

Syllabus for the post of Demonstrator, Physiotherapy

ANATOMY

COURSE DESCRIPTION

The study of Anatomy will include identification of all gross anatomical structures. Particular Emphasis will be placed on description of bones, joints, muscles, the brain, cardio-pulmonary and nervous systems, as these are related to the application of Physiotherapy.

SECTION - A

I. GENERAL ANATOMY:-

- 1. Introduction** - Anatomical position of body, Anatomical terms.
- 2. Bones** – Composition, Function, Classification, parts of young bone, blood supply, terms used, general remarks about bones of extremities, vertebral column, thorax and skull.
- 3. Arthrology**
 - a) Classification of joints
 - b) Construction of joint
 - c) Motion of joint
 - d) Articulation
- 4. Muscular system-**
 - a) Type of muscles
 - b) Characteristics of muscles.
 - c) Origin, insertion, nerve supply
- 5. Nervous system-**
 - a) Introduction and parts.
 - b) Nerve cell, nerve fibres, synapse and reflex arc.
- 6. Cardiovascular system-**
 - a) Introduction
 - b) Arterial and venous system.
 - c) Lymphatic system.
- 7. Connective Skin tissue & ligaments**

II. REGIONAL ANATOMY – (Under Following Headings)

- Osteology
- Soft parts
- Demonstration of dissected parts
- Surface anatomy
- Radiological Anatomy

SUPERIOR EXTREMITY

- **Osteology** – Clavicle, Scapula, Humerus, Radius, Ulna, Articulated hand.
- **Soft parts** – Breast, Pectoral region, Axilla including Axillary artery and brachial plexus
Scapular region, Cubital fossa, Front & Back of arm, front and back of forearm, Palm,
Nerves and Vessels of Arm, Forearm & Hand, Joints, Venous drainage, Lymphatic
drainage.
- **Demonstration of dissected part.**
- **Surface Anatomy.**
- **Radiological Anatomy.**

NEUROANATOMY

- Spinal cord, Parts of brain, CSF, Introduction to Medulla, Pons and Mid Brain so as to
know the positions of tracts.
- Cerebellum – Parts, Functions and Dysfunctions, Ventricle's of Brain, IV th ventricle in
detail.
- Cerebrum - Sulci and Gyri and various functional areas of cerebral hemispheres, Blood
supply and clinical anatomy.
- Thalamus, Internal capsule, Basal ganglia, Blood supply and clinical anatomy.
- Sensory - motor pathway and related clinical anatomy.

HEAD AND NECK

Osteology – Introduction to skull i.e. names of Bones forming skull.

Soft parts –

1. Muscles of Face
2. Extra cranial course of facial nerve, facial palsy
3. Carotid arteries
4. Jugular venous system
5. Introduction endocrine and thyroid glands (in details)
6. Salivary glands – parotid in detail
7. Introduction to Eye ball and extra ocular muscles – name, nerve supply, action
8. Other important muscles – Sterno- mastoid, Muscles of Mastication
9. Introduction to Cranial Nerves – Names and distribution(V, VII, XII in detail)
10. Tongue
11. Temporo mandibular joint.

Demonstration of dissected parts

- **Surface Anatomy** – Bony prominence, Points to palpate nerves, Identification of
important muscles.
- **Radiological Anatomy**

SECTION - B

INFERIOR EXTREMITY –

- **Osteology** – Hip bone, Femur, Patella, Tibia, Fibula, Articulated foot.
- **Soft parts** – Front of thigh including Femoral canal and hernia, Adductor canal, Medial compartment of thigh, Gluteal region, Popliteal fossa, Back of thigh, Anterior, Posterior, Medial and Lateral compartments of Leg & Sole, Foot, Joints - Hip, Knee, Ankle and Tarsal, Arches of foot, Venous and Lymphatic drainage.
- **Demonstration of dissected parts**
- **Surface Anatomy**
- **Radiological Anatomy**

THORAX

- **Osteology** – Sternum, ribs, thoracic vertebrae.
- **Soft parts** – Thoracic wall, Inter costal spaces, Movements of Respiration, Respiratory passage, Pleura, Lungs, Heart and Great vessels, Inter vertebral joint and Costo vertebral joint, Inter vertebral disc.
- **Demonstration of dissected parts** – Thoracic wall, Lung, Heart.
- **Surface Anatomy**
- **Radiological Anatomy**

ABDOMEN

- **Osteology** – Sacrum, Lumbar vertebrae.
- **Soft Parts-**
 1. Introduction to Abdominal wall, including nine quadrants of abdomen.
 2. Digestive system – General idea of GIT and associated glands, stomach in detail.
 3. Urinary system – General idea, Kidney in detail.
 4. Reproductive system – General outline of male and female reproductive system, Testis and Uterus in detail.
 5. Introduction to Liver & Spleen
- **Demonstration of dissected parts**
- **Surface Anatomy**
- **Radiological Anatomy.**

* Emphasis should be given to bones, muscle, nerves and joints of limbs.

PHYSIOLOGY

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.
- Lymph: Composition, formation, circulation and functions.

3. NERVE MUSCLE PHYSIOLOGY

- Introduction: Resting membrane potential. Action potential – ionic basis and properties.
- Nerve: Structure and functions of neurons. Classification, Properties and impulse transmission of nerve fibres. Nerve injury – degeneration and regeneration.
- Neuroglia: Types and functions.
- 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. 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.

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. 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.

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.
- Mechanism of Defecation.

7. RENAL SYSTEM

- 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. Insulin 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. Diuretics.
- Micturition: Mechanism of micturition. Cystometrogram. Atonic bladder, automatic bladder.
- Acid-Base balance (very brief)
- Artificial Kidney: Principle of haemodialysis.
- Skin and temperature regulation.

8. ENDOCRINE SYSTEM

- Role of hypothalamus as an endocrine gland
- Functions and hypo & hyper – section of hormones of
 1. Pituitary
 2. Thyroid
 3. Parathyroid
 4. Adrenal gland
 5. Endocrine part of pancreas.

9. REPRODUCTIVE SYSTEM

- 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. 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. CENTRAL NERVOUS SYSTEM

Outline of nervous system-

- General nervous system –
 - A. Synapse - definition, physiological anatomy, sequence of events of synaptic transmission, properties. Significance of synaptic transmission and applied aspect.
 - B. Neurotransmitters – in brief.
 - B. Receptors – definition, classification with examples. Properties (state each property with underlying mechanism and significance), homeostasis, conscious awareness of environment, tone, posture, protection.
 - C. Sensations – different modalities, classification with examples and significance – sensation of touch, pain, proprioception .
 - D. Reflexes – definition , classification and examples, reflex arc and its components, properties with basis and importance,
 - E. Stretch reflex – definition, muscle spindle (details with innervations, role of gamma motor neurons, role of supra spinal control – in brief , functions of stretch reflex regulation of muscle tone, inverse stretch reflex.
 - F. Polysynaptic reflex – withdrawal reflex.
- Tracts : Ascending and Descending tracts – details of each tract (situation and extent in spinal cord, origin, course, termination)
- Posture and Equilibrium : Definition, classification of postural reflexes & their functions, Vestibular apparatus: Physiologic anatomy, modes of function of utricle, saccule, semicircular canals, vestibulospinal reflexes
- E.E.G – Definition, different waves, Characteristics and functional significance of each wave
- Cerebellum – Introduction, functional classification, intracortical circuit, deep cerebellar nuclei, connection of different lobes, functions of cerebellum, cerebellar function test, effect of lesion in brief.

- Basal ganglia- Introduction, classification of nuclei, connection, intracortical circuits, functions, lesions, parkinsonism.
- Cerebral cortex - Gross anatomy and divisions, concept of Brodmann's mapping with diagram, Parietal lobe- anatomical and functional divisions, details of each functional parts as regards connections, topographic organization, functions. Frontal lobe – excitomotor cortex – anatomical and functional parts, details of each part as regards connections, topographic organization, functions. Prefrontal cortex- different areas, connections in brief, functions.
- Speech – afferent and efferent mechanism and role of cortical centres in speech, concept of cerebral dominance in development of speech, vocalization.
- Memory – Definition, stages, types, physiological basis, factors affecting, applied - Amnesias in brief
- Learning – Definition, types with examples, stages factors influencing, role of motivation (positive and negative reinforcement, reward and punishment), physiological basis – role of different parts of CNS, structural biochemical changes.
- Conditioned reflexes – Definitions, difference between unconditioned and conditioned reflexes, development of conditioned reflexes, properties and significance.
- Autonomic nervous system – Organization and function of Parasympathetic and Sympathetic and their control
- CSF – Introduction, composition, normal CSF pressure, formation and circulation, functions, applied aspect - blood brain barrier, blood CSF barrier in brief.

11. BODY TEMPERATURE REGULATION –

- Homeothermia – balance between heat gain and heat loss
- Regulation of body temperature.

12. PHYSIOLOGY OF EXERCISE

- Effects of acute and chronic exercise on
 - 1) O₂ transport
 - 2) Muscle strength/power/endurance
 - 3) B.M.R./R.Q.
 - 4) Hormonal and metabolic effect
 - 5) Cardiovascular system
 - 6) Respiratory system
 - 7) Body fluids and electrolyte
- Effect of gravity / altitude /acceleration / pressure on physical parameters
- Physiology of Age

BIO-CHEMISTRY

1. BIOPHYSICS

Concepts of pH and buffers, acid base equilibrium osmotic pressure and its physiological applications.

2. CELL

Morphology, structure & Kinetics of cell, cell membrane, Nucleus, Chromatin, Mitochondria, Endoplasmic Reticulum, Ribosomes.

3. CARBOHYDRATES:

Definition, functions, sources, classifications, Monosaccharides, Disaccharides, Polysaccharides, Mucopolysaccharides and its importance.

4. LIPIDS

Definition, functions, sources, classifications, Simple lipid, compound lipid, derived lipid, unsaturated fatty acid, essential fatty acid, and their importance, Blood lipids and their implications, cholesterol and its importance.

5. PROTEINS

Definition, sources, kinetics, classifications, simple protein, conjugated protein, derived proteins, properties & verities of proteins.

6. NUCLEIC ACID

Structure & function of DNA & RNA, nucleotides, genetic code, Biologically important nucleotides.

7. ENZYMES

Definition, classifications, mode of action, factors affecting enzyme action, clinical importance of enzyme.

8. VITAMINS

Classification, fat soluble vitamins, A, D, E & K, water soluble vitamin B complex & C, daily requirements, physiological functions & diseases of vitamin deficiency.

9. BIOENERGETICS

Concept of free energy change, Exogenic & Endogenic reactions, concepts regarding energy rich compounds, Respiratory chain & Biological oxidation.

10. CARBOHYDRATE METABOLISM

Glycolysis, HMP shunt pathway, TCA cycle, Glycogenesis, Glycogenolysis, Glucogenesis, maintenance of Blood Glucose, interconversions of different sugar.

11. LIPID METABOLISM

Fatty acid oxidation, Fatty acid synthesis, Metabolism of cholesterol, Ketone bodies, Atherosclerosis and obesity.

12. PROTEIN METABOLISM

Transamination, Transmethylation, Deamination, Fate of ammonia, urea synthesis & synthesis of creatine, inborn errors of metabolism.

13. WATER & ELECTROLYTE

Fluid compartment, daily intake and output sodium and potassium metabolism.

14. NUTRITION

Balance diet, metabolism in exercise and injury, Diet for chronically ill and terminally ill patients.

15. CONNECTIVE TISSUE

Mucopolysaccharide connective tissue proteins, glycoproteins, chemistry & Metabolism of bone and tooth, metabolism of skin.

16. NERVE TISSUE

Composition, metabolism, chemical mediators of Nerve activity.

17. HORMONES

General characteristics and mechanism of hormone action insulin, glucagone Thyroid and Parathyroid hormones, cortical & sex hormones.

18. ISOTOPES: Isotopes and their role in treatment and diagnosis of diseases.

SOCIOLOGY & PSYCHOLOGY

A. Introduction -Meaning, definition and scope of sociology, its relation with anthropology, psychology, social psychology and ethics.

Methods of sociology - Case study, social survey, questionnaire, interview and opinion poll methods.

B. Social change – Meaning & Factors of Social change, Human adaptation and social change, Social change and deviance, social change and stress, Social change and health programme.

The role of social Planning in the improvement of health and rehabilitation.

C. Socialization

Meaning and nature of socialization

Primary, secondary and anticipatory, socialization

Agencies of Socialization

D. Social groups

Concepts of social group,

Influence of formal and informal groups on health and Sickness

The role of primary groups in hospital and rehabilitation settings

E. Social Institution

F. Family

Meaning and definition,

Function and types of family

Changing family patterns Influence of family on the individual's health, family and nutrition,

The effect of Sickness on family

Psychosomatic diseases and their importance to Physiotherapy.

G. Community

Rural Community – meaning and features, health of ruralites

Urban Community- meaning, and features, health hazards of urbanites

H. Culture and health –

Concepts of culture

Culture and behaviour

Cultural and health

Culture and health disorders

I. Social problems of disabled - Major social problems

J. Social factors in health and disease -The meaning of social factors in health and illness

K. Social security - Social security and social legislation in relation to the disabled

L. Social work - Meaning of social work. The role of medical social worker.

M. Social Control - Meaning of social control, role of norms, folkways, customs, morals, religion, law and other means of social control in the regulation of human behaviour, social deviance and disease.

SECTION B- PSYCHOLOGY

1. Schools

Structuralism, functionalism, behaviourism & Psychoanalysis.

Branches: Pure psychology and applied psychology.

Methods: Introspection, observation, inventory and experimental method.

2. Growth and development

Infancy, childhood, adolescence, adulthood, middle age and old age.

3. Motivation

Motivate cycle (Need, drive, incentive, reinforcement)

Classification of motives.

Maslow's theory of need hierarchy.

Frustration: Sources of frustration.

Conflict: types of conflict.

Stress: Sources and management of stress.

4. Learning

Factors affecting learning.

Theories of learning: Trial and error learning classical conditioning, operant conditioning, Insight learning.

The effective ways to learn ; massed vs. spaced, whole vs. parts, recitation vs. reading, serial vs. free recall, incidental vs. intentional, knowledge of results association, organization, mnemonic methods.

5. Memory

Types of memory

Forgetting: curve, theories, and determinants of forgetting.

Methods to improve memory

6. Attention and perception

Attention: Characteristics and determinants

Perception: characteristics and laws of perceptual organization, determinants, errors.

7. Personality

Approaches to personality: Types and trait, psychoanalytic and behaviourist approach

Determinants

Personality assessment

8. Intelligence

Theories of intelligence

Distribution of intelligence

Assessment of intelligence

9. Abnormality

Concepts of abnormality and viewpoints (2 hours)

Classification of mental disorders (8 hours)

Anxiety disorders: Phobias, OCD, Conversion dissociative disorders, Somatization, PTSD (6 hours)

Psychotic disorders: Types of Schizophrenia, behavioural problems in disabled (4 hours)

Affective disorders: Depression, Mania and bipolar disorders (3 hours)

Management- ECT, chemotherapy, psychotherapy, cognitive behaviour therapy, behaviour therapy. (4 hours)

BIO PHYSICS

SECTION –A

1. PHYSICAL PRINCIPLE

- a. Electricity: Definition and types. Therapeutic uses. Basic physics of construction. Working Importance of currents in treatment.
- b. Static Electricity: Production of electric charge. Characteristic of a charged body. Characteristics of lines of forces. Potential energy and factors on which it depends. Potential difference and EMF.
- c. Current Electricity: Units of Electricity: farad, Volt, Ampere, Coulomb, Watt

- d. Condensers: Definition, principle, Types: construction and working, capacity and uses.
- e. Alternating current.
- f. Magnetism: Definition. Properties of magnets. Electromagnetic induction. Transmission by contact.. Magnetic field and magnetic forces. Magnetic effects of an electric field.
- g. Conductors, Insulators, Potential difference, Resistance and intensity
- h. Ohm's law and its application to DC and AC currents. Fuse: construction, working and application.
- i. Transmission of electrical energy through solids, liquids, gases and vacuum.
- j. Rectifying Devices-Thermionic valves, Semiconductors, Transistors, Amplifiers, transducer and Oscillator circuits.
- k. Display devices and indicators-analogue and digital.
- l. Transformer: Definition, Types, Principle, Construction, Eddy current, Working uses
- m. Chokes: Principle, Construction and working, Uses.

2. EFFECTS OF CURRENT ELECTRICITY

- a. Chemical effects-Ions and electrolytes, Ionisation, Production of an EMF by chemical actions.
- b. Electromagnetic Induction.
- c. Electromagnetic spectrum.

3. ELECTRICAL SUPPLY

- a. Brief outline of main supply of electric current
- b. Dangers-short circuit, electric shocks.
- c. Precaution-safety devices, earthing, fuses etc.
- d. First aid and initial management of electric shock

4. VARIOUS AGENTS

- a. Thermal agents: Physical Principles of cold, Superficial and deep heat.
- b. Ultrasound: Physical Principles of Sound
- c. Electro magnetic Radiation: Physical Principles and their Relevance to Physiotherapy Practice
- d. Electric Currents: Physical Principles and their Relevance to Physiotherapy Practice.

5. CIRCUIT DIAGRAMS

- a. SWD
- b. US
- c. MWD
- d. LASER.

SECTION – B

1. MECHANICAL BASIS OF MOVEMENT

Force and force Systems, Motion and its Laws, Levers, Angle of Pull, Pulleys and its types, Pendulum, Friction, Work, Energy and Power, Friction, Stress and Strain.

2. SKELETAL BASIS OF MOVEMENT

Planes and Axes, Joints and their Classification. Classification of Movement, Degrees of Freedom, Bones and their Classification.

3. MUSCULOSKELETAL BASIS OF MOVEMENT

Structure of Muscle and its Classification, Muscle Tension, Muscle Fiber, Group Action of Muscles, Torque & angle of pull

4. GRAVITY

Effects, Centre of gravity, Line of Gravity and their Alterations, Role in Human Body and Movement.

5. EQUILIBRIUM

Effects, Supporting Base, Role in Human Movement.

6. SIMPLE MACHINES

Levers and their Functions and classification, Pulleys and their Functions and classification, Inclined Planes and their Functions and classification.

7. ELASTICITY

Stress, Strain, Hooke's Law, Springs and their properties

8. HYDROSTATICS AND HYDRODYNAMICS - Principles, Application

9. FUNDAMENTAL AND DERIVED POSITIONS

10. TRACTION: PRINCIPLES

PATHOLOGY & MICROBIOLOGY

SECTION A - PATHOLOGY

1. Introduction to pathology, & concepts of diseases.

GENERAL PATHOLOGY

2. **Cell Injury** – causes, reversible injury.

3. **Irreversible cell injury** – Necrosis, Gangrene.

4. Intra cellular accumulations, fatty changes, calcification, amyloidosis.

5. **Inflammation** – Acute inflammation.

6. **Chronic Inflammation** – Non specific and granulomatous.

7. **Healing and repair.**

8. **Circulatory disturbances**

Oedema, chronic venous congestion, thrombosis, embolism, infarction, shock.

9. **Deficiency disorders**

Vitamin- A, B, C, D, Protein energy malnutrition

10. **Tuberculosis, Leprosy**

11. **Growth disturbance** – Atrophy, Hypertrophy, hyperplasia

12. **Tumours**

Classification, difference between benign and malignant tumours, carcinogenesis, precancerous lesions, spread of tumours, methods of diagnosis.

13. **Haematology**

Anaemia- iron deficiency, megaloblastic , haemolytic anaemia

14. **Auto immune disorders, Hypersensitivity.**

SYSTEMIC PATHOLOGY (IN BRIEF)

15. **CVS**

Atherosclerosis, Hypertension, Cardiac failure, Rheumatic Heart disease, Congenital Heart Disease.

16. **Respiratory** - Pneumonia, COPD, Tuberculosis, Pneumoconiosis.

17. **GIT** - Gastritis, Peptic Ulcer, Ulcerative lesions of intestine,

18. **Liver** - Hepatitis, Cirrhosis & types and its classification.

19. **Endocrine** – Diabetes, Thyroid

20. **Urinary** - UIT, Urinary calculi, Nephrotic syndrome, Nephritic syndrome, pyelonephritis

20. **IN DETAIL ABOUT**

CNS – Meningitis, encephalitis, CNS Tumour

Muscle – Myopathies, Myasthenia gravis.

Bones & Joints –

Fracture healing, Osteomyelitis, Osteoporosis, Bone Tumours, Arthritis – Rheumatoid & Suppurative, Gout, Tenosynovitis.

SECTION B - MICROBIOLOGY

1. GENERAL MICROBIOLOGY

- Introduction and general Historical background.
- Morphology of Bacteria.
- Growth requirements and culture of bacteria- culture media and methods
- Sterilization and disinfections.

2. IMMUNOLOGY

- Antigen and antibodies
- Antigen antibody reactions with their practical applications.
- Immunity – acquired and innate.
- Autoimmune diseases.
- Hypersensitivity and allergy.

3. SYSTEMIC MICROBIOLOGY-

BACTERIOLOGY

- Gram Positive cocci – Staphylococci, Streptococci, Pneumococci
- Gram Negative cocci – Meningococci, Gonococci.
- Gram Positive bacilli – M. tuberculosis, M.leprae, Clostridium.
- Gram Negative bacilli – Salmonella, E.coli, V.cholerae, Pseudomonas.
- Spirochetes – Syphilis and sexually transmitted diseases.

VIROLOGY

- General Properties of viruses
- Polio, Hepatitis, Rubella, Rabies.
- HIV / AIDS

PARASITOLOGY

- Filaria
- Malaria
- Amoebiasis

MYCOLOGY

- Pathogenic fungi
- Actinomycosis
- Maduramycosis
- Candidiasis

4. APPLIED MICROBIOLOGY

- As relevant to diseases of bones joints, muscles, skin and C.N.S.
- Wound infections and Burn infections.
- Hospital acquired Infections.

COMMUNITY MEDICINE

SECTION A

1. Outline of the natural history of diseases and the influence of social, economic and cultural aspects of health and diseases.

2. Outline of the various measures of prevention and methods of intervention – especially for diseases with disability.

3. Overview Of Public Health Administration At Central & State Levels – Strategies of Health Delivery System for “The Health for All” National health programme [brief role of WHO], outline about polio, leprosy and family health programme.

4. Socio-Economical & Cultural Issues related to morbidity owing to the physical Disability & Handicaps of Structural / Neuro-motor & Psycho-somatic origin-

A) Health problems of vulnerable groups

- i] Pregnant & lactating women, Pelvic floor Dysfunction, Urinary incontinence,
- ii] Pre-term babies with high risk, Infants & Pre-School Children-Brain Damage, during birth injury, Congenital & Acquired structural Deformities, Spinal Dysraphism, T.B. Meningitis, Polio, Cerebral palsy, Other Hereditary Neuro-motor Conditions, such as Myopathies & Muscular Dystrophies, Malnutrition – Rickets,
- iii] Auto-immune & Hereditary diseases- Rheumatoid arthritis, S.L.E. Sero-ve arthritis, Ankylosing Spondylitis, Multiple Sclerosis, Spinal Muscular Atrophies & Myopathies, Dystrophies in adults.
- iv] Geriatric-Osteoporosis, Malnutrition, Alzheimer’s disease, Parkinsons, Ataxia, CHD, Hypertension.
- v] Addiction – Alcoholic – Neuro-motor & Psychosomatic disorders, Smoking – asthma, COPD.

B) Definition of occupational health and list methods of prevention of occupational diseases and hazards

5. FAMILY PLANNING – objectives of National Family Planning Programmes & Family Methods, General Idea of Advantage & Disadvantage of the Methods.

SECTION B

6. MENTAL HEALTH – Socio-economical & cultural aspect, role of Physiotherapist in mental health problems i.e mental retardation.

7. EPIDEMIOLOGY OF DISEASES -

- Communicable diseases - with reference to reservoir, mode of transmission, route of entry and levels of prevention- Malaria, Filaria, TB, Leprosy, Polio, Viral Encephalitis, Universal Immunization programme, Diarrhoea, ARI, Polio control programme.
- Non communicable diseases - Accidents, Blindness, Rheumatic heart disease, cancer, Ischaemic heart disease and cerebro vascular accidents

8. IMMUNIZATION PROGRAMMES– children & hospital staff.

9. PRINCIPLE OF HEALTH EDUCATION -Methods of communication and role of health education in rehabilitation services.

10. DISASTER MANAGEMENT – Brief overview of natural and man made disasters, disaster impact and response, relief phase, disease control, nutrition, rehabilitation.

PHARMACOLOGY

SECTION A

1. **GENERAL PHARMACOLOGY** (Brief description only)

- Introduction & general concepts
- Pharmaco-kinetics (routes of administration, metabolism & elimination)
- Pharmaco-dynamics - Factor modifying the drug action or effect (mechanism of drug action, therapeutic & side effects, toxicity)

2. **AUTONOMIC NERVOUS SYSTEM**

- Brief outline of Sympathetic-parasympathetic nervous system
- Therapeutic agents-uses, effects and interaction with physical therapy i.e Drug alters this autonomic function and physiotherapy can also alter. Myasthenia – gravis, Parkinsonism, skeletal muscle spasm, spasticity, skeletal muscle relaxants.

3. **CARDIO VASCULAR SYSTEM**

- Antihypertensive drug especially which cause's postural hypotension.
- Drug used in Angina, CCF.
- DIURETICS - Dehydration electrolyte imbalance
- SHOCK- Types of shock and primary treatment
- Antiarrhythmic- Name of drugs and side effect

4. **GASTRO INESTINAL TRACT**

- Drug used in peptic ulcer.
- Drug used in constipation.
- Drug used in diarrhea: O.R.S.

SECTION B

5. INFLAMMATORY/IMMUNE DISEASES

- Non-narcotic Analgesics and Nonsteroidal Anti-Inflammatory Drugs: Acetaminophen, NSAIDs, Aspirin, Nonaspirin NSAIDs, drug Interactins 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/Inflmmatory Diseases: Myasthena gravis, Idiopathic Inflammatory Myopathies, systemic lupus Erythmatosus, Scleroderma, Demyelinating Disease

6. RESPIRATORY SYSTEM

- Asthma – drugs producing asthma and management.
- Respiratory tract infection

Any defect in respiratory system may affect the physiotherapy given to patient .

7. CENTRAL NERVOUS SYSTEM

- Anesthetic agents- uses, side effects and interaction with physical therapy
- Sedatives and hypnotics - uses, side effects and interaction with physical therapy
- Anti epileptic drugs- uses, side effects and interaction with physical therapy
- Analgesics - uses, side effects and interaction with physical therapy
- Anti inflammatory drugs- uses, side effects and interaction with physical therapy
- Psychotherapeutic agents- uses, side effects and interaction with physical therapy
- Alcoholism and drug dependence and interaction with physical therapy
- Therapeutic agents used for movement disorders- uses, side effects and interaction
- With physical therapy

8. HORMONES

- Anti diabetic drug- hypoglycaemia and management.
- Corticosteroid – osteoporosis, hypertension, Peptic ulcer, Anabolic steroid.
- Female sex hormone
- Male sex hormone

9. Miscellaneous

- Antiemetics – Emetis
- Anti histamines.

- Antibiotic – Tubercular, leprosy, malaria.
- Anticancer – Side effect of Anti cancer drugs.
- Counter irritants – ointment, liniment gel, Lotion
- Antifungal drug-
- Doping- drug banned in sports and the drugs which decrease the performance in sport
- Vitamin – D, Calcium, Phosphorus, Magnesium.

GENERAL MEDICINE & PEDIATRICS

SECTION A- MEDICINE

A. INFECTIONS

Introduction: Brief outline of subject of medicine, a medical patient, common signs & symptoms of disease

Bacteria – Tetanus,

Viral - Herpes simplex, Zoster, Varicella, Measles, Hepatitis B, AIDS,

Protozoal - Filaria.

B. HAEMATOLOGY

Diseases of the blood: Examinations of blood disorders – Clinical manifestations of blood disease; Anemia iron deficiency, Vitamin B₁₂, Folic acid, Sickle cell – signs and symptoms – types and management; Hemophilia – cause, clinical features, severity of disease, management, complications due to repeated hemorrhages – complications due to therapy.

C. DISEASES OF GASTROINTESTINAL TRACT

- Brief description of manifestations of alimentary tract disease & general principle of diagnosis & outline of management of following diseases: pharyngitis, vomiting, dysentery, diarrhea, Peptic ulcer disease
- Brief description of liver diseases along with outline of management: Hepatitis & Jaundice, Cirrhosis of liver

D. DISEASES OF CONNECTIVE TISSUE

- Brief introduction to concept of autoimmune disease.
- Define; Systemic lupus erythematosus, Polymyositis, Dermatomyositis, polyarthritis Nodosa, Sclerodema.

F. RENAL DISEASES

- Define and briefly outline acute and chronic renal failure.
- Urinary tract infection. Pathogenesis. Outline common clinical conditions complicated by UTI.

G. METABOLIC DISEASES

- Common presenting features of endocrine diseases - common classical disease presentation, clinical features and its management.
- Diabetes-define and outline aetiology. List types of diabetes & complications and briefly outline use of insulin, diet and oral hypoglycemic agents in management of diabetes.
- Obesity - Define and outline management.

F. SKIN

Characteristics of normal skin, abnormal changes, types of skin lesions & Psoriasis.

H. GERIATRICS

1. List diseases commonly encountered in the elderly population and their role in causing disability; osteoporosis, falls and immobility

SECTION B - PAEDIATRICS

1. Describe growth and development of a child from birth to 12 years: including physical, social, adaptive development and target milestones.

2. Outline the maternal and neonatal factors contributing to high risk pregnancy; the neonate: inherited diseases; maternal infections-viral and bacterial; maternal diseases incidental to pregnancy, such as gestational diabetes, pregnancy induced hypertension; chronic maternal diseases such as heart diseases, renal failure, tuberculosis, diabetes, epilepsy; bleeding in the mother at any trimester.

3. Briefly describe community programmes: International (WHO), national and local, for prevention of poliomyelitis, blindness, mental retardation and hypothyroidism. Outline the immunization schedule for children.

4. **Cerebral Palsy**: Define and briefly outline etiology-Pre-natal, Perinatal and Postnatal causes; briefly mention pathogenesis, types of cerebral palsy (Classification), findings on examination; General examination, examination of C.N.S, Musculoskeletal system, Respiratory system, G.I.T. & Nutritional status.

Briefly outline associated defects: Mental retardation, Microcephaly, Blindness, Hearing and Speech impairment, Squint and Convulsions.

Outline prevention, appropriate management of high risk pregnancies, prevention of neonatal and postnatal infection & metabolic problems.

5. **Muscular dystrophy**: Outline various forms, modes of inheritance and clinical manifestation; physical findings in disabilities, progression of various forms and prognosis. Describe treatment goals in forms that are and are not fatal.

6. **Spina bifida, meningocele** Outline development, clinical features of lower limbs, bladder and bowel control; complications-U.T.I. & Hydrocephalus; medical treatment and surgical treatment.

7. Still's disease: classification, pathology in brief, physical findings, course & prognosis. Outline treatment, prevention & correction of deformity.

8. Acute C. N. S. infections: Classify (Bacterial and viral) and outline the acute illness, CNS sequel leading to mental retardation, blindness, deafness, speech defect, motor paralysis, bladder and bowel problems seizure disorder and special problems such as subdural effusion, hydrocephalus, pressure sores, feeding difficulties, acute flaccid paralysis and polio.

9. Normal diet of newborn and child: List dietary calorie fat, protein, mineral and vitamin requirement, their functions and outline their deficiency in a normal child and in a child with malnutrition. Classify and outline etiology findings and treatment of Rickets: Vitamin D deficiency, resistant rickets.

10. Lung infections: Outline the clinical findings, complications and medical treatment of bronchiectasis, lung abscess and bronchial asthma, pulmonary T.B.

11. Common infectious diseases in children: Brief description of following infectious diseases along with outline of management- Tetanus, measles.

EXERCISE THERAPY

SECTION A

1. Mechanics

Define the following terms and describe the principles involved with suitable examples.

- a) Force: Composition of force, Parallelogram of forces. Equilibrium: Stable, unstable, neutral.
Forces applied to the body
- b) Gravity: Centre of gravity, Line of gravity.
- c) Levers: 1st order, 2nd order, 3rd order, their examples in the human body and their practical applications in physiotherapy.
- d) Pulleys: Fixed, Movable.
- e) Springs: Series and Parallel, Tension, Elasticity: Hooke's law.
- f) Axis: Sagittal, Frontal/Transverse & Vertical. Planes: Sagittal, Frontal & Horizontal.
- g) Definition of: Speed, velocity.
- h) Work, Energy, power, Acceleration, Momentum, Friction and Inertia.

2. Muscle Action

Muscle work: Isotonic (concentric, eccentric), Isometric (static). Group action: Agonists (prime movers), Antagonists, synergists, Fixators. Angle of muscle pull, Mechanical efficiency of the muscles.

3. Pelvic Tilt

Normal pelvic tilts, alterations from normal, anterior tilt (forward) posterior tilt (backward), Lateral tilt. Muscles responsible for alterations and pelvic rotation. Identification of normal pelvic tilt, pelvic rotation and altered tilts and their corrective measures.

4. Starting Positions

Positions, their muscle work, effects and uses. Specify the importance and derived positions for each one: standing, kneeling, sitting, lying, and hanging.

5. Movements

a) Anatomic movements: Flexion, Extension, Abduction, Inversion, Eversion, Supination, Pronation, Internal rotations, External rotations, Gross flexion, Gross extension, Trunk side flexion.

b) Surface Anatomy of the individual joints.

c) Rhythm of movement. Timing of movement. Duration of movement.

d) Classification of Movement: Active, passive, Effects of exercise: Physiological effects, Therapeutic effects. Indications and contra - indications of the following and demonstrate technique for each: Active movements: Voluntary (free, active assisted, assisted resisted, resisted, Involuntary (associated reflex, peristaltic, visceral, cardiac). Passive movements: Relaxed passive, mobilizing passive (forced P.M. manipulations, serial manipulations). Passive stretching.

6. Passive Movements

Passive stretching of following muscles/ muscle groups and describe the indications, contra - indications, physiological effects, advantages and disadvantages of each. Upper limb: pectoralis major, biceps brachi, triceps brachi, and long flexors of the fingers.

Lower limb: rectus femoris, iliotibial band (tensor fascia lata), gastro - soleus, hamstrings, hip abductors, iliopsoas. Neck: Sternocleidomastoid.

7. Active Movements

Types, techniques, indication and contraindications, physiological effects, advantages and disadvantages and demonstrate three progressive resisted exercises in progression for the following muscle groups: Shoulder abductors, shoulder forward flexors, Triceps Brachi, Hip abductors, Hip flexors, Quadriceps femoris, Abdominal Muscles, Back extensors. Home programme for strengthening neck muscles and back extensors

8. Progressive Resisted Exercises

Advantages and disadvantages and demonstrate the techniques of the following types of PRE's: Fractional system, Mac queens set system, Mac Queen's power system. Delorme's boot, Dumbbells, Sand bags in pulleys, powder board and suspension therapy.

9. Muscle Grading

a) Principles and applications techniques of manual muscle testing

b) Testing position, procedure and grading of muscles of the upper limb, lower limb and trunk etc.

10. Re- Education of Muscles

a) Re-Education of Muscles: Techniques, Spatial Summation, Temporal Summation.

b) Re-Education Techniques and Facilitating Methods on Various Groups of Muscles. Progressive Exercises In Strengthening Using Various Applications: (According To Their Muscle Power) Grade 1- Grade IV.

11. Joint Mobility

Joint ranges (outer range, middle range, inner range). Individual joint structures, joint movements (anatomic, accessory). Causes of joint range limitations, prevention of joint stiffness. Positioning (physiological resting position) of joints and teaching home programme.

12. Goniometry

a) Normal range of various joints, Description of goniometer, range of measuring systems (180 foot trunk and head), Techniques of goniometry. Demonstrate measuring of individual joint range using goniometer.

b) Demonstrate measurement of limb girth (using measuring tape): arm, forearm, thigh

13. Crutch Walking

Components of a crutch, classifications of crutches, characters of a good crutch, preparing a patient for crutch walking, crutch walking muscles, Measurement of crutches (axillary piece, hand piece). Crutch stance, crutch palsy. Types of crutch walking (4 point, 3 point, 3 point) (non - weight bearing and partial weight bearing), modified 3 point (paraplegic and shuffling gait, swing to and swing through. Crutch measurement (sitting standing and lying positions) and various types of crutch walking (even ground stairs and ramps).

SECTION B

14. Relaxation

Relaxation, Muscle fatigue, Muscle spasm, General causes, signs, symptoms of tension (mental and physical). Factors contributing to fatigue. Types of relaxation (local and general), indications for relaxation, and techniques of relaxation (local and general).

15. Posture

a) Posture (static and dynamic). Definition of good posture, Muscles responsible for good posture.

b) Postural mechanisms

c) Definition of abnormal posture (Kyphosis, Scoliosis, Lordosis, Kypho - scoliosis, kypholordosis).

d) Assessment of posture (inspection, measurement - length of legs, width of pelvis, plumb line. ROM of trunk in flexion, extension, side flexion and rotation). Postural correction by: strengthening of muscles, mobilisation of trunk, Relaxation, Active correction of the deformities. Passive correction (traction) postural awareness, abdominal and back extensor.

e) Outline principles in bracing of the trunk and surgical correction. Identification of abnormal posture, and postural corrective measures.

16. Gait

- a) Gait and centre of gravity of the human body.
- b) Muscles responsible for normal gait, six determinants of gait (pelvic rotation, pelvic tilt, hip flexion, lateral displacement of pelvis knee flexion in stance phase, normal foot pattern during walking).
- c) Walking cycle: Stance (heel strike, foot flat, midstance, and push off), Swing (acceleration, mid swing and deceleration).
- d) Following pathological gaits: Gluteus medius Gait, Gluteus maximus gait, Hip flexor weakness gait, Quadriceps weakness gait; Foot drop gait, hemiplegics gait, Ataxic waddling gait, equinus gait, calcaneus's gait, Equinovarus gait.
- e) Skills in identifying pathological gait and proper gait training.

17. Co - Ordination

Balance (static and dynamic). Mechanism of neuromuscular co-ordination. In coordination: Lower motor neuron lesions, upper motor neuron lesions (spasticity), Cerebellar lesions, Loss of kinesthetic sense (tabes dorsalis, syringomyelia, leprosy), imbalance due to muscular disease. Re-education of balance. Re-education co-ordination: Frenkels Exercises, proprioceptive neuromuscular facilitation (PNF) techniques. Re-education techniques of balance and coordination.

18. Suspension Therapy

Basic physics of simple pendulum and pendular movement. Type of suspension: Pendular, Axial, Eccentric fixation (anterior, posterior, medial and lateral). Indications and technique for each type of suspension. Axial and eccentric fixation for mobilizing, strengthening and re - education of various muscles and joints.

19. Hydrotherapy

Hydrostatic pressure, upward thrust of water, buoyancy. To list the indications and contra indications for hydrotherapy. Dress codes for patients and therapists, and necessary hydrotherapy equipment. Construction of hydrotherapy tank: Design, Construction, safety features, cleaning the pool, water heating systems, Hygiene of patient and pool.

20. Bed Rest Complications

Complications of patients on prolonged bed rest. Maintenance exercises for patients on prolonged bed rest.

21. Massage

i. History of massage. Mechanical points to be considered. Points to be considered while giving massage. Manipulations. The time of day for treatment. The comfort and support of the patient (draping and positioning). Position of operator (therapists stance)Using body weight, Contact and continuity, Techniques, indications, and contra indications. Physiological effects of massage on various system of body: Excretory system, Circulatory system, Muscular system, Nervous system and Metabolic system

ii. Various manipulation techniques used in massage.

iii. Stroking manipulation: Effleurage, stroking. Pressure manipulations: Kneading:

Squeezing, stationary, circular ironing (reinforced kneading), Finger kneading, petrissage (picking up, wringing, rolling), Frictions. Percussion manipulation: Tapotement, hacking, clapping, Beating and pounding. Shaking manipulations: Vibration, shaking, Technique, effects, uses and contra indications of the following manipulations: Stroking manipulations. Pressure manipulations. Percussion manipulations Shaking manipulations. Massage for upper limb, Scapular region, Shoulder joint, Upper arm, Elbow joint, Forearm, Wrist, Hand. Massage for lower limb: Thigh, Knee joint, Leg, Foot (including ankle joints and toes). Massage for back: Neck and upper Middle and lower back. Gluteal region, arm and leg, Massage for the face.

22. Motor Learning & Motor Control

a) Introduction to motor learning

- Classification of motor skills
- Measurement of motor performance

b) Introduction to motor control

- Theories of motor control
- Applications
- Learning Environment
- Learning of skill
- Instructions and augmented feed back
- Practice conditions

23. Therapeutic Gymnasium

- Set-up of gymnasium & its importance
- Various equipment in the gymnasium
- Operational skills, effects, & uses of each equipment

24. Functional re-education

General therapeutic techniques to re-educate ADL function.

25. Special Techniques

a) Introduction to special mobilization & manipulation techniques, effects indications, effects, indications & contraindications.

b) Conceptual framework, principle of proprioceptive neuromuscular facilitation (PNF) techniques, including indications, therapeutic effects and precautions.

c) Review normal breathing mechanism, types, techniques, indications, contraindications, therapeutic effects & precautions of breathing exercises.

26. Basic principles of General fitness - warming up exercises, aerobics - cool down

Exercises

27. Introduction to manual therapy techniques such as Maitland's, Cyriax, Mulligan's, etc.

ELECTROTHERAPY

SECTION A

SECTION 1 – THERAPEUTIC ELECTRICITY

Section I A - Low frequency Currents

1. Basic types of current
 - Direct Current: types, physiological & therapeutic effects.
 - Alternating Current
2. Types of Current used in Therapeutics
 - Modified D.C
 - Faradic Current
 - Galvanic Current
 - Modified A.C
 - Sinusoidal Current
 - Diadynamic Current.
 - Ultrareiz current
3. Faradic Current: Definition, Modifications, Techniques of Application of Individual, Muscle and Group Muscle stimulation, Physiological & Therapeutic effects of Faradic Current, Precautions, Indications & Contra-Indications, and Dangers.
4. Galvanic Current: Definition, Modifications, Physiological & Therapeutic effects of Galvanic Current, Indications & Contra-Indications, Dangers, Effect of interrupted galvanic current on normally innervated and denervated muscles and partially denervated muscles.
5. Sinusoidal Current & Diadynamic Current in Brief.
6. HVPGS – Parameters & its uses
7. Ionization / Iontophoresis: Techniques of Application of Iontophoresis, Indications, Selection of Current, Commonly used Ions (Drugs) for pain, hyper hydrosis, wound healing.
8. Cathodal / Anodal galvanism.
9. Micro Current & Macro Current
10. Types of Electrical Stimulators
 - NMES- Construction component.
 - Neuro muscular diagnostic stimulator- construction component, Components and working Principles
11. Principles of Application: Electrode tissue interface, Tissue Impedance, Types of Electrode, Size & Placement of Electrode – Water bath, Uni- polar, Bi-polar, Electrode coupling, Current flow in tissues, Lowering of Skin Resistance.
12. Nerve Muscle Physiology: Action Potential, Resting membrane potential, Propagation of Action Potential, Motor unit, synapse, Accommodation, Stimulation of Healthy Muscle, Stimulation of Denervated Muscle, and Stimulation for Tissue Repair.

13. TENS: Define TENS, Types of TENS, Conventional TENS, Acupuncture TENS, Burst TENS, Brief & Intense TENS and Modulated TENS. Types of electrodes, placement of electrodes, dosage parameters, physiological & therapeutic effects and its indications & contraindications.
14. Pain: Define Pain, Theories of Pain (Outline only), and Pain Gate Control theory in detail.

SECTION II B - ELECTRO-DIAGNOSIS

1. FG Test
2. SD Curve: Methods of Plotting SD Curve, Apparatus selection, Characters of Normally innervated Muscle, Characters of Partially Denervated Muscle; Characters of Completely denervated Muscle; Chronaxie & Rheobase.
3. Nerve conduction velocity studies
4. EMG: Construction of EMG equipment.
5. Bio-feed back.

SECTION II C - MEDIUM FREQUENCY

1. Interferential Therapy: Define IFT, Principle of Production of IFT, Static Interference System, Dynamic Interference system, Dosage Parameters for IFT, Electrode placement in IFT, Physiological & Therapeutic effects, Indications & Contraindications.
2. Russian Current
3. Rebox type Current

SECTION B

SECTION III - THERMO & ACTINOTHERAPY (HIGH FREQUENCY CURRENTS)

1. 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
3. Pulsed Electro Magnetic Energy: Principles, Production & Parameters of PEME, Uses of PEME.
4. Micro Wave Diathermy: Define Microwave, Wave length & Frequency, Production of MWD, Applicators, Dosage Parameters, Physiological & Therapeutic effects, Indications & Contraindications, Dangers of MWD.
5. 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, Non thermal effects, Principles & Application of US: Direct contact, Water bag, Water bath, Solid sterile gel pack method for wound. Uses of US; Indications, Contraindications and Dangers of Ultrasound.

Phonophoresis: Define Phonophoresis, Methods of application, commonly used drugs, Uses. Dosages of US.

6. IRR: Define IRR, wavelength & parameters, Types of IR generators, Production of IR, Physiological & Therapeutic effects, Duration & frequency of treatment, Indication & Contraindication.
7. 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
8. LASER: Define LASER, Types of LASER, Principles of Production, and Production of LASER by various methods. Methods of application, Dosage, Physiological & Therapeutic effects, Safety precautions and Classifications of LASER. Energy density & power density

SECTION IV – SUPERFICIAL HEATING MODALITIES

1. 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.
2. Contrast Bath: Methods of application, Therapeutic uses, Indications & Contraindications.
3. Moist Heat Therapy: Hydro collar packs – in brief, Methods of applications, Therapeutic uses, Indications & Contraindications.
4. Cyclotherm: Principles of production, Therapeutic uses, Indications & Contraindications.
5. Fluidotherapy: Construction, Method of application, Therapeutic uses, Indications & Contraindications.
6. Whirl Pool Bath: Construction, Method of Application, Therapeutic Uses, and Indications & Contraindications.
7. Magnetic Stimulation, Principles, Therapeutic uses, Indications & contraindication.
8. Cryotherapy: Define- Cryotherapy, Principle- Latent heat of fusion, Physiological & Therapeutics effects, Techniques of Applications, Indications & Contraindications, Dangers, and Methods of application with dosages.

GENERAL SURGERY, OBSTETRICS & GYNECOLOGY

Topics:-

1. History and introduction of surgery with relevance to physical therapist.
2. Surgical procedures – Indications in general performance of surgical procedures
3. Role of asepsis and antiseptics in surgical procedures
4. Principles of surgical examination i.e. preoperative assessment, intraoperative assessment, post operative assessment.
5. Effects of anaesthesia and surgical trauma – Pulmonary, haemorrhage, shock
6. Complications of surgery with special reference to physiotherapy – Infective, functional, abdominal, respiratory, neurological, musculoskeletal, complication related to prolonged immobilization.
7. Burns – Causes, classification, complication, conservative management of patients. With special reference to postural deformities due to burns, methods of prevention and precautions. Mentioning cosmetic and functional treatment measures.
8. Abdominal wall: Brief surgical anatomy, abdominal incisions, external opening of abdominal viscera (colostomy), resultant potential complications and management.
9. Neurosurgery : In brief
Head injury – Classification, clinical features, complication and management with special reference to management of unconscious patient.
10. Vascular disorders – clinical features, complication and management of arterial occlusions, dilatations.
 - a. Gangrene – classification, clinical features, and management
 - b. Superficial and deep vein thrombosis – pathogenesis, prevention and management.
 - c. Lymph oedema – outline of causes, clinical features and management
11. Thorax –
 - a. Wall anatomy and various operative Incisions over thorax.
 - b. Chest injuries – classification, causes, clinical features, complication and management i.e. fracture ribs, flail chest, stove in chest, Pneumothorax and hydro-pneumothorax – clinical features. and management with overview of various drainage systems
 - c. Pulmonary resection - classification, causes, clinical features, complication and management
 - d. Heart - classification, causes, clinical features, complication and management of various surgical heart diseases ie CABG. Valve replacements, congenital heart diseases- ASD, PDA, VSD, coarctation of aorta.
 - e. Brief introduction about cardiopulmonary bypass, Intra aortic balloon counter pulsation.

12. Brief description of first aid, principles of cardiopulmonary resuscitation and trauma.

OBSTETRICS AND GYNAECOLOGY-

1. Outline the anatomy and physiology of male and female reproductive system.
2. Principles of clinical examination, investigation, diagnosis and prognosis in female reproductive system disorders.
3. Describe an ante-natal program in preparation for labour: ante – natal training, breathing, relaxation, pelvic and lower extremity exercises.
4. Outline the mechanism of labour and post – natal management after normal delivery, forceps delivery and caesarian sections.
5. Outline the pre-disposing factors and the role of exercises in the management of incontinence and prolapse uterus
6. Family Planning methods
7. Cancer Cervix – clinical features and management.

PHYSIOTHERAPY IN GENERAL MEDICINE AND GENERAL SURGERY

SECTION A

1. Review of the pathological changes and principles of management by Physiotherapy in the following conditions [10 Hours]
 - a. Diabetes Mellitus
 - b. Oncology
 - c. Geriatric Medicine.
 - d. Inflammation- acute, chronic and suppurative.
 - e. Edema – Traumatic, obstructive, paralytic, edema due to poor muscle and laxity.
 - f. Common condition of Skin – Acne, Psoriasis, Alopecia, Leucoderma.
 - g. Deficiency Diseases – Rickets, Obesity, Osteoporosis & other deficiency disorders related to Physiotherapy.
2. Special Considerations [5Hours]
 - a. Problems of Elderly
 - i) Medical, Sensori- motor, cognitive falls.
 - ii) Frail and Institutionalized elder
 - iii) Functional assessment of the elderly.

SECTION B

3. General Gynaecology and Obstetrics and ENT [7Hours]

Review of the pathological changes and principles of pre and postoperative management by Physiotherapy of the following conditions:

- a. Common abdominal surgeries, including GIT, liver, spleen, kidney, bladder, etc.
- b. Common operations of reproductive system, including surgical intervention for child delivery. Ante natal and post natal Physiotherapy management.
- c. Common operations of the ear, nose, throat and jaw as related to Physiotherapy.
- d. Common organ transplant surgeries – heart, liver, bone marrow, etc.

4. Wounds, Burns and Plastic Surgery [8Hours]

Review of the pathological changes and principles of pre and postoperative management by Physiotherapy of following conditions:

- a. Wounds, ulcers, pressure sores.
- b. Burns and their complications.
- c. Common reconstructive surgical procedures for the management of wounds, ulcers, burns and consequent contractures and deformities.

5. Physiotherapy in General Surgery [10Hours]

Asses the patients medical history, past treatment, breathing pattern, ability to cough and pain. Identify problems: Pain, increased secretion, defective posture and decreased exercise tolerance. Treatment techniques: Breathing exercise, huffing and coughing, mobilizing exercise, posture correction and graduated exercise programme.

CLINICAL CARDIO RESPIRATORY

SECTION A

ANATOMY AND PHYSIOLOGY

1. Describe in brief the anatomy of the heart and its blood supply and briefly outline the electrical activity of the myocardium and normal ECG.
2. Describe in detail the anatomy of the lungs, bronchi and bronchopulmonary segments.

CARDIOVASCULAR DISEASE

3. General Examination of the Cardiovascular System, Basic 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 i.e ASD,VSD, PDA TOF , Cardiac Arrest ; Examination and Investigations of diseases of arteries and veins ;

Hypertension : Definition, causes, classification, types, assessment, investigations and management.

SECTION B

RESPIRATORY DISEASE

4. Examination of the Respiratory System – Investigations : Chest Radiographs, Pulmonary Function Testing, Arterial Blood Gas Analysis ; 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.

FIRST AID AND EMERGENCY

5. Introduction to First aid, importance of first aid, Golden rules of first aid, scope and concept of emergency, CPR.

PHYSIOTHERAPY IN CARDIO RESPIRATORY AND VASCULAR CONDITIONS

SECTION A

A. Anatomy

Review the regional anatomy of thorax, upper respiratory tract - trachea and bronchial tree. Lung and broncho pulmonary segments, Differences between adult and pediatric lung, Muscles of respiration, Heart and great vessels, Movements of the chest wall and surface anatomy of lung and heart.

B. Physiology

Review the mechanics of respiration - inspiration and expiration, lung volumes, respiratory muscles, compliance of lung and chest wall, work of breathing, dead space, gas exchange in lung and pulmonary circulation.

C. General Overview

Assessment: Describe physical assessment in cardio respiratory dysfunction:

Inspection: Posture (recumbent, erect, orthopneic): breathing pattern (rate, rhythm, use of accessory muscles), chest movement (symmetry, Intercostals and diaphragmatic components), Chest deformity (Barrel chest, pigeon chest), Spinal deformity(scoliosis, kyphosis, kyphoscoliosis), sputum (color, type, volume, consistency), cough (types, productive/non-productive, presence of a normal cough reflex).

Palpation: Tactile and vocal fremitus, mobility of thoracic spine and rib cage.

Percussion: Dullness and hyper resonance.

Auscultation: Normal and abnormal breath sounds.

D. Measurement

Chest expansion at different levels (auxiliary), nipple, xiphoid); exercise tolerance (six minute walking test); post - operative range of motion and muscle assessment.

E. General Overview of physiotherapy treatment

Physiotherapy techniques to increase lung volume – controlled mobilization, positioning,

Breathing exercises: Physical Treatment: Indication, goals and procedure of breathing exercises.

Describe diaphragmatic breathing, localized basal expansion, apical expansion, specific segmental exercise raising the resting respiratory level. Chest mobilization exercises, Neurophysiological Facilitation of Respiration, Mechanical aids -

Incentive Spirometry, CPAP, IPPB

Physiotherapy techniques to decrease the work of breathing – Measures to optimize the

balance between energy supply and demand, positioning, Breathing re-education – Controlled breathing during walking and during functional activity., Relaxation positions for the breathless patient - high side lying, forwarded lean sitting, relaxed sitting, forward lean standing, relaxed standing, Exercise for the breathless patient, Exercise tolerance testing and exercise programme, Oxygen therapy,

Mechanical aids – IPPB, CPAP, BiPAP

Physiotherapy techniques to clear secretions – Hydration, Humidification & Nebulisation, Mobilisation and Breathing exercises, Postural Drainage Techniques including indications, general precautions and contra-indications, preparation, drainage of individual bronchopulmonary segments, modified postural drainage and continuing postural drainage as a home programme, Manual techniques – Percussion, Vibration and Shaking, Rib Springing, ACBT, Autogenic Drainage, Mechanical Aids – PEP, Flutter, IPPB, Facilitation of Cough and Huff, Nasopharyngeal Suctioning- Techniques of sterile nasopharyngeal and endotracheal suctioning

G. Mechanical Respiration.

i. Respiratory failure, Oxygen therapy Types of mechanical ventilator

Classify ventilator by their cycling control (volume cycling, pressure cycling, and time cycling and mixed cycling). Indications, various commonly used modes of mechanical ventilation their indications, advantages and disadvantages i.e IMV, SIMV, CPAP, PEEP, IPPB, IPPV, High frequency jet oscillator, BiPAP, and complications of mechanical ventilation.

ii. Principles of Aerosol Therapy. Describe the physical properties of aerosols and their deposition in the alveoli. Describe the principles of operation of nebulisers.

iii. Principles of humidification therapy and methods of correcting humidity deficits. Describe the principles of operation of pass - over humidifiers and bubble -diffusion humidifiers.

H. Physiotherapy in Obstructive Lung Diseases

Assess: Effort of breathing. Extent of wheeze, pattern of breathing, sputum production, chest deformity, exercises tolerance (Patients efforts tolerance.)

Identify problems: Decreased outflow due to bronchospasm, anxiety due to difficulty in ventilation, exhaustion due to increased work of disturbed breathing, increased secretions which are difficult to remove, decreased exercise tolerance.

Demonstrate treatment techniques: Relaxation postures and techniques, reassurance and education about disease. Controlled breathing, breathing exercise, postural drainage, vibratory shaking, huffing and coughing, graduated exercise programme and posture correction.

I. Physiotherapy in Chest Infections

Assess: Sputum, cough, fever and dyspnea.

Identify problems: Productive cough with risk hemoptysis, exhaustion due to increased work of breathing, chest deformity, and decreased exercise tolerance.

Treatment techniques: postural drainage with use of adjuncts, percussion, vibration, huffing, and coughing to expectorate mobilizing exercises to thorax and graduated exercise.

SECTION B

J. Physiotherapy in Restrictive Lung Disorders

Assess: Chest expansion at different levels, mobility of thorax and spine, posture (kyphosis or scoliosis) and tests for exercises tolerance (six minutes walking test}. Identify problems: Decreased expansion of lung due to restriction of chest wall movement causing decreased ventilation, defective posture and decreased exercise tolerance.

Demonstrate treatment techniques: Vigorous mobilizing exercises to thorax and spine, breathing exercise to increase ventilation and drain secretions, exercises for posture correction, graduated exercises to increase tolerance.

K. Principles Of Intensive Care Physiotherapy

Knowledge of the following equipment: Endotracheal tubes, tracheostomy tubes, Humidifiers, ventilators, High frequency ventilators, differential ventilators, CPAP masks, suction pump,

Electrocardiogram. Pressure monitors - arterial, central venous, pulmonary artery and pulmonary wedge, Intracranial. Temperature monitors.

Assess: special instructions pertaining to any operation performed, respiration, level of consciousness, Colour, blood pressure, pulse, temperature, sputum expectorated (colour and quantity), drugs (time last does of analgesic given), drains, presence of pacemaker or intra aortic balloon pump. ECG and blood gas results. Describe chest radiograph with respect to expansion of lungs, size of heart, and presence of secretions and placement of chest tubes.

L. Physiotherapy after Pulmonary Surgery

Preoperative: Demonstrate treatment techniques: Explanation to patient, care of incision, mechanical ventilation, breathing exercise, huffing and coughing, mobilizing exercise, posture correction, graduated exercise programme.

Post - operative: Assess: Special instructions pertaining to operative procedure performed, breath sounds, cyanosis, respiratory rate, temperature and pulse, blood pressure, drainage from pleural drain (bubbling or swinging) sputum expectorated, analgesia, movements of chest wall (symmetry) position of patient and effort of breathing, chest radiograph and blood gases.

Identifying problems: Pain, inter costal drains in situ, decreased air entry, retained secretions, decreased movement of the shoulder of affected side, decreased mobility and poor posture.

Treatment techniques: Deep breathing and segmental breathing exercises, vibrations, percussions, huffing and coughing, full range active -assisted arm exercises, ankle foot exercises, trunk exercises, posture correction, positioning of patient, IPPB and inhalations.

M. Physiotherapy after Cardiac Surgery

Pre operative: Assess patients of medical history, normal breathing pattern of patient, pulse, respiratory rate, BP, thoracic mobility, posture and patients exercise tolerance. Identifying problems: Excess secretions, decreased mobility of thorax, defective posture, decreased exercised tolerance.

Treatment techniques: Explain to the patients about their operation and about the incision, ICU, Endotracheal tube. Central lines, nasogastric tube, catheter, ECG leads, drains, peripheral lines, temperature probe etc. Teach breathing exercises, splinting of incision, huffing and coughing, correct posture, range of motion exercises to trunk and shoulders, active exercise to ankle and foot.

Post operative: Assess special instructions pertaining to operative procedure performed, type of incision, blood pressure, pulse rate, respiration, colour, time of last analgesic dose, drains, temperature, ECG, chest X -ray and blood gases.

Identify problems: Pain, decreased air entry, retained secretions, reduced leg movements, decreased mobility.

Treatment techniques: Deep breathing exercises, suctioning, active/assisted exercises to arm and leg, graduated exercise programme.

N. Physiotherapy in Rehabilitation after Myocardial Infarction

Role of the Physiotherapist in a coronary care unit during the first 48 hours. Principles of formulation of an exercise programme: Bed exercises, walking, stair climbing. Home exercise programme and advice on leisure activities. Describe physiotherapy for complications after myocardial infarction: Chest infections, cerebral embolism and shoulder hand syndrome.

O. Neonatal and Pediatrics Physiotherapy

Chest physiotherapy for children, The neonatal unit, Modifications of chest physiotherapy for specific neonatal disorders, Emergencies in the neonatal unit

P. 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.

Q. Applied Yoga in Cardio-respiratory conditions

BIO-MECHANICS

SECTION A

A. Basic concepts of biomechanics (kinetics and kinematics)

1. Introduction and role of biomechanics in physiotherapy
2. Analysis of motion- kinematics description
3. Analysis of force producing movement-kinetic analysis
 - Internal and external force
 - Reaction forces
 - Concurrent and parallel force system
 - Friction
 - Torque

B. Joint structure and function

1. Basic principles of human joint design and a human joint
2. Materials in human joint
3. General properties of connective tissues
4. Classification of joint
5. Joint motion

6. Effect of disease, injury and immobilization

C. Muscle structure and function

1. Describe Mobility and stability functions of muscles.
2. Describe elements of muscle structure- Composition of a muscle fibre, the motor unit, types of muscle fibres, muscle fibre size, arrangement and number, Muscle tension, length-tension relationship.
3. Describe the types of muscle contraction, speed and angular Velocity, Applied load, Voluntary control, Torque & Isokinetic exercise.
4. Summarize factors affecting muscles, tension.
5. Classify muscles- spurt and shunt muscles, Tonic and phasic muscles.
6. Factors affecting muscle function: Type of joint and location of muscle attachment, number of joints passive insufficiency, Sensory receptors.

D. Bio-mechanics of peripheral joints

(Joint structure and function of following joints)

1. Shoulder complex
2. Elbow complex
3. Wrist and hand complex

SECTION B

4. Hip complex
5. Knee complex
6. Ankle and foot complex
7. Vertebral column

(Applied aspect- General effect of disease, injury, aging, immobilisation)

E. Posture

Definition, factors responsible for posture, relationship of posture, factors responsible postural imbalance in static and dynamic position, Biomechanical analysis of posture. Effects of age, pregnancy and occupation on posture.

F. Gait

1. Definition
2. subdivision(RLA & traditional)
3. Distance and time parameters
4. Gait determinants
5. Muscle activity at hip, knee, ankle during gait(brief) and ROM
6. Upper limb & trunk pelvis motion while walking
7. Pathological gait
 - Hip extensor
 - Hip abductor

CLINICAL NEUROLOGY

A. NEUROANATOMY

Review the basic anatomy of the brain and spinal cord including: Blood supply of the brain and spinal cord, circle of willis, anatomy of the visual pathway, cranial nerves connections of the cerebellum and , long tracts of the spinal cord, pyramidal and extrapyramidal system, spinal nerve, the brachial and lumbar plexuses and cranial nerves.

B. NEUROPHYSIOLOGY

Review in brief the Neurophysiological basis of: tone and disorders of tone and posture, bladder control, muscle contraction and movement and pain pathway.

C. BRIEFLY OUTLINE THE CLINICAL FEATURES AND MANAGEMENT OF THE FOLLOWING NEUROLOGICAL DISORDERS

1. Congenital and Childhood Disorders

- a. Cerebral palsy
- b. Hydrocephalus
- c. Spina Bifida

2. Cerebro - Vascular Accidents

- a. General classification; thrombotic, embolic, haemorrhagic
- b. Gross localization and Sequelae
- c. Risk factors, clinical features, investigations and management.
- d. Brief rehabilitative programmed.

3. Trauma

Broad localization, first aid and management of Sequelae of head injury and spinal cord injury.

4. Diseases of the spinal cord

- a. Cranio-vertebral junction anomalies.
- b. Syringomyelia
- c. Cervical and lumbar disc lesions (prolapsed).
- d. Tumours (brief).
- e. Spinal arachnoiditis.

5. Demyelinating Diseases (Central and Peripheral) – Acute disseminated encephalomyelitis, Transverse myelitis & multiple sclerosis.

6. Degenerative disorders -Parkinson's disease & Dementia.

7. Infections - Pyogenic Meningitis, tuberculous infection of central nervous system & Poliomyelitis.

8. Diseases of The Muscle: Classification, signs symptoms, progression and management.

Myasthenia gravis, course, clinical features and management.

9. Peripheral Nerve Disorders

- a. Peripheral nerve injuries: Clinical features and management.
- b. Entrapment neuropathy
- c. Peripheral neuropathy (classification)
- d. Gullian-Barre Syndrome
- e. Diabetic neuropathy

10. Disease Of Cerebellum

Etiology, pathophysiology, clinical feature & management

- a. Cerebral ataxia
- b. Friedreich's ataxia

11. Miscellaneous

- a. Epilepsy- Definition, classification, and management,
- b. Intracranial tumours- Broad classification, signs and symptoms and in brief management.
- c. Motor neuron disease- Definition, classification, clinical feature and management.

12. General assessment procedure and basic principles of management.

CLINICAL ORTHOPAEDICS

1. INTRODUCTION TO ORTHOPAEDICS

- a. Orthopaedic terminology & instruments
- b. History taking & clinical examination in orthopaedics.
- c. Common investigation procedures in orthopaedics (Radiographs & other imaging techniques)
- d. Principles of orthopaedic management
- e. Common orthopaedic procedures (Arthrodesis, arthroscopy, arthroplasty, osteotomy, bone grafting, tendon transfers, soft tissue releases, tenotomy & lengthening procedure, tendon & nerve suturing, common spinal surgeries & stabilization procedures.

2. FRACTURES & DISLOCATIONS

- a. Introduction to fractures
- b. Types of fracture
- c. Healing of fracture, factors affecting healing of fracture.

- d. Fracture complications, its prevention & treatment
- e. Principles of fracture management (conservative & operative)
- f. Closed & open reduction, internal & external fixation
- g. Enumerate major long bone fractures of **upper limb, lower limb & spine**. Briefly describe their mechanism of injury, clinical features, complications & management of following fractures
- h. Upper limb – clavicle, scapula, humerus, radius, ulna, carpals, metacarpals, phalanges.
- i. Lower limb – pelvis, femur, patella, tibia, fibula, tarsal, metatarsal, phalanges
- j. Spine – cervical, thoracic & lumbar spine. (Vertebral column fractures), rib fractures.
- k. Dislocation, subluxation (shoulder, hip, patella, elbow) & their management.

3. SOFT TISSUE & SPORTS INJURIES

- a. Sprain, Strain, Bursitis, Tendonitis, Tenosynovitis, fascitis & capsulitis.
- b. Soft tissue healing.
- c. Mechanism of injury, clinical manifestation, evaluation & basic treatment of following conditions
- d. Shoulder - Rotator cuff injury & tendonitis, PA shoulder, adhesive capsulitis, sub-acromial bursitis, biceps tendonitis.
- e. Elbow - Tennis elbow, Golfers elbow, triceps tendonitis, olecranon bursitis.
- f. Wrist & Hand – DeQuervain's disease, Trigger finger & thumb, ganglion, Dupuytren's contracture, Carpal tunnel syndrome, mallet finger.
- g. Hip - Groin strain (Hip adductor strain), ITB friction syndrome, piriformis syndrome, greater trochanter bursitis.
- h. Knee ligament injuries- Cruciates, collateral, meniscus injuries, bursitis, tendonitis, Osgood Schlatter's disease, anterior knee pain, chondromalacia patellae
- i. Ankle & foot - Ankle sprain, tendonitis, Heel pain, foot pain, metatarsalgia, tarsal tunnel syndrome, mortons neuroma

4. BONE & JOINT INFECTIONS

- a. Osteomyelitis (Acute & chronic)
- b. TB (Spine & hip) Pott's spine & paraplegia
- c. Septic arthritis

5. COMMON TUMOURS OF MUSCULO-SKELETAL SYSTEM & THEIR

MANAGEMENT (osteoma, osteosarcoma, osteochondroma, Ewing's sarcoma, GCT, multiple myeloma).

6. ARTHRITIS (3HRS) – Outline the etiopathology, clinical presentation & management including joint replacement for the followings

- Osteoarthritis
- Rheumatoid arthritis
- Ankylosing spondylitis.

7. METABOLIC BONE DISEASES (2 Hrs) – Rickets, osteomalacia, osteopenia & osteoporosis.

8. CERVICAL & LUMBAR PATHOLOGY

- a. Cervical – Cervical spondylitis, spondylosis, PIVD, Brachial plexus injury, thoracic outlet syndrome, brachial neuralgia, VBI.
- b. Lumbar – Lumbar spondylitis, spondylosis, PIVD, spondylosisthesis, lumbar canal stenosis, LS strain, sciatica, lumbarisation, sacralisation.

9. SPINAL DEFORMITIES (2 Hrs) - Aetio-pathology, clinical features, & management of scoliosis, kyphosis, lordosis.

10. DEFORMITIES –

Congenital deformities -

- a. Congenital deformities & limb deficiencies
- b. Upper limb – sprengel’s shoulder, radial club hand.
- c. Lower limb – DDH, Coxa vara, CTEV, congenital vertical talus.
- d. Spine – torticollis, spina-bifida, klippel feil syndrom.

Acquired deformities –

- Coxa vara, genu valgum, genu varum, genu recurvatum, pes cavus, planus, hallux valgus, hallux rigid, hammer toe.

11. NEURO-MUSCULAR DISORDERS -

Poliomyelitis – Aetio-pathology, stages, clinical presentation & management of poliomyelitis. Orthopaedic & orthotic management of PPRP deformities.

Cerebral Palsy – Aetio-pathology, types, clinical presentation, & orthopedic management.

12. AMPUTATION (2 Hrs) - Definition, levels of amputation of both lower & upper limbs, indications& complications.

13. HAND INJURIES (2 Hrs) – Mechanism of injury, clinical features, management of the following- crush injuries, Flexor & Extensor injuries and Burn injuries of hand.

14. X-RAYS OF EXTREMITIES & SPINE

PHYSIOTHERAPY IN ORTHOPEDIC CONDITIONS

Syllabus –

1. Review manual, mechanical, skin, skeleton & spinal traction.
2. Review common orthopedic surgeries & role of Physiotherapy in the same along with detailed preoperative & post operative physiotherapy evaluation & management including Arthroscopy, Arthroplasty, Arthrodesis, and Osteotomy, Soft tissue procedures & tendon transfers, common spinal surgeries.
3. Detail description about the **Physiotherapy evaluation** skills in Orthopedic conditions including subjective & objective assessment & special test, with special emphasis on spine, shoulder, elbow, wrist & hand, hip, knee & ankle & foot. (Review of clinical Anatomy & Bio-mechanics).
4. **Fractures** – Classifications of fractures, causes, types, sign & symptoms. Healing of fractures & the factors affecting it. Complications of fractures & its Physiotherapy management. Principles of fracture management. Role of Physiotherapy in fracture management. Role of Physiotherapy in management of specific fractures of **Upper limb** (Clavicle, Humerus, Radius, Ulna, Carpal & Metacarpal fractures) **Lower limb** (Pelvis, Neck femur, Intertrochantric fracture femur, shaft femur, patellar fractures, fractures around knee, tibial fractures, fractures around ankle & foot. **Spinal fractures** (vertebral fractures with & without neurological complications) Common dislocations & subluxation (Hip, Shoulder & patella) & its management.
5. Physiotherapy in Soft tissue & Sports Injuries – Review causes, grades, clinical feature & management of Sprain, Strain. Bursitis, Tendonitis, Tenosynovitis, fasciitis & capsulitis. Soft tissue healing. Mechanism of injury, clinical manifestation, Physiotherapy evaluation, management & Rehabilitation of following conditions **(15Hrs)**
 - Shoulder - Rotator cuff injury & tendonitis, PA shoulder/ Adhesive capsulitis.
 - Elbow - Tennis elbow, Golfers elbow.
 - Wrist & Hand – DeQuervain's disease, Trigger finger, Carpal tunnel syndrome.
 - Hip - Groin strain (Hip adductor strain), hamstring strain, ITB friction syndrome, and Piriformis syndrome.
 - Knee ligament injuries- Cruciate, collateral, meniscus injuries, including ACL ligament reconstruction surgery & Rehabilitation protocol.
 - Ankle & foot – Shin split, Ankle sprain, Heel pain, foot pain.

6. Role of physiotherapy in **congenital & acquired deformities** - Torticollis, CDH, CTEV, flat foot, Mal-alignment at the knee joint, toe deformities.
7. **Anesthetic foot & planter ulcers** in Diabetic foot & leprosy. Its detail physiotherapy evaluation & management including care of anesthetic foot, Role of Electrical modalities & Orthotics.
8. **Cervical & Lumbar spine pathologies (10Hrs)** – Physiotherapy assessment & management of following conditions
 - Cervical Spine – Cervical spondylitis, PIVD, Vertebro-Basillar Insufficiency, Thoracic outlet syndrome.
 - Lumbar Spine - Lumbar spondylitis, PIVD, Spondylo-listhesis, Lumbar canal stenosis.
 - Differential diagnosis of Low Back Pain.
 - Principal s of Physiotherapy Management in Low back pain
9. Review **Spinal deformities (Scoliosis, Kyphosis)** its classification, etiopathology, clinical presentation, & management (Conservative, Orthotic & Surgical) Detailed Physiotherapy evaluation including postural evaluation & management guideline.
10. **ARTHRITIS** – Review basic classification of Arthritis. Etio-pathology, clinical presentation, investigation & Medical, Surgical & Physiotherapy management of **Osteo-arthritis, Rheumatoid Arthritis, Ankylosing Spondylitis.**
11. **Amputation** – Review types, indication, surgical principals of major upper & lower limb Amputations. Complications of Amputation Surgeries, its prevention & treatment. Role of Physiotherapy in Post operative management , dressings & immediate post-operative fittings, prosthetic prescription , check-out & training of the Amputee with prosthesis.
12. **Neuro-Musculo-Skeletal Disorders** –

Poliomyelitis –Review Aetio-pathology, Clinical features, Stages, common deformities & its orthopaedic corrections including soft tissue release procedures, osteotomy, arthrodesis, Tendon transfers. Detailed Physiotherapy evaluation, & management (Conservative & Post operative), Orthotic prescription & gait training.

Cerebral Palsy – Review definition, causes, classification, clinical presentation, associated problems of Cerebral palsy, with special emphasis on orthopaedic management Principals in Spastic Cerebral Palsy. Detailed Physiotherapy evaluation & management principals. Recent trends in management (BOTOX)
13. **Physiotherapy in Burns** - Review basic clinical anatomy of skin, various causes of burns, degree of burns, clinical features & complications of Burn injuries. Medical treatment & first aid, surgical treatment including skin grafting. Physiotherapy evaluation & management of Burn including the role of exercise therapy & electrotherapy modalities. Orthotics in Burn rehabilitation.

PHYSIOTHERAPY IN NEUROLOGICAL CONDITIONS

A. REVIEW OF NEUROANATOMY AND PHYSIOLOGY

Review the structure and function of a) neuron b) synapse c) supporting tissue. Review the organization and function of a) cerebral hemispheres b) cerebellum c) spinal cord d) peripheral nerves e) pyramidal system f) extra pyramidal system g) internal capsule h) Basal ganglia i) Lumbar and brachial plexus. Review the factors influencing alpha motor neuron activity. Review the neurological basis of muscle tone and movement and demonstrate the following: a) hypotonia b) hypertonia - spasticity and rigidity c) ataxia d) Involuntary movement

B. PRINCIPLES OF ASSESSMENT

Review a) skills in history taking b) assessment of higher functions, cortical sensations, cranial nerves, dorsal column sensation and pain & temperature sensations c) assessment of motor function : grading of muscle power, assessment of range of movement, balance and coordination d) assessment of superficial and deep reflexes e) assessment of reflex maturation in terms of stimulus, and their significance f) assessment of gait-both normal and abnormal (spastic, ataxic and paralytic patterns) Emphasis should be placed on teaching accurate assessment techniques and various recording methods eg. colour coding on body charts, graphs etc. g) Bladder control and its types.

C. BASIC INVESTIGATIVE PROCEDURES USED IN NEUROLOGY

- a. EMG
- b. NCV
- c. H reflex & F wave
- d. EEG
- e. Cerebral evoked potentials
- f. CT scan
- g. MRI

D. PRINCIPLES OF TREATMENT

Review the treatment principles as follows: -

- a. Sensory re-education: hypersensitivity, hypo sensitivity and anesthesia.
- b. Treatment of altered tone: hyper tonicity and hypotonicity.
- c. Motor re-education: Strengthening exercise, coordination exercises, joint mobilization exercises, use of equilibrium and labyrinthine systems, use of PNF patterns, controlled sensory use of stretch to elicit movement (facilitation), light joint compression (inhibition), use of reflex activity to improve motor function, phylogenic sequence of motor behavior.

- d. Treatment to improve functions: Free exercises, gait training with and without aids, activities of daily living, mat exercises and exercises and recreation.
- e. Review the use of ambulatory aids in neurological conditions: in spastic upper motor neuron lesions, in lower motor neuron lesions, in dorsal column dysfunction and cerebellar dysfunction.
- f. Review the use of splints and braces in spastic upper motor neuron and in flaccid lower motor neuron lesions in both upper and lower limbs.
- g. Review the management of chronic pain in neurological conditions with respect to the types of pain, treatment modalities available, selection criteria for each modality and possible complications.

D. CEREBRAL PALSY

Define cerebral palsy and describe the topographical classification - monoplegia, diplegia, paraplegia, hemiplegia & tetraplegia. Describe types of cerebral palsy: spastic, athetoid, ataxic & mixed. Identify common associated problems: Visual, hearing, speech and intelligence. Assess reflex activity at different levels: Cortical, midbrain, brain stem, spinal. Assess developmental milestones from birth to five years. Assess functional Ability: Prone to supine (rolling), coming to sitting, quadrupod, crawling, kneeling, kneel to stand, stand with support and walking. Examine for contractures as follows: hip flexion, adduction, internal rotation, knee flexion, ankle plantar flexion, inversion, eversion, flexion contractures of elbow, wrist, fingers and spinal deformities.

Treatment - Describe and demonstrate the treatment motor disabilities; Passive movement stretching of soft tissue tightness, use of ice to reduce spasticity, positioning the child to prevent soft tissue contractures, to inhibit abnormal reflexes and to facilitate volitional movement. Describe and demonstrate techniques of carrying of different types of CP children, encouraging bimanual activities in different starting positions like prone sitting and standing and activities across the midline. Describe appropriate home programmes for positioning the child, handling them and assisting improvement of function. Introduction of use of various treatment approaches in CP.

E. PERIPHERAL NERVE LESIONS

Identify types of peripheral nerve lesions. Assess the motor system: Specific muscles, range of motion, active and passive ranges, muscle girth. Assess sensory system: touch, pain, temperature, paraesthesia, nerve degeneration & regeneration. Assess autonomic function: sweating, skin condition, soft tissue atrophy. Treatment: describe early reeducation techniques, electrical stimulation (selection of current), late reeducation techniques, active, assisted, resisted movements, Passive and auto assisted stretching, and massage. Describe

sensory reeducation and pain relief by various modalities. Describe the common splints used in peripheral nerve lesions: static, & dynamic. Functional reeducation.

Muscle transfers; Preparation for transfer-assessment of muscle power, stretching of soft tissue tightness, isolation of muscle contraction, specific muscle strengthening. Post-operative management: Pressure bandaging & muscle reeducation after transfer. Describe a home programme.

F. MUSCULAR DYSTROPHY

Definition, Classification & Pathology. Describe motor dysfunction w.r.t stages of the disease: Ambulatory, wheelchair and bed stage. Other dysfunctions, investigation used, Identify and assess common contractures and deformities. Assess range of motion and muscle power. Assess functional ability.

Demonstrate treatment programme for strengthening weak muscles: active movements and hydrotherapy. Increase range of motion by suspension therapy, powder board, passive stretching, positioning etc. Demonstrate gait training with appropriate orthosis. Describe management of chest complications: breathing exercises, chest percussion, drainage of secretions and assisted coughing.

G. PARKINSONISM

Review the natural history, course and prognosis of the disease. Identify and assess problems in posture, sitting, kneeling and standing balance, voluntary and automatic movements, rigidity, tremor and gait. Assess also hearing, speech and finger dexterity. Describe disability grading according to Hoen's & Yarr's Scale.

Demonstrate treatment: postural awareness and relaxation training, flexibility exercises, gait training techniques, heel-toe gait, overcoming obstacles, start and stop on command, turning and walking backwards, forwards and sideward. Describe an appropriate home exercise programme.

H. SPINAL CORD LESIONS

Describe types of spinal cord lesions. Describe signs of tract and root interruptions. Describe positioning of the patient in acute spinal cord injury. Describe assessment of the motor system: tone, power of specific muscles, range of motion and limb girth. Myotome & dermatomal assessment. Describe assessment of sensory system and reflexes. Describe assessment of functional activities and balance reactions in appropriate cases. Describe assessment of respiratory function: Muscles of respiration, coughing ability and vital capacity. Describe how the level of lesion is ascertained. ASIA Scale & Frenkel's Scale.

Treatment: Describe the stages of immobilization & stage when loading of the spine is allowed. Describe spinal orthosis. Demonstrate motor reeducation programmes and a programme for respiratory care in high level paraplegics and quadriplegics. Demonstrate progressive ambulation, mat exercises, various strengthening programmes, methods of decreasing spasticity and improving sitting balance. Demonstrate various types of paraplegic gaits and reeducation in functional activities: transfers, wheel chair transfers and protective falling. Describe common ambulatory aids used in paraplegics and common splints used in tetraplegics. Describe the use of hydrotherapy in paraplegics.

I. HEMIPLEGIA

Define hemiplegia and identify the following: Sensory disturbance, alteration in tone, loss of selective movement, loss of balance reactions and communications problems.

Treatment: Describe the unilateral and bilateral approaches to treatment. Describe positioning in the supine position, on the affected and on the unaffected sides. Demonstrate activities in the recumbent position: arm mobilization, trunk elongation, scapular movement, arm elevation activities for a recovering arm; Activities for the lower limb i.e. hip and knee flexion over the side of the bed, knee extension with dorsiflexion, hip control and isolated knee extension.

Mat activities: demonstrate rolling on to affected and unaffected sides, sitting and kneeling. Describe the technique of making a patient sit passively & active assisted sitting. Demonstrate transfer techniques. Describe activities in sitting, equal weight transfer on buttocks, shuffling on buttocks, equal weight transfer through arms, balance reactions of trunk & head. Demonstrate activities in the standing position: standing from plinth, from chair (assisted and independent). Weight bearing on affected leg, knee control in standing, weight transfers forward, backward and sideward, gait training and stair climbing. Describe tilt board activities in the lying and sitting positions. Describe additional methods of stimulation using verbal cues, ice, pressure & tapping. Describe management of shoulder pain and shoulder hand syndrome. Identify and describe hemiplegic's gait, identify synergy components and abnormal reflex activities.

Demonstrate re-education of gait: motor relearning techniques, functional approach and use of orthosis.

J. CEREBELLAR LESIONS

Identify and assess abnormal tone, decomposition of movement, dysdiadochokinesia, rebound phenomenon, proprioception, dysmetria, posture and gait.

Treatment: Demonstrate exercises for in-coordination; Frenkel's and weighted exercises. Demonstrate techniques for re-education of balance and equilibrium reactions by visual compensation. Describe use of appropriate aids for ambulation depending on the severity of affection - walker, elbow crutches, quadruped, walking sticks etc.

K. POLIOMYELITIS

Define poliomyelitis and review the Stages in the disease - acute, recovery and residual paralysis. Describe treatment in the acute stage: head, chest care, positioning. Describe the assessment of a patient in the recovery Stage: active and passive range of motion, soft tissue tightness, muscle power & Spinal deformities. Demonstrate treatment in the recovery stage: muscle strengthening, progressive resisted exercises, active assisted, active exercises. Describe the role of suspension and hydrotherapy. Describe the treatment of soft tissue tightness by passive

stretching. Auto stretching and positioning. Demonstrate treatment in the stage of residual paralysis Pre-operative assessment of contractures; hip flexion, TFL contractures, knee flexion and foot deformities. Describe also assessment of limb length discrepancy and spinal deformities. Review orthotic aids commonly used the management of polio. Describe tendon transfer operation commonly performed. Describe functional retraining for self-care, gait training and posture correction.

L. TRAUMATIC BRAIN INJURY

- a) Types & mechanism of Head Injury, Clinical feature and potential complications.
- b) Physiotherapy principles of immediate & post operative therapeutic management.

M. MULTIPLE SCLEROSIS Clinical feature, assessment and principles of therapeutic management.

N. CONCEPTS OF FOLLOWING NEUROPHYSIOLOGICAL TECHNIQUES

1. NDT (Bobath)
2. PNF
3. Rood's
4. Brunnstrom Movement Therapy
5. MRP
6. Vojta
7. Motor Control, Motor learning & motor development.

REHABILITATION MEDICINE

1. **INTRODUCTION** – Definition & concept of rehabilitation team approach. Brief explanation about the Role of each team member in the process of Rehabilitation.
2. **History of Physiotherapy**, Rules of professional conduct, Ethics and legislation of Physiotherapy in India. Administration, organization & management of Physiotherapy department.
3. Brief explanation about the **scope of Physiotherapy** in following fields.
 1. Sports Physiotherapy –Fitness Testing & Training
 2. Hand rehabilitation – Tendon injury
 3. Pediatric physical therapy – early identification & intervention in pediatrics age group patients including neo-natal screening, common congenital, acquired & developmental conditions producing disability in pediatrics.
 4. Geriatrics (Gerontology) – Age related changes in musculo-skeletal, nervous and cardio-respiratory systems. Assessment of Quality of life in old age population. Industrial Physiotherapy – Role of physiotherapy industrial health. Cumulative trauma disorders. Ergonomics.
 5. Community Based Rehabilitation – Concept & need of CBR. Difference between CBR & IBR. Role of Physiotherapy in CBR.
4. **THERAPEUTIC TECHNIQUES**

Explain the theory and mechanisms of therapeutic techniques and relevant precautions, for the following:

 - a) Joint mobilization
 - b) Reducing spasm
 - c) Assisting weak muscles
 - d) Increasing endurance
 - e) Muscle re-education following muscle transfer surgery
 - f) Strengthening muscles
 - g) Increasing co-ordination
 - h) Improving balance
 - i) Gait training
5. Brief explanation about the fields of **Occupational therapy**.
Architectural Barriers and modifications.
6. **Orthotics** – Material, Principals & Indications of Upper limb, Lower limb & Spinal orthosis.
7. **Prosthetics** – Material, Principals, Indication of upper limb & lower limb prosthetics. Checkout & training of prosthesis.

8. **Mobility aids**, appliances & assistive devices used in Rehabilitation.
Pain – Physiology of pain, Pain assessment & modulation of Pain with physiotherapy.
Myofascial pain syndrome.
9. **Disability evaluation** – Basic guideline for the evaluation of Disability & the process of certification in India (As per the notification in gazette of India). Enumerate the benefits and compensations awarded to a Person with disability (PWD) including PWD act. Legal aspect of Disability.
10. Brief explanation about **Communication problems** & its management.
11. Role of Physiotherapist in **Pre-vocational evaluation** & training.
12. Describe **Community Based Rehabilitation** & Compare It with Institutional Based Rehabilitation.
