

INSTITUTE OF ADVANCED STUDIES IN
EDUCATION (DEEMED UNIVERSITY)
GANDHI VIDYA MANDIR
SARDARSHAHAR

DETAILED SYLLABUS

FOR

DISTANCE EDUCATION

**CERTIFICATE IN PHYSIOTHERAPY
(CPT)**

(SEMESTER SYSTEM)

FIRST SEMESTER

S. NO.	PAPER NAME	PAPER CODE	INTERNAL ASSESSMENT		UNIVERSITY EXAMINATION			TOTAL
			Th.	Pr.	Th.	Viva	Pr.	
1.	Human Anatomy	CPT - 110	20	20	100	20	40	200
2.	Biochemistry	CPT - 120	20	20	100	20	40	200
3.	Human Physiology	CPT- 130	20	20	100	20	40	200

SECOND SEMESTER

S. NO.	PAPER NAME	PAPER CODE	INTERNAL ASSESSMENT		UNIVERSITY EXAMINATION			TOTAL
			Th.	Pr.	Th.	Viva	Pr.	
1.	Biomechanics	CPT - 210	20		80			100
2.	Pathology & Microbiology	CPT - 220	20	20	100	20	40	200
3.	Principles of Bioelectrical Modalities	CPT - 230	20	-	80	-	-	100

FIRST SEMESTER

CPT – 110 HUMAN ANATOMY

Maximum Marks : 100

Duration : 3 hours

Objectives :

1. To know gross structure of various body parts especially Musculo-skeletal, cardiorespiratory and nervous system.
2. To study effects of physical therapy on body anatomy.

General Anatomy :

1. Introduction, various terminologies used, anatomical position etc.
2. Regions of Body, cavities and Systems outline.
3. connective tissue & its modification, tendons, membranes, Special connective tissue.
4. Bone structure, blood supply, growth, ossification, and classification.
5. Muscle, Nerve, blood vessels & lymphatics – structure, types & distribution
6. Joints – classification, structures of joints, movements, range, limiting factors, stability, blood supply nerve supply, dislocations and applied anatomy.

Thorax (In brief) :

1. Thoracic cage
2. Pleural cavities & pleura
3. Lungs and respiratory tree
4. Mediastinum & pericardium
5. Heart and great vessels
6. Diaphragm

Upper extremity :

1. Bones & joints.
2. Muscles – origin, insertion, actions, nerve supply & blood supply.
3. Major nerves – course, branches and implications of nerve injuries.
4. Development of limb bones, muscles and anomalies.

Lower Extremity :

1. Bones & joints
2. Muscles – origin, insertion, actions, nerve supply & blood supply
3. Major nerves – course, branches and implications of nerve injuries
4. Development of limb bones, muscles and anomalies

Spine :

1. Back – muscles - Superficial layer, Deep muscles of back, their origin, insertion, action and nerve supply.
2. Vertebral column – Structure & Development, Structure & Joints of vertebra

3. Applied anatomy & Developmental defects.

Abdomen and pelvis :

1. Abdominal cavity – divisions
2. Muscles of Abdominal wall, pelvic floor
3. Bony Pelvis
4. Digestive system (Liver & pancreas, Alimentary canal).
5. Urinary system. = Kidney, Urter, bladder, urethra
6. Adrenal gland
7. Genital system – male and female

Head and neck :

1. Cranium
 2. Central nervous system – disposition, parts and functions
 3. Cerebrum (Brief Description)
 4. Cerebellum (\Brief Description)
 5. Midbrain & brain stem (Brief Description)
 6. Blood supply & anatomy of strokes
 7. Spinal cord-anatomy, blood supply, nerve pathways, applied significance
 8. Pyramidal, extra pyramidal system
 9. Thalamus, hypothalamus (Brief Description)
 10. Ventricels of brain, CSF circulation (Brief Description).
 11. Development of nervous system & defects (Brief Description)
 12. Nerve plexuses.
 13. Cranial nerves – special emphasis on V, VII, X, XI, XII (course, distribution and palsies)
 14. Sympathetic nervous system, its parts and components (Brief Description).
 15. Parasympathetic nervous system (Brief Description).
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1. Endocrine – system – Pituitary, Thyroid, parathyroid (Brief Description)
 2. Special senses (Brief Description) : Nerve receptors, Eye, Ear, Labyrinth
 3. Embryology (Brief Description) : - General embryology, placenta, fetal membranes, twinning, and teratogenesis.

Suggested Readings :

1. B. D. Chaurasia, “Human Anatomy”.
2. B. D. Chaurasia, “Hand Book of General Anatomy”.
3. B. D. Charasia, “Human Osteology”.
4. Inderbir Singh, “Text Book of Neuranatomy”.
5. Inderbir Singh, “Text Book of Human Histology”
6. inderbir Singh, “Text Book of Human Osteology”.
7. Krishna Garg, “Basics of Anatomy and Physiology”.
8. Gray, “Gray’s Anatomy”.

Maximum Marks : 100

Duration : 3 hours

A brief outline of metabolic pathways mentioned herein is indicate.

Details and structures are to be avoided.

1. Carbohydrates : Definition, classification with examples and general functions. Metabolism-Glycolysis, T.C.A. Glycogen metabolism, Blood Sugar regulation Diabetes and diabetic keto-acidosis.
2. Lipids : Definition, classifications and general functions, Essential fatty acids, cholesterol, Blood lipid. Brief review of lipoproteins. Metabolism-Oxidation of fatty acids, cholesterol synthesis, and fatty liver.
3. Proteins. : Definition, classification, and Bio-medical Importance. Study of hemoglobin and immunoglobulins.
4. with functions. Plasma Proteins and functions. Metabolism : General reactions of amino acids. Formation and fate of ammonia – Urea cycle.
5. Nucleic Acids : Brief overview of the structure of RNA and DNA including nucleotides.
6. Nutrition : Basic principles of nutrition of carbohydrates, Proteins and Lipid caloric requirement and balance diet.
7. Enzymes : Definition, classification with examples. Factors affecting enzyme action. Brief study of enzyme inhibition. Clinical importance of enzymes.
8. Vitamins : Definition, classification and functions. Dietary source, Daily requirement and deficiency disorders.
9. Water and Electrolyte Balance : General outline of fluid compartments of the body with their water and electrolyte content and balance, Dehydration.
10. Tissue chemistry : Chemistry of connective tissue, bone and teeth. Composition function and chemical mediators of nerve structure of muscle tissue. General Biochemistry of muscle contraction and relaxation.

Suggested Readings :

1. Chatterje & Shinde, "Textbook of Medical Biochemistry"
2. A. C. Deb, "Fundamentals of Biochemistry"
3. Lehninger, "Principles of Biochemistry".
4. Murray, "Harper's Biochemistry".

Maximum Marks : 100 Duration : 3 hours

Objectives : To know the Physiology of human body. To understand the effects of physical therapy on human physiology with major emphasis on cardio-respiratory, Musculo-skeletal and nervous system.

1. Genral Physiology (brief description only)
 1. Structure of cell.
 2. Functional morphology of the cell
 3. Intercellular communication
 4. Homeosasis
2. Cardiovascular System (descriptive)
 1. Anatomical, biophysical consideration of arterial, arteriolar & capillary venous level, Lymphatic circulation
 2. Hemodynamics.
 3. Origin and spread of cardiac excitation
 4. Basic idea of Electrocardiogram
 5. Cardiac cycle, Cardiac output, its regulation
 6. Local & systemic regulatory mechanisms of CVS, humeral & neural
 7. Cerebral, coronary, splachnic, skin, Placental & Fetal circulation
3. Respiratory System (descriptive)
 1. Physiological anatomy of lungs, mechanics of respiration
 2. Pulmonary circulation, Ges exchange in lungs
 3. Oxygen & Carbon dioxides transport
 4. Other fncion of respiratory system
 5. Neural & chemical control of breathing
 6. Regulation of respiratory activity, non-chemical influences on respiratory activity
4. Cardio respiratory adjustments in health & disease (descriptive)
 1. Exercise, high altitutde, deep sea diving
 2. Hypoxia, hypercapnia, hypocapnia, oxygen treatment
 3. Asthma, emphysema, artificial respiration
5. Blood (brief description only)
 1. W.B.C., R.B.C. Platelets formation & functions
 2. Plasma, Blood Groups
 3. Haemostasis, Immunity
6. Digestive System & excretory System (In brief)
7. Nerve (descriptive)
 1. Nerve _ General Concept
 2. Nerve cell – structure
3. Genesis of resting membrane potential & Action potential
 4. Their ionic basis, All or None phenomenon
 5. Ionic basis of nerve conduction
 6. Classification & types of nerve fibre

7. Mixed nerves & compound action potential
8. Concept of nerve injury & Wallerian degeneration
8. Muscle (descriptive)
 1. Skeletal & cardiac muscle
 2. Morphology, properties
 3. Electric & Mechanical responses & their basis
 4. Concept of isometric & isotonic muscle contraction
 5. Pacemaker tissues & their potential in cardiac muscle
 6. Metabolism
9. Synaptic & Junction Transmission (brief description only)
 1. Functional anatomy of synapses
 2. Electrical events in postsynaptic neurons
 3. Inhibition & facilitation at synapses
 4. Chemical transmission of synaptic activity
 5. Principal neurotransmitter system
 6. Neuromuscular junction, structure & events occurring during excitation
 7. Concept of denervation hypersensitivity
10. Function of Nervous system (descriptive)
 1. Reflexes, monosynaptic, polysynaptic, withdrawal reflex
 2. Properties of reflexes
 3. Sense organ, receptors, electrical & chemical events in receptors
 4. Ionic basis of excitation
 5. Sensory pathways for touch, temperature, pain, proprioception, others
 6. Control of tone & posture : integration at spinal, brain stem, cerebellar, basal ganglion levels, along with their functions & clinical aspects
11. Endocrinology (brief description only)
12. Male & female reproductive system (brief description only)
13. Autonomic nervous system (brief description only)
14. Hypothalamus (brief description only)
15. Higher functions of nervous system (brief description only)
 1. Learning & memory, neocortex, limbic functions, sexual behaviour, fear & rage, motivation – brief idea
16. Special senses (brief description only)
17. Arousal mechanisms & sleep (brief description only)

Suggested Readings :

1. C. C. Chatterji, "Human Physiology"
2. Keele, "Samson's Wright's Applied Physiology".
3. Bijlani, "Understanding Medical Physiology".
4. Ganong, "Review of medical Physiology".
5. Guyton, "Textbook of Medical Physiology".
6. A. K. Jain, "Manual of Practical Physiology".

SECOND SEMESTER

CPT – 210 BIOMECHANICS

Maximum Marks : 100 Duration : 3 hours

Objectives : To understand the basic principles of biomechanics.

All topics are for a brief description only.

Definition of mechanics and Biomechanics

Force – Definition, diagrammatic representation, classification of forces, concurrent, coplanar and co-linear forces, composition and resolution of forces, angle of pulls of muscle.

Momentum-principles, and practical application

Friction

Gravity : Definition, line of gravity, Centre of gravity.

Equilibrium : Supporting base, types, and stability of equilibrium.

Energy work and power : Energy (potential and kinetic) work and power.

Levers : Definition, function, classification and application of levers in physiotherapy & order of levers with example of lever in human body.

Pulleys : system of pulleys, types and application.

Elasticity : - Definition, stress, strain, HOOKE'S Law,.

Springs – properties of springs, springs in series and parallel, elastic materials in use.

Aims and scope of various biomechanical modalities : Shoulder wheel, shoulder ladder, shoulder pulleys, pronator/supinator instrument, static cycle, rowing machine, ankle exerciser, balancing board, springs, weights, etc.

Hydrostatics and Hydrodynamics : Specific gravity, Hydrostatic pressure, Archimedes, principle, Properties of water, and other liquids, Buoyancy-law of floatation, factors determining up-thrust, effect of buoyancy on movements performed in water. Equilibrium of a floating body, Bernoulli's theorem.

Suspension Therapy : Principles of suspension, types, components of suspension apparatus, effects and uses of suspension therapy – their therapeutic application.

Soft tissue manipulation : History, definition, types and their rationale, general effects, local effects of individual manipulation (physiological effects) and uses, contra-indications and techniques of application.

Hydrotherapy : History and introduction, indication and contraindication dangers and precautions, hydrotherapy regimes of exercises, hydrotherapy exercise for all age groups, different types of pools and baths.

Suggested Readings :

1. Hollis & Cook, "Practical Exercise Therapy"
2. Gardiner, "Principles of Exercise Therapy".

Maximum Marks : 100 Duration : 3 hours

Course objectives : Brief concept of health and illness, health promotion and diseases prevention.

Contents :

1. Immunology : Brief outline of immune system, Immunity, immune responses & immune deficiency. Immunology and exercise with us implications on Physical therapy, Hypersensitivity disorders
2. Infectious diseases : Brief description of classification of microorganisms, morphology, and identification. Sterilization and disinfections.
3. Brief outline of identification, disease produced, prevention and treatment of common pathogens – streptococci, staphylococci, gonococci, Meningococci, salmonella, V. cholerae, E. coli, shigella, tetanus, Diphtheria, M. leprae, M. tuberculosis, Poliomyelitis, Rabies, Malaria, Amoebiasis, Helminthiasis, Scabies, ringworm, candidiasis.
4. Inflammation, injury and repair (Brief description)
5. Oncology : Classification, general clinical features, relationship with exercise, cancer pain syndrome. (brief Outline only)
6. Skin : (Brief outline only) – Etio – pathogenesis, gross pathology, and clinical features of commonly occurring skin Diseases, Burns, Pressure ulcers.
7. Cardiovascular system : (Brief description only) – Etio – pathogenesis, gross pathology, and clinical features of conditions of aging, IHD, MI, CCF, HT, RHD, Congenital heart disease, Arteriosclerosis, Thrombo-angitis, Vasomotor/Raynaud's, venous thrombosis, Gangrene Lymph edema.
8. Haematology : (Brief outline only) – Etio of pathogenesis, gross pathology, and clinical features
9. Respiratory system : (Brief description only) - Etio - pathogenesis, gross pathology, and clinical features of conditions-aging, Pneumonia, Pulmonary TB, Bronchiectasis, COPD, Bronchial Asthma, Restrictive Lung disease, Occupational lung disease.
10. Musculoskeletal system : (Brief description only) - Etio-pathogenesis, gross pathology, and clinical features of conditions - Biological responses to trauma, bone and soft tissue immobilization, osteomalacia, Osteoporosis, Osteomyelitis, Osteoarthritis, rheumatoid arthritis, Gout, spondyloarthropathy, Osteonecrosis, Myofascial pain syndrome.
11. CNS AND PNS: (Brief description only) - Etio-pathogenesis, gross pathology, and clinical features of conditions - aging, meningitis, Encephalitis, Parkinson's, Amyotrophic lateral Sclerosis, stroke, Neuropathies (Charcot Marie Tooth's disease,

Compression and entrapments, diabetic, G.B. syndrome) Poliomyelitis and post-polio syndrome, Myasthenia Gravis.

Suggested Readings :

1. P. Chakraborty, "Textbook of Microbiology".
2. Anathnarayan, "Textbook of Microbiology".
3. Harsh Mohan, "Textbook of Pathology".
4. Kumar, Coutran, "Basic Pathology".
5. Nagalotima, "Textbook of Pathology".

CPT – 230 PRINCIPALS OF BIO-ELECTRICAL MODALITIES

Maximum Marks : 100 Duration : 3 hours

Course Objective:

To understand the basic electricity, equipments and their application in Electrotherapy.

All topics are for a brief description only.

DC Currents - Modern concept of electricity: fundamental electric charges (protons and electron), bound free electrons, free electron and current, static electric charge, charging of an object potential difference and EMF.

A. C. currents : Sinusoidal wave form, frequency, wavelength, Amplitude and phase of a sine wave, Average & RMS value of a sine wave

Quantity of electricity, magnitude of current, conductors and insulators, resistance of conductor and Ohm's law, resistances in series and parallel.

Capacitors : Electric field around a capacitor, charging and discharging a capacitor, types of capacitor with application of each in physiotherapy department.

Rheostat : Series and shunt Rheostat with application of each in the Physiotherapy department.

Effects of electric Current : Thermal effect, chemical effect (ionization) and magnetic effect. Electric shock, Earth shock, causes and its prevention.

Magnetism : magnetic - non-magnetic substances and their properties, properties of magnet, molecular theory, poles of magnet and its properties, magnetic lines of force and their properties, Electromagnetism, magnetic effects of electric current, Electromagnetic induction, Lenz's law, Inductor and Inductance types of inductor, reactance and impedance.

BASIC ELECTRICAL INSTRUMENTATION

THERMIONIC VALVES : Thermionic emission, Diode and Triode valves and their characteristics, Construction and application of Cathode Ray Oscilloscope.

SEMICONDUCTOR DEVICES : Intrinsic and extrinsic semiconductors, advantages of diode and transistor devices. Biasing of Diode and their characteristics, Light Emitting Diodes, integrated circuits.

ELECTRONIC CIRCUITS : Rectifiers & smoothing circuits, Oscillators - Sinusoidal and nonsinusoidal types.

a.c. AND D.C. METERS : Functions and applications of Ammeter and volt meters, Ohmmeters, Wheat stone bridge
Emphasis should be given to fundamental part with formulae without mathematical derivations wherever necessary.

PHYSICAL ENERGY : Definition, description, effects, physiological effects and dangers of heat and electromagnetic radiations.

MEDICAL INSTRUMENTATION FOR PHYSICAL THERAPY : Brief description of generation, circuit diagrams and testing.

Low frequency currents, Direct currents, Medium frequency currents

Short wave Diathermy-continuous and pulsed

Microwave Diathermy

Ultrasonics

Actino-therapy Infrared, UVR and lasers.

NOTE: Emphasis is given only to generation circuit diagram and testing of the various electrotherapy apparatus.

Suggested Reading:

1. Forster & Palastanga "Clayton's Electrotherapy"
2. Low & Reed, "Electrotherapy Explained"
3. Nelson & Currier, "Clinical Electrotherapy"