopnoea. Hyperpnoea, hyperventilation, apnoea, tachypnoea. periodic breathing – types Artificial respiration Respiratory changes during exercise.

13)- **CARDIO – VASCULAR**---------- 20hrs
i) structure & properties of cardiac muscle;
ii) Cardiac cycle;
iii) Heart rate regulation-factors affecting;
vi) Peripheral resistance, venous return
vii) Regional circulation-coronary-muscular, cerebral
viii) normal ECG.
Introduction: Physiological anatomy and nerve supply of the heart and blood vessels. Organization 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. Cardiovascular changes during exercise

14) **Exercise Physiology** ---------- 5 hrs
i) Effects of acute & chronic exercises; ii) oxygen / CO2 transport-O2 debt) effects of exercise on muscle strength, power, endurance, B.M.R., R.Q.-hormonal & metabolic effects-respiratory & cardiac conditioning IV) AGING v) Training-fatigue- & recovery; vi) Fitness-related to age, gender, & body type

15)- **A.N.S** ---------- 4 hrs
Sympathetic / parasympathetic system-adernal medulla-functions-Neuro Transmitters-role in the function of pelvic floor-(micturation, defecation labour)

16) **Applied Physiology [10 Hours]**
More detailed study of the physiology and practical applications of the following selected topics with emphasis on aspects, which should help in understanding the nature and treatment of common clinical situations of interest in Physiotherapy. Pulmonary Functions, Properties of gases, Mechanics of respiration, Diffusion capacity, special features of pulmonary circulation and their application. Respiratory adjustments in exercises... Artificial respiration. Breath sounds. Cardio vascular Functions. Blood flow through arteries, arterioles, capillaries, veins and venuoles. Circulation of Lymph, Oedema. Factors affecting cardiac output. Circulatory adjustment in exercise and in postural and gravitational changes. Pathophysiology of fainting and heart failure. Muscles and Nervous System Functions: Peripheral nervous system, Neuromuscular transmission, Types of nerve fibres. Action potential, Strength-duration curve, ECG, EMG, VEP, NCV. Degeneration and regeneration of nerve, Reactions of denervations.. Synaptic transmission, Stretch reflex- Mechanism and factors affecting it. Posture, Balance and Equilibrium/Coordination of voluntary movement. Voluntary motor action, clonus, Rigidity, Discordination, Special senses- Vision, taste, hearing, vestibular, Olfaction. Sympathetic and Parasympathetic regulation, Thermoregulation, Blood functions Thalassemia Syndrome, Hemophilia, VWF. Anemia, Leucocytosis Bone marrow transplant
Metabolic Functions: Diabetes Mellitus, Physiological basis of Peptic Ulcer, Jaundice, GIT disorders and Dietary fiber, Thyroid functions, Vitamins deficiency,

PRACTICAL
I. Haematology[20 Hours]
To be done by the students

1. Study of Microscope and its uses 2. Determination of RBC count 3. Determination of WBC count 4. Differential leukocyte count
5. Estimation of hemoglobin 6.Calculation of blood indices
7. Determination of blood groups 8. Determination of bleeding time
9. Determination of clotting time
ii. Demonstrations only
1. Determination of ESR 2. Determination of PCV
iII. Clinical Examination [20 Hours]
1. Examination of Radial pulse. 2. Recording of blood pressure
3. Examination of CVS 4. Examination of Respiratory system
5. Examination of Sensory system 6. Examination of Motor System
7. Examination of reflexes 8. Examination of cranial nerves

III. Amphibian Experiments – Demonstration and Dry charts Explanation. [10 Hours]
1. Instruments used for frog experiments. Kymograph, heart liver, Muscle trough, stimulator. 2. Simple muscle curve. 3. Effect of increasing the strength of the stimuli 4. Effect of temperature on muscle contraction.
5. Effect of two successive stimuli. 6. Effect of Fatigue.
7. Effect of load on muscle contraction 8. Genesis of tetanus and clonus.
9. Velocity of impulse transmission. 10. Normal cardiogram of amphibian heart. 11. Properties of Cardiac muscle 12. Effect of temperature on cardiogram.

IV. Recommended Demonstrations*
1. Spirometry

SCHEME OF EXAMINATION
THEORY-80MARKS + INT. ASSESSMENT-20MARKS=TOTAL - 100MARKS
Section-A-MCQ.
Q-1) based on single Best answer ------ (20 x 1) ---------- 20 marks
It must include MUST KNOWN questions
Section-B-SAQ.
Q-2) Answer any Five out of Six ----- (5 x 3) ---------- 15 marks
Should include – i)- Blood, ii)- G.I. tract iii)- Endocrine
iv)- Uro-genital v)- Metabolism vi)- special senses (eye/ear/skin)
Q-3) Answer any Three out of four ----- (3 x 5) ---------- 15 marks
Should include i)- Cardio – vascular ii)- Respiratory iii)- Exercise Physiology iv)- Electrolyte balance
Section-C-LAQ
Q-4) based on Musculo-skeletal system ---------- 15marks
(LAQ should give breakup of 15 marks)
Q-5) based on C.N.S./ spinal cord/Electro-Neuro-Physiology -------- 15 marks
OR
Q-6)- ---------- do---------- 15 marks
PRACTICAL – 80 Marks + Internal Assessment 20 Marks – total 100 marks
a) Spots-based on topics covered in syllabus ---------- 20 marks
b) Viva-based on 1 to 8 mentioned in practical syllabus --------- 20 marks

c) Demonstration – on Clinical Physiology ---------- 35 marks
d) Journal ---------- 05 marks

INTERNAL ASSESSMENT
THEORY:
Two exams – Terminal and prelims of 80 marks each TOTAL 160 marks
Section-A-MCQ.Q-1]-based on single Best answer---- [20 x 1] ---------- 20 marks
It must include MUST KNOW questions
Section-B- SAQ-Q-2] Answer any Five out of Six --- [5 X 3] ---------- 15 marks
Should include –
i]-Blood, ii]-G.I. tract iii]-Endocrine iv] - Uro-genital v]- Metabolism
vi]-special senses [eye/ear/ skin]
Q-3]-answer any Three out of four – [3 X 5] ---------- 15 marks
Should include
i] Cardio- vascular ii] Respiratory iii] Exercise Physiology iv] Electrolyte balance
Section-C-LAQ-Q-4]-based on Musculo-skeletal system---------- 15 marks
Q-5]-based on C.N.S./ Spinal Cord/Electro-Neuro-physiology- 15 marks
OR
Q-6] ----------do---------- 15marks
[LAQ should give break up of 15 marks]
I.A. to be calculated out of 20 marks
PRACTICAL:
Two exams – Terminal and prelims of 80 marks each TOTAL 160 marks
1. Spots: - Based on Topics covered in syllabus---------- 20 marks
2. Viva: - Based on 1-8 mentioned in practical syllabus ---------- 20 marks
3. Demonstration on clinical Physiology ---------- 35 marks
4. Journal ---------- 05 marks
I.A. to be calculated out of 20 marks

Recommended text books:
1) Essentials of Medical physiology – K. Semubulingam
1. Text book of medical physiology – Guyton Arthur
2. Concise medical physiology – Chaudhuri Sujit K.
3. Human Physiology – Chatterjee C.C.
4. Text book of practical Physiology – Ranade.
5. Text of Physiology – A.K.Jain.
6. Basics of Medical physiology- Venkatesh D & Sudhakar H H
7. Manipal Manual of Physiology – Prof. C N Chandrashekar
Reference:
8. Review of Medical Physiology – Ganong William F.
9. Physiological basis of Medical practice – Best & Taylor

SUBJECT: BIOCHEMISTRY
(Subject Code: BPT – 103)

Subject Title & Code	**Biochemistry (BPT- 103)**
Duration **Total Hours** **Theory**	**New: 60 Hours Didactic**
Total Hrs/week **Lectures**	 **2hrs/week**
Method of Assessment	**Theory**

SYLLABUS

1) Cell biology ----------2hr
i) – Cell Membrane, structure, & function;

2) - Carbohydrates ---------- 8 hrs
i) - Chemistry-definition, classification with examples ;
ii) - functions of carbohydrates with muccopolysaccarhides (in details) :
iii) - Reducing properties of sugars of clinical & diagnostic importance
(e.g. Benedict's test, Banfood's test etc
iv) - Metabolism-Digestion & absorption of carbohydrates – Glycolysis – aerobic, anaerobic, Energetics & regulation;
v) - Kreb's cycle-its energetic & regulation-role of T.C.A. cycle;
vi) Glycognesis, glycogenolysis & their regulation-role of liver in muscle glycogen
vii) - glyconeogenesis-significance of H.M.P. shunt
viii) - hormonal regulation of blood sugar levels-Important metabolic disorders of glycogen, lactose intolerance, and Diabetes mellitus.

3) Proteins ---------- 6 hrs
i) - Chemistry-definition-function-classification of Amino acids-protein structure effect of temperature on proteins – denaturation-coagulation; isoelectric pH & its importance;
ii) - Metabolism-Digestion & absorption-Decarboxylation – De-amination-Transmethylation- transamination & their importance – Detoxification of ammonia including urea cycle ;
iii) - special products of amino acid e.g. tryptophan, phenylalnine, glycine, methionine
iv) - Neuro-transmitters. Those produced from amino acids eg: Serotonin, GABA, Dopamine, Epinephrine(Functions)

4) Lipids - ---------- 5 hrs
i) - Chemistry-definition classification (including fatty acids with examples) – function
ii) - Metabolism-Digestion & absorption of lipids – B-oxidation – of saturated fatty acids & its energetic & regulation of fat metabolism in adipose tissue-Ketone bodies formation & utilization –cholesterol & its importance (no biosynthesis needed) – classification, sources & function of lipoproteins – lipoproteinemia atherosclerosis

5) – Nuclic Acids ---------- 1 hr

i) – D.N.A. / R.N.A.- definition-structure & function-types-Genetic code-catabolism of purine- gout

6)-Enzymes ---------- 3 hrs
i) – definition-Co- Enzymes-classification-factors affecting -;
ii) – general Mechanism of action (in brief);
iii) Inhibition & types of inhibitors;
iv) –Iso- Enzymes ;
v) – clinical & therapeutic use of enzymes

7) – Vitamins ---------- 6 hrs
i) –water & Fat soluble-definition- classification;
ii) – individual vitamins-sources- Co- Enzymes forms- function-reaction related to metabolism covered;
iii) – RDA, absorption - & transport-deficiency & toxicity

8) – Biological Oxidation ----------1 hr
- Oxidative phosphorylation

9)- Minerals ---------- 2 hrs
i) –Phosphate, calcium, & iron (in details);
ii) magnesium, fluoride, Zink, Copper, Selenium Molybdenum, Iodine-sources, RDA, absorption,-transport-excretion function & disorder

10) – Acid – Base Balance, Water & Electrolyte ---------- 2 hrs
i) – Body water, pH-osmolarity Extra & Intra cellular fluid;
ii) – Buffers – pH, buffer system in blood –
iii) – Role of kidneys & lungs in acid-base balance :
iv) – water-electrolyte balance im-balance-dehydration

11) – Hormones ---------- 4 hrs
i) –Definition-classification-mechanism & action –
ii) – second messenger (Ca, cAMP, inositol phosphate,
iii) – metabolic effects of a) – Insulin, b) Glucagon, c) Catecholamines,
d) – Thyroxine e) – Mineralo-corticoids, f) – gluco corticoids

12) –Muscle Contraction ---------- 1 hr
i) – Contractile elements;
ii) –Biochemical events during contraction ;
iii) – erergy metabolism in skeletal & muscle

13) - Connective Tissue ---------- 1 hr
Biochemistry of connective tissue-collagen-Glyco-protein-proteoglycans

14) – Nutrition ---------- 5 hrs

i) – Importance of nutrition-Calorimetry-energy value-calorimeter-respiratory quotient & its significance ;
ii) – Basal metabolic rate-definition-normal values-factors affecting BMR;
iii) – energy requirement-with-age/sex/themogenesis/-specific dynamic action of food,-energy expenditure for various activities
iv) – Composition of food, balanced Diet dietary recommendations nutritional supplementation nutritional value of carbohydrates/proteins/fats & Fibers,
v) Nitrogen balance & its significance – Protein energy malnutrition-Kwashiorkor & Marasmus

15) – Clinical Biochemistry ---------- 3 hrs
i) –Liver function test & Renal function test;
ii) –Relevance of blood levels of glucose, urea, and Ca-Phosphate - & uric acid;
iv) –Lipid profile-Tri-glyceride,cholesterol/HDL/LDL/ALDL etc;
v) –Protein & Aggression i)-Glycosuria

SCHEME OF EXAMINATION
Section A-MCQ Section
A- Q1) MCQ – Single best answer [10 x 1] ---------- 10 marks
Section B-Q2) SAQ – To attempt any FIVE out of Six answers [5x3] ------ 15marks
Section C-Q3) LAQ To attempt any THREE out of Four answers [3 x5] ------- 15marks
INTERNAL ASSESEMENT 10 marks
Two exams – Terminal and prelim examination of 40 marks each TOTAL 80 marks
Section-A- Q 1) MCQ - Single best answer - [10 x 1] ----- 10 marks
Section-B- Q 2) SAQ-To attempt any FIVE out of Six answers-[5 x 3] --------15 marks
Section-C-Q3) SAQ - To attempt any THREE out of Four answers-[3 x 5] ---15 marks
I.A. to be calculated out of 10 marks

TEXT BOOKS
1) Biochemistry – by Dr. Deb Jyoti Das,
2) Biochemistry – by Dr. Satyanarayan
3) Text book of Biochemistry for Medical students by – Dr. Vasudevan / Shri Kumar
REFERENCE BOOKS
Review of Biochemistry (24th edition) by Harpar

SUBJECT: FUNDAMENTALS OF EXERCISE THERAPY (Subject Code BPT- 104)

Subject Title & Code	**FUNDAMENTALS OF EXERCISE THERAPY (BPT- 104)**
Duration **Total Hours** **Theory** **Practical**	**New: 250 Hours** **100** **150**
Total Hrs/week **Lectures**	**9** **3hrs/week**

Practicals **Seminars**	**6hrs/week**
Method of Assessment	**Theory and Practical**

Syllabus:

1] Bio-mechanics i) Axes / planes, laws of inertia & motion, mechanics of Forces, levers, pendulum, equilibrium, Torque ii) Types of muscle work angle of pull – Mechanical advantage – applied mechanics in the Therapeutic Gymnasium.

1. Basic Concepts in Biomechanics: Kinematics and Kinetics [10 Hours]
a) Types of Motion, b) Location of Motion, c) Direction of Motion, d) Magnitude of Motion, e) Definition of Forces, f) Force of Gravity, g) Reaction forces, h) Equilibrium,i) Objects in Motion, j) Force of friction, k) Concurrent force systems, l) Parallel force systems, m) Work, n) Moment arm of force, o) Force components, p) Equilibrium of levers

2. Joint structure and Function [6 Hours]
a) Joint design, b) Materials used in human joints,c) General properties of connective tissues, d) Human joint design, e) Joint function, f) Joint motion
g) General effects of disease, injury and immobilization.

3. Muscle structure and function [6 Hours]
a) Mobility and stability functions of muscles, b) Elements of muscle structure, c) Muscle function, d) Effects of immobilization, injury and aging

2] Starting & derived positions, stability, base of support …..(8 hrs)
3] Classification of movements, (active, passive, assisted, resisted) / (8 hrs)
4] Limb length (only lower limb – apparent, true, Supratrochantric) & girth Measurements……..(5 hrs)
5] Assessment of Sensations / Reflex testing….(5hrs)
6] Assessment of Blood pressure / pulse rate / chest expansion & Respiratory rate…. 6 hrs
7] Relaxation – all methods…. 3 hrs
8] Massage manipulations – principles effects / merits / demerits – skills on extremities / scalp/ spine / abdomen / face…… 12 hrs

9] Therapeutic Gymnasium suspension therapy, use of accessories such as pulleys, springs, shoulder wheel, axillary crutches, finger ladder, therapeutic balls parallel, bars etc applied Biomechanical principles….. 6 hrs
10] Physiological & Biophysical principles of Stretching, Strengthening and aerobic conditioning for general fitness exercise, Group & recreational activities – Warm up – stretching mobility strengthening – cool down….. 12 hrs
12] Basic principles of General fitness – warming up exercises, aerobics – cooling down exercises…. 3 hrs
13] Hydrotherapy – physics – application – effects – merits / demerits… 5 hrs
14. Active Movements

Types of active movements,Free exercise: Classification, principles, techniques, indications, contraindications, effects and uses
Active Assisted Exercise: principles, techniques, indications, contraindications, effects and uses

15. Goniometry : Techniques, uses, types. Measurement of Ranges of motion of various joints using Goniometer.

16.Passive Movements [4 Hours]
Causes of immobility, Classification of Passive movements, Specific definitions related to passive movements, Principles of giving passive movements, Indications, contraindications, effects of uses , Techniques of giving passive movements.

PRACTICAL (150 Hrs)
Skills included in all topics listed in sr. no. 2 to 13 above to be practiced on self & models

SCHEME OF EXAMINATION
THEORY – UNI. EXAM – 80 MARKS + INT. ASSESSMENT – 20 MARKS
Section -A-MCQ
Q1] based on Single best answer [20 x 1] ---------- 20 marks (20Min)
[to cover the must KNOW area of the subject]
Section B-SAQ
Q2] Answer any FIVE out of Six – [5 x 3] ---------- 15 marks
Q3] Answer any THREE out of Four [3 x 5] ---------- 15 marks
Section C- LAQ
Q4] [compulsory] based on Bio-mechanics ---------- 15 marks
#Q5] based on any other topic ---------- 15 marks
OR
Q6] based on any other topic ---------- 15 marks

PRACTICAL–80 MARKS + INT.ASSESSMENT–20 MARKS = TOTAL – 100 MARKS
1 Long case – based on Massage / Goniometry ---------- 35 marks
i] Cognitive – Bio-physics / Biomechanical principles / indications – contra indication Documentation of findings etc ---------- 20 marks
Ii] Psychomotor & affective – skills ---------- 15 marks
2 a) Short Case :- any one of the following ---------- 20 marks
Short case Based on passive movts / Relaxation / Limb / Ength – girth /
Sensation / Reflex testing / / Aerobics / group exercise / warm ups /
BP/ & Pulse / Chest Expansion / Respirate / Starting / Derived position etc.
b) Spots – Four spots based on therapeutics gymnasium etc. 5 minute per spots (4x5) = 20 marks
3 Journal ---------- 5 marks

INTERNAL ASSESSMENT
THEORY (20 marks)

Two exams –Terminal and prelim examination of 80 marks each TOTAL -160 marks
Section-A-MCQ-Q-1]-based on -Single best answer [20 x 1] ----20marks(20 Min.)
[to cover the must KNOW area of the subject]
Section-B-SAQ- Q-2]-Answer any FIVE out of Six—[5 x 3] ---------- 15 marks
Q-3]-Answer any THREE out of Four-[3 x 5] ---------- 15 marks
Section-C-LAQ-Q-4]-[compulsory]—based on Biomechanics---------- 15 marks
Q-5]-based on any other topic---------- 15 marks
OR
Q-6]-based on any other topic---------- 15 marks
I.A. to be calculated out of 20 marks

PRACTICAL
Two exams –Terminal and prelim examination of 80 marks each TOTAL -160 marks
1. Long Case:-Massage/ Goniometry ---------- 35Marks
i) Cognitive – Biophysics / Biomechanical principles / indications / contraindications**.** Documentation of findings etc. ---------- 20 marks
ii) Psychomotor and affective skills ---------- 15 marks
2. a) Short Case:- any one of the following.---------- ---------- 20 Marks
Short case Based on passive movts /Relaxation/Limb/ Length -girth/ Sensation/Reflex testing/ Yoga posture/Aerobics/group exercise/warm ups /BP & Pulse/Chest Expansion/Respiratory Rate/Starting & Derived position etc.
b) Spots - Four spots based on therapeutics gymnasium etc. 5 minute per spots ----- (4X5 = 20 Marks)
3. Journal ---------- 5 Marks

I.A. to be calculated out of 20 marks

TEXT BOOKS
1] Principles of Exercise Therapy – Dena Gardiner
2] Massage, manipulation & traction – Sydney Litch
3] Therapeutic Exercise ---------- do ----------
4] Massage – Holly
5] Suspension Therapy in Rehabilitation – Margaret Hollis
6] Bio mechanics –Cynthia Norkin
8] Measurement of physical function – Cynthia Norkins.
1] Therapeutic Exercise – Carolyn Kisner

REFERENCE BOOKS
2] Physiotherapy in Orthopedic conditions – by Jayant Joshi

SUBJECT: FUNDAMENTALS OF ELECTRO THERAPY
(Subject Code BPT-105)

Subject Title & Code	**FUNDAMENTALS OF ELECTRO THERAPY (BPT-105)**
Duration **Total Hours** **Theory** **Practical**	**New: 200 Hours** **95** **105**
Total Hrs/week **Lectures** **Practicals** **Seminars**	**8** **2hrs/week** **4hrs/week**
Method of Assessment	**Theory and Practical**

Syllabus:

1] Fundamentals of Low frequency currents ….. 16 hrs
i] production of electricity, mains supply,
ii] A.C. currents & Faradic type current
iii] D.C. currents – Types – fundamentals of electrical charges, static electricity- physic of direct currents Ohm's law Conductors-Capacitors-Rheostats-Potentiometers-ammeters-oscilloscopes,
iv] types of electrodes galvanic skin resistance – electrode –gels- types significance

2] Fundamentals of High frequency currents ….. 16 hrs
i] Magnetism, E.M.F. Conduction – Lenz's Law- transformers -types,
ii] Thermonic valves,
iii] Semi – conductors – types -Transistors
iv] Electronic circuits –oscillators,, - pulse generators
3] E.M. spectrum – Laws of transmission reflection – refraction – absorption – attenuation. …… 4 hrs
4] Cellular Bio-physics – reception & emission of E.M.F. signals….. 4 hrs
5] Environmental currents & fields risk factors on prolonged exposure to E.M. field…… 3 hrs
6] Production, Physical principles, Panel diagram, Testing of apparatus – S.W.D. Ultra sound, U.V.R., I.F.T. / Beat frequency currents, I.R. LASER (no panel diagram)…….. 18 hrs
7] Therapeutic continuous / interrupted Direct currents & their various wave forms,A.C. current…… 14 hrs
8] Bio-physics of Superficial heat & cold – Physiological effects –Therapeutic effects/ uses – Merits / demerits, Indications / contra-indications-skills of applicationi]Home remedies, ii] Paraffin wax bath iii] whirl pool, iv] contrast bath
v] Hydro-collator hot packs / cold packs, vi] Cryo therapy…… 16 hrs

9) Medical Electricals / Physiology of Gen indication & contra indication Therapeutic effects pain relief, Neuro & muscle etc….. 6 hrs
10) Basic Skills – in electro OPD & precaution……. 2 hrs

PRACTICALS (105 Hrs)
1] Panel diagrams – Identification of components – Testing the mains supply & Machines
2] Skills of application of thermal agents

SCHEME OF EXAMINATION
Theory – 80 marks. I.A. – 20 Marks;
Theory – model question paper – [80 marks]
Section A-MCQQ-
1] based on Single best answer [20 x 1] ---------- 20 marks
Section B-SAQ
Q-2] to answer any FIVE out of six --- [5 x 3] ---------- 15 marks
Q-3] to answer any THREE out of Four [3 x 5] ---------- 15 marks
Section C-LAQ
Q-4] based on superficial Thermal agents ---------- 15 marks
* Q-5] ---------- 15 marks
OR
* Q-6] ---------- 15 marks

PRACTICAL - PRACTICAL – 80 MARKS +, I.A. – 20 MARKS TOTAL = 100 MARKS
1] Long case based on Superficial thermal agent ---------- 35 marks
[Cognitive – Medical electronic area/ Physiological –Biophysical principles / therapeutic effects / Indications – contraindications] ---------- [20 marks]
+ [Psychomotor + Affective skills] ----------[15 marks]
2] Spots
A] Identification of Electronic component & give one use with example OR panel Diagram ---FOUR spots [5 minutes per spot] (4 x 5) ---------- [20 marks]
B] testing of equipment TWO spot (10 x2) [10 minutes] ---------- [20 marks]
Journal ---------- [05 marks]

INTERNAL ASSESSMENT ---------- 20 MARKS
THEORY (20 marks)
Two exams – Terminal and prelim examination of 80 marks each TOTAL -160 marks
Section-A-MCQ-Q-1] - based on Single best answer –[20x 1]---------- 20 marks
Section-B-SAQ -Q-2] - to answer any FIVE out of six—[5 x3] ---------- 15 marks
Q-3] - to answer any THREE out of Four-[3 x 5] ----------15 marks
Section-C-LAQ- Q-4] - based on superficial Thermal agents---------- 15 marks
* Q-5] ---------- 15 marks
OR
* Q-6] ---------- 15 marks
I.A. to be calculated out of 20 marks

PRACTICAL

Two exams – Terminal and prelim examination of 80 marks each TOTAL -160 marks

1. Long Case: - Superficial thermal agents---------- 35 Marks

(Cognitive – medical electronic area / physiological – Biophysical principles/therapeutic effects /

Indications / contraindications) ---------- 20 marks

(Psychomotor + affective skills) ---------- 15 marks

2. Spots ---------- 40 marks

a) Identification of electronic component and give 1 use with example or panel diagram(4 spots, 5 min per spots) (4 x 5 = 20 marks)

b) Testing of equipment – 2 spots (10 minutes) (2 x 10 = 20 marks)

3. Journal ---------- 5Marks

I.A. to be calculated out of 20 marks

INTERNAL ASSESSMENT IN PRACTICAL ---------- 20 marks

TEXT BOOKS

1. Clayton 1s Electro therapy – 3rd & 10th ed,
2. Electro therapy explained – by Low & Read
3. Electro Therapy – by Kahn
4. Basics of Electrotherapy – Dr. Subhash Khatri

REFERENCE BOOK –

Clinical Electro Therapy – by Nelson & Currier.