ALL INDIA COUNCIL FOR VOCATIONAL AND PARAMEDICAL SCIENCE

SYLLABUS

OF

Diploma in Physiotherapy

REGULAR PROGRAMME

PARAMEDICAL EDUCATION & RESEARCH ORGANISATION

Diploma in Physiotherapy

Syllabus (DPT)

SYLLABUS

Paper Code	Nomenclature of paper/course	Credit C(L-T-P)
	First Year	
	General pathology (101)	
	UNIT I Introduction to Pathology & Hematology. Formation, Composition and function of Blood. Haemopoisis (Erythropoiesis, Leucopoiesis & Thrombopoisis), Anticoagulant, Mode of Action, Uses, Advantages & Disadvantages. Collection, Preservation, Transportation & Handling and disposable of Blood Sample. Standard& Universal Precautions in Hematology. Hematological Stain, Principle, Composition & procedure of Staining. Preparation of Blood Smear and their significance. Hem cytometer, principle, working procedure Care & Maintenance. **Unit-II** Haemoglobin, its synthesis and types, normal and abnormal hemoglobins, extravasccular and intravascular hemolysis. Anaemia and its classification, Morphological and etiological, pathogenesis, laboratory investigations and management, Iron deficiency anaemia, metabolism of iron, pathogenesis, laboratory investigations and management, principle and procedure of special test Megaloblastic anaemia, pernicious anaemia, pathogenesis, laboratory investigations Cell Injury and Cellular Adaptations- Normal Cell**,** Cell Injury- types of cell injury, etiology of cell injury, and morphology of cell injury, cellular swelling, and Cell death: types- autolysis, necrosis, and apoptosis. Inflammation- Acute inflammation - vascular event, cellular event, inflammatory cells Chronic Inflammation - general features, granulomatous inflammation	

Unit III

Tissue Renewal and Repair, healing and fibrosis, cirrhosis, introduction of oedema, hyperaemia, congestion, haemorrhage, haemostasis, thrombosis, embolism, infarction, shock and hypertension.

Neoplasia: Definition, how does it differ from hyperplasia, difference between benign tumor and malignant tumor. Healing-Definition, different phases of healing, factors influencing wound healing.

Unit IV

Infectious Diseases: pathogenesis & overview of modes of infections, prevention and control with suitable examples like Typhoid, Dengue

Cancer: Definitions, nomenclature, characteristics of benign and malignant neoplasm, metastasis, Carcinogens and cancer, concept of oncogenes, tumour suppressor genes, DNA repair genes and cancers stem cells.

PRACTICALS

1. Collection of blood Sample by Venous & Capillary Method
2. Estimation of Hb By Sahli 's & CMG Method
3. Determination of RBC, WBC & Platelet Counts By Hem cytometer
4. Preparations of EDT & Sodium Citrate Vials
5. Preparation of thin & thick blood smear
6. Separation of Buffy Coat
7. Determination of ESR by Win Trobe& Western Green Method
8. Any other practical's based on theory paper
9. Blood group

RECOMMENDED BOOKS

1. Text Book of Pathology- Hares Mohan
2. Text Book of Pathology- Robbins
3. Practical Hematology- JV Decie & Lewis
4. Hematology- William J William, Ernest Butter
5. Lynch's MLT – Raphels
6. Atlus of Hematology – George, A Mcdolald, TC Codde
7. Blood & its Diseases- Chanari

Human Anatomy & Physiology (102)

Unit I

Introduction to medical sciences. Organization of human body and integrated physiology:- Cell, Tissue, Organ, Organ system & body. Anatomical terms: - Body position, Section, Cavity & their related term.

Lymphatic system: Lymphatic organs, lymphocytes, Spleen, Bone marrow etc. primary & secondary immune response, Immunity. Primary defense mechanism of human body against pathogenic microbes.

Physiology of various body fluids: CSF, peritoneal, Pericardial, Pleural and synovial fluids.

Cartilage,ligaments,tendons.

Unit II

Respiratory system: - Anatomy & physiology of nose and nasal cavity, pharynx, larynx, trachea, lungs. Mechanism of respiration.Lungs capacity. Lobes of lungs,layers of lungs

Integumentary system: - Anatomy & physiology of skin & its layer,nails,hairs,structure and function of skin,care of skin.

Excretory system: Anatomy & physiology of Kidney, Ureters, Bladder & Urethra. Mechanism of urine formation, GFR, mechanism of GFR, Nephrons diagram and its function.

Sense organ: Anatomy & physiology of eye,diagram of eye, ear,diagram of ear, nose & tongue.

Unit III

Digestive system: - Anatomy & physiology of mouths, pharynx, esophagus, stomach: parts , structure function,blood supply.intestine: parts,structure,function and blood supply. Pancreas: parts,structure,ducts,functions. Liver: structure, lobes,quadrants,blood supply and function.gall bladder: bile,duct, Mechanism of digestion.

Skeletal system:- Anatomy & physiology of bones,structure of bone,parts of bone,types of bone,blood supply of bone, Joints and its types with eg., .Upper limb,Lower limb,Vertebral column,Thorax/cheast,skull.

Nervous system: Anatomy& physiology of Neurons structure and function, Brain and its parts, Spinal cord, Central & Peripheral nervous system.

Endocrine system: Anatomy & physiology of hormones, glands, Pituitary gland & hypothalamus, thyroid gland, parathyroid glands, adrenal glands, pancreas, pineal gland & mechanism of action.

Unit IV

Muscular system:-skeletal muscle,cardiac muscle,smooth muscle, Physiology of muscular contraction and controlling them various types of Joints and their physiology,neuromuscular junction

Cardiovascular system: - Anatomy & physiology of blood vessels, heart structure,chambers of heart,function of heart,systematic circulation, valves, pressure, circulation in adults & fetal, blood,artery,vein,capillary.
Reproductive system: Male- Anatomy & physiology of Primary & secondary reproductive organs, sperm diagram and its function, spermatogenesis, testis,prostate gland,
Female-Anatomy & physiology of Primary & secondary reproductive organs, ovary, ovum, uterus, Oogenesis, mensuration cycle

PRACTICALS

1. Demonstration of Human cell, Cell division Mitosis & meiosis - from chart& slides.
2. Demonstration of various tissue- Epithelial, Connective, Muscular & Nervous.
3. Demonstration of Individual Bones & Respiratory System from Chart
4. Measurement of Blood Pressure, Respiration & Heart Beat
5. Demonstration of Body Organ like Eye, Nose, Tongue etc.
6. Collection of body Fluids
7. Estimation of sugar in CSF fluid
8. Demonstration of Semen
9. Analysis of Semen
10. Estimation of Insulin Hormone
11. Examination of Urine
12. Demonstration of Reproductive System by Chart
13. Demonstration of Glands in chart in human body
14. Demonstration of Sense Organ
15. Demonstration of spinal & Cranial Nerve
16. Any other practical's based on theory paper

RECOMMENDED BOOKS

1. Anatomy & physiology- Rose & Wilson
2. Anatomy & Physiology- Tortora
3. Text book of Anatomy & physiology- B D Chaurasia
4. Text book of Anatomy & physiology- CC Chaterjee
   Text book of physiology- K Sabuingum

Basics of Biochemistry (103)

Unit I

Introduction to Clinical Biochemistry and role of Medical Lab Technologist, ethics, responsibility, safely measure and hazards in clinical biochemistry lab and first aid in laboratory accidents. Basic awareness of laboratory in respect to equipments&glasswares (Unit of Measurements, and calibration of volumetric apparatus.Colorimetry, spectrophotometery , flame photometry , analytical balance etc, (principles instrumentations & applications) Preparation and storage of reagents standard solutions, buffer solutions and pH determination. Biophysics, techniques- osmosis, dialysis, surface tension, sedimentation and viscosity – principles &applicatons.

Metabolism: Introduction to metabolism, concept of catabolism and anabolism. Metabolic pathways and their significance in the living system. Metabolites: Introduction, clinical significance, physiological variation in various body fluids, pathological aspects.

Unit II

Henderson – Hassalbach equation and it's clinical applications. Acid base disturbances and their clinical significance Acid –base –buffer and pH-simple calculations. Concept of clinical sensitivity and specificity and factors affecting the clinical results.Collection of blood specimens avoiding Haemolysis, de- proteinization& separation of serum/plasmas.

Carbohydrates: Introduction, general and structural classification, biological functions. Metabolism of carbohydrates (Glycolysis, TCA, ETS and oxidative phosphorylation). Genetic disorders related to carbohydrate metabolism, Blood glucose and its regulation, hyperglycemia, hypoglycemia and glucosuria. Vitamins: Types and their roles, deficiency related diseases.

Unit-III

Preparation of solution and reagents, normal solution, molar solutions, percent solution, buffer solution, dilutions, w/v, v/v, standard solution, aqueous solutions, concepts of acid and base

Units of measurement: SI unit, reference range, conversion factor, units for measurement of bio metabolite, enzymes, protein, drugs, hormones, vitamins

Amino acids: Introduction, classification, structural properties, biological functions. Proteins: Introduction, general and structural classification, biological functions. Metabolism of proteins (Digestion of proteins, General reactions of amino acids, Regulations of amino acid biosynthesis). Disorders related to proteins and amino acids metabolism. Enzymes: Introduction, properties and biological significance, structure and mechanism of action, enzyme inhibition (competitive and non competitive inhibition), concept of

co-factors, prosthetic groups, apoenzyme, holoenzyme and co-enzymes (with examples) and enzyme excess or deficiency related disorders.

Unit-IV

Specimen collection and processing of blood, urine & CSF, separation of serum and plasma, deproteinization of sample, Handling of specimens for testing, preservation of specimen, transport of specimen, factors affecting the clinical results, effect of storage onsample

Physical, chemical and microscopic examination of urine, Bence Jones Proteinuria and its clinical significance, qualitative test of urine for reducing sugars, protein, ketone bodies, bile Salt, bile pigments, urobilinogen, occult blood, uric acid, urea and Creatinine, quantitative estimation of 24 hrs urine for protein and their clinical significance.

Fatty acids and fats: Introduction and biological significance, classification of fatty acids, structure of fats and fatty acids. Lipids: Introduction, classification, biological significance, metabolism of lipids. Nucleic acid: Historical prospective, types and their functions, role of nucleic acid in protein synthesis (central dogma) , double helical model of DNA, nucleic acid mutations and its related disorders. Miscellaneous – urea cycle, formation and breakdown of hemoglobin, iron metabolism.

PRACTICALS

1. Cleaning of Laboratory Glass wares.
2. Preparation of distilled Water.
3. Preparation of 0.1N NaOH, 5M **H_2SO_4**&0.2N HCl Solution
4. Preparation of 0.2 Molar Sod Bicarbonate &70 % Ethanol Solution
5. Preparation of Hypertonic, Hypotonic & Norm tonic Solution & their Clinical Significance.
6. Collection of Blood Sample, serum & plasma separation

   Qualitative test:

   i. Carbohydrate
      a. Molisch's Test
      b. Fehling's Test
      c. Benedict's Test
      d. Barfoed's Test
      e. Seliwanoff's Test
      f. Iodine Test
      g. Osazone Test,

   ii. Qualitative test of urine for Ketone bodies

   iii. Any other practical's based on theory paper

RECOMMENDED BOOKS

1. Practical Clinical chemistry- H Varley.
2. Lynch's MLT –Raphel
3. Clinical chemistry- Principle & technique- Henry
4. Practical biochemistry- HW Cole

5. Clinical biochemistry – teiz
6. Principal of Biochemistry by Lehninger

General Microbiology (104)

Unit I

History & Introduction of Medical Microbiology.Importance of Medical Microbiology.Discovery of Microorganism.Contribution of Robert Koch, Bordet, Paul Ehrlich, Alexander Flaming, etc.Scope& Relevance of Safety Measures of Medical Microbiology.Bacterial Structure- Cell wall, Outer membrane, Lipopolysaccharide, Cytoplasmic membrane, Nucleus and Morphology - Shape, Capsule, Flagella, fimbriae, capsule, spore.

General Characteristics (Margin, surface, texture, color) and Classification.Bacterial classification Based on Shape, Based on Oxygen requirement, Based on their size, Based on Host Resistance or Pathogenicity, Based on Staining reaction.Bacteriological Culture media, Composition, Classification- Depending on the consistency, depending upon the oxygen requirement of organisms, their preparation and uses.

Unit II

Growth and Nutrition requirement (Oxygen, Carbon di-oxide, Temperature, Moisture and drying, Hydrogen Ion concentration and Light) of Bacteria, Autotrophs, Heterotrophs.Bacterial Growth (Lag phase, Log phase, Stationary phase and Phase of Decline) Curve.Products of Bacterial growth and Bacterial enzymes.

Different types of staining: Simple stains, Negative stain, Impregnation Method, Differential stain. Gram's stain- preparation of stain and staining methods.Ziehl–Neelsen stain.

Basic requirements of culture media. Biochemical test: Principle, method and importance of various test like- Indole, Motility, Citrate, Urase, Catalase, Coagulase, Oxidase, Nitrate Reduction, Triple sugar iron, Voges-Proskauer/Methyl red, H_2S production, Gas production. Purpose of Satellitism test, Cyclic adenosine monophosphate (CAMP), Optochin test, Novobiocin test, Bacittracin test. Growth and nutrition of Bacteria: Oxygen, carbon di-oxide, temperature, moisture and drying, hydrogen ion concentration and light.

Unit-III

General safety measures used in Microbiology laboratory, Sterilization and disinfection: Various physical methods of sterilization – heat, UV radiation, ionizing radiation, filtration, characters affecting sterilization, auto clave control and sterilization indicators.

Biomedical waste management in a Medical Microbiology laboratory: Types of the waste generated, Segregation, Treatment, Disposal

Principle, working, use, care & maintenance of Laminar air flow, Centrifuge, Autoclave, hot air Oven, Incubator, Colony Counter, Muffle Furnace, Mac-intos Field-jar etc. Sterility testing of I/v fluids, Collection,

transportation and processing of I/v fluids for bacterial contamination, Recording the result and interpretation

Unit-IV

Antiseptics & Disinfectants: Definition, types and properties, mode of action, use, qualities of good disinfectants. Chemical disinfectants – phenol and its compounds, alcohol, halogen, heavy metals and quaternary ammonium compounds, aldehyde, gaseous compound. use and abuse of disinfectants. precautions while using the disinfectants.

Hospital acquired infection, Specimen collection from patients, clinics and hospitals, Specimen collection for epidemiological investigations, role of microbiology laboratory in control of nosocomial infection

Antimicrobial agents and Antibiotics: Introduction, mechanism of action, classification and uses, Antibiotic susceptibility testing in bacteriology, Culture medium used for Antibiotic susceptibility testing, Preparation and standardization of inoculums, Control bacterial strains, Description, morphology, cultural characteristics, pathogenecity, cultural characteristics, clinical features and lab diagnosis of Staphylococcus, Streptococcus, Pneumococcus, Neisseria, Bordetella, Choice of antibiotics MIC and MBC: Concepts and methods for determinationVarious methods of Antibiotic susceptibility testing with special reference to Stokes and Kirby-Bauer method

PRACTICALS

1. Preparation of smear.
2. Perform Ziehl-Neelsen staining.
3. Perform Gram's staining
4. Perform Negative staining
5. Perform capsule staining
6. Perform spore stainingPreparation of Nutrient Agar
7. Preparation of McConkey Agar
8. Preparation of Blood Agar
9. Preparation of Chocolate Agar
10. Preparation of Muller Hinton Agar
11. Preparation of Nutrients Broth
12. Preparation of Slop Medium
13. Preparation of Solid Liquid Medium

RECOMMENDED BOOKS

1. Medical Laboratory Technology by Kanai Lal Mukherjee; Tata McGraw Hill Publishers, New Delhi
2. Textbook of Microbiology by Ananthanarayan and Panikar; Orient Longman, Hyderabad
3. Practical Book of Medical Microbiology by Satish Gupta; JP Brothers,

New Delhi
4. Text Book of Medical Microbilogy by Satish Gupta; JP Brothers, New Delhi
5. Text Book of Medical Laboratory Technology by Praful B Godkar; Bhalani Publishing House; Mumbai
6. Medical Laboratory Science Theory and Practice by J Ochei and A Kolhatkar
7. A Textbook of Microbiology New Central Book Agency (P) Ltd By P Chakraborty
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Biophysics
(105)

SUBJECT DESCRIPTION - To understand the concept and basic principles to know electrotherapy equipments is given under this topic. The student will be taught about physics related to electrotherapy and application on human body tissues.

Unit I
Physical principles

Structure and properties of matter -solids, liquids and gases, adhesion, surface tension, viscosity, density and elasticity.

Structure of atom, molecules, elements and compound

Electricity: Definition and types. Therapeutic uses. Basic physics of construction.

Working

Importance of currents in treatment.

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.

Current Electricity: Units of Electricity: farad, Volt, Ampere, Coulomb, Watt

Condensers: Definition, principle, Types- construction and working, capacity & uses.

Magnetism: Definition. Properties of magnets. Electromagnetic induction. Transmission by contact. Magnetic field and magnetic forces. Magnetic effects of an electric field.

Conductors, Insulators, Potential difference, Resistance and intensity

Ohm's law and its application to DC and AC currents. Fuse: construction, working and application.

Transmission of electrical energy through solids, liquids, gases and vacuum.

Rectifying Devices- Thermionic valves, Semiconductors, Transistors,

Amplifiers, transducer and Oscillator circuits.
Display devices and indicators-analogue and digital.
Transformer: Definition, Types, Principle, Construction, Eddy current, working uses
Chokes: Principle, Construction and working, Uses

Unit II

Effects of Current Electricity

Chemical effects-lons and electrolytes, lonisation, Production of an EMF by chemical actions.
Ionization: Principles, effects of various technique of medical ionization.
Electromagnetic Induction.
Electromagnetic spectrum.

Unit III

Electrical Supply

Brief outline of main supply of electric current
Dangers-short circuit, electric shocks: Micro/ Macro shocks
Precaution-safety devices, earthing, fuses etc.
First aid and initial management of electric shock
Burns: electrical & chemical burns, prevention and management

Unit IV

Various agents

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

Therapeutic Electricity

Practical

1. Thermal agents: Superficial and deep heat
2. Ionization
3. Physical Principles
4. Electrical Supply

1.

Electrotherapy
(106)

Unit I

Low frequency Currents

Direct Current: types, physiological &therapeutic effects.

Alternating Current

Types of Current used in Therapeutics

Modified D.C

Faradic Current

Galvanic Current

Modified A.C

Sinusoidal Current

Diadynamic Current.

Faradic Current: Definition, Modifications, Techniques of Application of Individual, Muscle and Group Muscle stimulation, Physiological & Therapeutic effects of Faradic Current, Precautions, Indications & Contra-Indications, Dangers.

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.

Sinusoidal Current & Diadynamic Current in Brief.

HVPGS – Parameters & its uses

Ionization / Iontophoresis: Techniques of Application of Iontophoresis, Indications, Selection of Current, Commonly used Ions (Drugs) for pain, hyperhydrosis, would healing.

Cathodal / Anodal galvanism.

Micro Current & Macro Current

Types of Electrical Stimulators

- NMES- Construction component.
- Neuro muscular diagnostic stimulator- construction component.
- Components and working Principles

Unit II

Principles of Application: Electrode tissue interface, Tissue Impedance, Types of Electrode, Size & Placement of Electrode – Waterbath, Unipolar, Bi-polar, Electrode coupling, Current flow in tissues, Lowering of Skin Resistance.

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.

TENS: Define TENS, Types of TENS, Conventional TENS, Acupuncture TENS, Burst TENS, Brief & Intense TENS, Modulated TENS. Types of Electrodes & Placement of Electrodes, Dosage parameters, Physiological & Therapeutic effects, Indications & Contraindications.

Pain: Define Pain, Theories of Pain (Outline only), Pain Gate Control theory in detail.

Electro-diagnosis

FG Test

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.

Nerve conduction velocity studies

EMG: Construction of EMG equipment.

Bio-feedback.

Medium Frequency

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.

Russian Current

Rebox type Current

Thermo & Actinotherapy (High Frequency Currents)

Electro Magnetic Spectrum.

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.

Unit III

Pulsed Electro Magnetic Energy: Principles, Production & Parameters of PEME, Uses of PEME.

Micro Wave Diathermy: Define Microwave, Wave length & Frequency, Production of MW, Applicators, Dosage Parameters,

	Physiological & Therapeutic effects, Indications & Contraindications, Dangers of MWD. **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, Dangers of Ultrasound. Phonophoresis: Define Phonophoresis, Methods of application, commonly used drugs, Uses. Dosages of US. [8 Hours] **IRR:** Define IRR, wavelength & parameters, Types of IR generators, Production of IR, Physiological & Therapeutic effects, Duration & frequency of treatment, Indication & Contraindication. [2 Hours] **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 **LASER:** Define LASER. Types of LASER. Principles of Production. Production of LASER by various methods. Methods of application of LASER. Dosage of LASER. Physiological & Therapeutic effects of LASER. Safety precautions of LASER. Classifications of LASER. Energy density & power density [8 Hours] **Unit IV** **Superficial heating Modalities** **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. **Contrast Bath:** Methods of application, Therapeutic uses, Indications & Contraindications. **Moist Heat Therapy:** Hydro collator packs – in brief, Methods of applications, Therapeutic uses, Indications & Contraindications. **Cyclotherm:** Principles of production, Therapeutic uses, Indications & Contraindications. **Fluidotherapy:** Construction, Method of application, Therapeutic uses, Indications & Contraindications. **Whirl Pool Bath:** Construction, Method of Application, Therapeutic Uses, Indications & Contraindications. **Magnetic Stimulation, Principles, Therapeutic uses, Indications & contraindication.**	

Cryotherapy: Define- Cryotherapy, Principle- Latent heat of fusion, Physiological & Therapeutics effects, Techniques of Applications, Indications & Contraindications, Dangers, Methods of application with dosages.

PRACTICAL

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

1. Electrical stimulation for the muscles supplied by the peripheral nerves
2. Faradism under Pressure for UL and LL
3. Plotting of SD curve with chronaxie and rheobase
4. Demonstrate FG test
5. Practical on EMS
6. Demonstrate treatment method using IFT for various regions
7. Calculation of dosage and technique of application of LASER
8. Technique of treatment and application of Hydrocollator packs, cryotherapy, contrast bath, wax therapy
9. Demonstrate the treatment method using whirl pool bath

Foundation of Exercise Therapy and Therapeutic Massage (107)

Unit I

EXERCISE THERAPY

Introduction to Exercise Therapy - The aims of Exercise Therapy, The techniques of Exercise Therapy, Approach to patient's problems, Assessment of patient's condition – Measurements of Vital parameters, Starting Positions – Fundamental positions & derived Positions, Planning of Treatment.

Methods of Testing

Functional tests

Measurement of Joint range: ROM-Definition, Normal ROM for all peripheral joints & spine, Goniometer-parts, types, principles, uses, Limitations of goniometry, Techniques for measurement of ROM for all peripheral joints

Tests for neuromuscular efficiency

Electrical tests

	Manual Muscle Testing: Introduction to MMT, Principles & Aims, Indications & Limitations, Techniques of MMT for group & individual: Techniques of MMT for upper limb / Techniques of MMT for lower limb / Techniques of MMT for spine. Anthropometric Measurements: Muscle girth – biceps, triceps, forearm, quadriceps, calf. **Unit II** Static power Test Dynamic power Test Endurance test Speed test Tests for Co-ordination Tests for sensation Pulmonary Function tests Measurement of Limb Length: true limb length, apparent limb length, segmental limb length Measurement of the angle of Pelvic Inclination. **Relaxation** Definitions: Muscle Tone, Postural tone, Voluntary Movement, Degrees of relaxation, Pathological tension in muscle, Stress mechanics, types of stresses, Effects of stress on the body mechanism, Indications of relaxation, Methods & techniques of relaxation- Principles & uses: General, Local, Jacobson's, Mitchel's, additional methods. **Unit III** **Passive Movements** Causes of immobility, Classification of Passive movements, Specific definitions related to passive movements, Principles of giving passive movements, Indications, contraindications, effects of uses , Techniques of giving passive movements. **Active Movements** Definition of strength, power & work, endurance, muscle actions. Physiology of muscle performance: structure of skeletal muscle, chemical & mechanical events during contraction &relaxation, muscle fiber type, motor unit, force gradation. Causes of decreased muscle performance Physiologic adaptation to training: Strength & Power, Endurance. Types of active movements **Free exercise:** Classification, principles, techniques, indications, contraindications, effects and uses.	

Unit IV

Active Assisted Exercise: principles, techniques, indications, contraindications, effects and uses Assisted-Resisted Exercise: principles, techniques, indications, contraindications, effects and uses Resisted Exercise: Definition, principles, indications, contraindications, precautions & techniques, effects and uses

Types of resisted exercises: Manual and Mechanical resistance exercise, Isometric exercise, Dynamic exercise: Concentric and Eccentric, Dynamic exercise: Constant versus variable resistance, Isokinetic exercise, Open-Chain and Closed-Chain exercise.

THERAPEUTIC MASSAGE

History and Classification of Massage Technique

Principles, Indications and Contraindications

Technique of Massage Manipulations

Physiological and Therapeutic Uses of Specific Manipulations

PRACTICAL

1. Different test methods
2. Demonstrate relaxation techniques.
3. Demonstrate to apply the technique of passive movements
4. Demonstrate various techniques of Active movements
5. Demonstrate massage technique application according to body parts.
6. Demonstration on different Types of resisted exercises

Second Year
Exercise Therapy
(201)

Unit I

Specific exercise regimens

Isotonic: de Lormes, Oxford, MacQueen, Circiut weight training

Isometric: BRIME (Brief Resisted Isometric Exercise), Multiple Angle Isometrics Isokinetic regimens

Proprioceptive Neuromuscular Facilitation

Definitions & goals

Basic neurophysiologic principles of PNF: Muscular activity, Diagonals patterns of movement: upper limb, lower limb

Procedure: components of PNF

Techniques of facilitation

Mobility: Contract relax, Hold relax, Rhythmic initiation

Strengthening: Slow reversals, repeated contractions, timing for emphasis, rhythmic stabilization Stability: Alternating isometric, rhythmic stabilization

Skill: timing for emphasis, resisted progression Endurance: slow reversals, agonist reversal

Suspension Therapy

Definition, principles, equipments & accessories, Indications & contraindications,

Benefits of suspension therapy

Types of suspension therapy: axial, vertical, pendular Techniques of suspension therapy for upper limb Techniques of suspension therapy for lower limb

Unit II

Functional Re-education

Lying to sitting: Activities on the Mat/Bed, Movement and stability at floor level; Sitting activities and gait; Lower limb and Upper limb activities.

Aerobic Exercise

Definition and key terms; Physiological response to aerobic exercise, Examination and evaluation of aerobic capacity – Exercise Testing, Determinants of an Exercise Program, The Exercise Program, Normal and abnormal response to acute aerobic exercise, Physiological changes that occur with training, Application of Principles of an Aerobic

	conditioning program for patients – types and phases of aerobic training. **Stretching** Definition of terms related to stretching; Tissue response towards immobilization and elongation, Determinants of stretching exercise, Effects of stretching, Inhibition and relaxation procedures, Precautions and contraindications of stretching, Techniques of stretching. **Manual Therapy & Peripheral Joint Mobilization** Schools of Manual Therapy, Principles, Grades, Indications and Contraindications, Effects and Uses – Maitland, Kaltenborn, Mulligan Biomechanical basis for mobilization, Effects of joint mobilsation, Indications and contraindications, Grades of mobilization, Principles of mobilization, Techniques of mobilization for upper limb, lower limb, Precautions. **Unit III** **Balance - Definition** Physiology of balance: contributions of sensory systems, processing sensory information, generating motor output Components of balance (sensory, musculoskeletal, biomechanical) Causes of impaired balance, Examination & evaluation of impaired balance, Activities for treating impaired balance: mode, posture, movement, Precautions & contraindications, Types Balance retraining. **Co-ordination Exercise** Anatomy & Physiology of cerebellum with its pathways Definitions: Co-ordination, Inco-ordination Causes for Inco-ordination, Test for co-ordination: equilibrium test, non-equilibrium test Principles of co-ordination exercise. Frenkel's Exercise: uses of Frenkel's exercise, technique of Frenkel's exercise, progression, home exercise. **Posture** Definition, Active and Inactive Postures, Postural Mechanism, Patterns of Posture, Principles of re-education: corrective methods and techniques, Patient education. **Walking Aids** Types: Crutches, Canes, Frames; Principles and training with walking aids. **Unit IV** **Basics in Manual Therapy & Applications with Clinical reasoning** Examination of joint integrity Contractile tissues Non contractile tissues	

	Mobility - assessment of accessory movement & End feel Assessment of articular & extra-articular soft tissue status Myofascial assessment Acute & Chronic muscle hold, Tightness,Pain-original & referred Basic principles, Indications & Contra-Indications of mobilization skills for joints & soft tissues. Maitland, Mulligan, Mckenzie, Muscle Energy Technique, Myofascial stretching, Cyriax, Neuro Dynamic Testing **MMT** muscle strength using the principles and technique of MMT **Hydrotherapy** Definitions, Goals and Indications, Precautions and Contraindications, Properties of water, Use of special equipment, techniques, Effects and uses, merits and demerits **Individual and Group Exercises** Advantages and Disadvantages, Organization of Group exercises, Recreational Activities and Sports **PRACTICAL** The students of exercise therapy are to be trained in Practical Laboratory work for all the topics discussed in theory. The student must be able to evaluate and apply judiciously the different methods of exercise therapy techniques on the patients. They must be able to 1. Demonstrate the technique of measuring using goniometry 2. Demonstrate muscle strength using the principles and technique of MMT 3. Demonstrate the PNF techniques 4. Demonstrate exercises for training co-ordination – Frenkel's exercise 5. Demonstrate the techniques of massage manipulations 6. Demonstrate techniques for functional re-education 7. Assess and train for using walking aids 8. Demonstrate mobilization of individual joint regions 9. Demonstrate to use the technique of suspension therapy for mobilizing and strengthening joints and muscles 10. Demonstrate the techniques for muscle stretching 11. Assess and evaluate posture and gait 12. Demonstrate techniques of strengthening muscles using resisted exercises 13. Demonstrate techniques for measuring limb length and body circumference.	

Basic Principles of Biomechanics
(202)

Unit I

Basic Concepts in Biomechanics: Kinematics and Kinetics

Types of Motion, Location of Motion, Direction of Motion, Magnitude of Motion, Definition of Forces, Force of Gravity(LOG and COG in relation with human body).

Reaction forces, Equilibrium, Objects in Motion, Force of friction, Concurrent force systems, Parallel force system, Work, Moment arm of force, Force components, Equilibrium of levers

Unit II

Joint structure and Function -

Joint design, Materials used in human joints, General properties of connective tissues, Human joint design, Joint function, Joint motion,

General effects of disease, injury and immobilization.

Unit II

Muscle structure and function -

Mobility and stability functions of muscles, Elements of muscle structure, Muscle function, Effects of immobilization, injury and aging

Unit IV

Biomechanics of the Thorax and Chest wall -

General structure and function

Rib cage and the muscles associated with the rib cage

Ventilatory motions: its coordination and integration

Developmental aspects of structure and function

Changes in normal structure and function I relation to pregnancy, scoliosis and COPD

The Temporomandibular Joint-

General features, structure, function and dysfunction

Practical

1. Equilibrium
2. Moment arm of force
3. Force of Gravity (LOG and COG in relation with human body).
4. Practical on joints structure and function.
5. Practical on muscle structure and function.

6. Demonstration on movements and abnormality of rib cage and TMJ.

Clinical Orthopedics and Traumatology (203)

Unit I
Introduction

- Introduction to orthopedics.
- Clinical examination in an orthopedic patient.
- Common investigative procedures.
- Radiological and Imaging techniques in Orthopedics.
- Inflammation and repair, Soft tissue healing.

Traumatology

- Fracture: definition, types, signs and symptoms.
- Fracture healing.
- Complications of fractures.
- Conservative and surgical approaches.
- Principles of management – reduction (open/closed, immobilization etc.).

Unit II
Fractures and Dislocations of Upper Limb

Fractures of Upper Limb - causes, clinical features, mechanism of injury, complications, conservative and surgical management of the following fractures:

- Fractures of clavicle and scapula.
- Fractures of greater tuberosity and neck of humerus.
- Fracture shaft of humerus.
- Supracondylar fracture of humerus.
- Fractures of capitulum, radial head, olecranon, coronoid, and epicondyles.
- Side swipe injury of elbow.
- Both bone fractures of ulna and radius.
- Fracture of forearm – monteggia, galaezzi fracture –dislocation.
- Chauffer's fracture.
- Colle's fracture.
- Smith's fracture.
- Scaphoid fracture.
- Fracture of the metacarpals.
- Bennett's fracture.

- Fracture of the phalanges. (Proximal and middle.)

Unit III

Dislocations of Upper Limb –

- Anterior dislocation of shoulder – mechanism of injury, clinical feature, complications, conservative management (Kocher's and Hippocrates maneuver), surgical management (putti plat, bankart's) etc.
- Recurrent dislocation of shoulder.
- Posterior dislocation of shoulder – mechanism of injury, clinical features and management.
- Posterior dislocation of elbow – mechanism of injury, clinical feature, complications & management.

Fracture of Spine

- Fracture of Cervical Spine - Mechanism of injury, clinical feature, complications (quadriplegia); Management- immobilization (collar, cast, brace, traction); Management for stabilization, management of complication (bladder and bowel, quadriplegia).
    - Clay shoveller's fracture.
    - Hangman's fracture.
    - Fracture odontoid.
    - Fracture of atlas.
- Fracture of Thoracic and Lumbar Regions - Mechanism of injury, clinical features, and management— conservative and surgical of common fractures around thoracic and lumbar regions.
- Fracture of coccyx.
- Fracture of Rib Cage - Mechanism of injury, clinical features, management for Fracture Ribs, Fracture of sternum.

Unit IV

Fractures and Dislocations of Lower Limb

Fracture of Pelvis and Lower Limb - causes, clinical features, mechanism of injury, complications, conservative and surgical management of the following fractures:

- Fracture of pelvis.
- Fracture neck of femur – classification, clinical features, complications, management - conservative and surgical.
- Fractures of trochanters.
- Fracture shaft femur—clinical features, mechanism of injury, complications, management-conservative and surgical.
- Supracondylar fracture of femur.
- Fractures of the condyles of femur.

- Fracture patella.
- Fractures of tibial condyles.
- Both bones fracture of tibia and fibula.
- Dupuytren's fracture
- Maisonneuve's fracture.
- Pott's fracture – mechanism of injury, management.
- Bimalleolar fracture
- Trimalleolar fracture
- Fracture calcaneum – mechanism of injury, complications and management.
- Fracture of talus.
- Fracture of metatarsals
- Fracture of phalanges.

Dislocations of Lower Limb - mechanism of injury, clinical features, complications, management of the following dislocations of lower limb.

- Anterior dislocation of hip.
- Posterior dislocation of hip.
- Central dislocation of hip.
- Dislocation of patella.
- Recurrent dislocation of patella.

Practical

1. Practical on fracture and dislocation of upper limb.
2. Practical on fracture and dislocation of lower limb.
3. Practical on fracture of spine.

Biomechanics and Kinesiology (204)

Unit I

Biomechanics of the vertebral column -

- General structure and function
- Regional structure and function – Cervical region, thoracic region, lumbar region, sacral region
- Muscles of the vertebral column
- General effects of injury and aging

Unit II

Biomechanics of the peripheral joints -

- The shoulder complex: Structure and components of the shoulder complex and their integrated function

- The elbow complex: Structure and function of the elbow joint – humeroulnar and humeroradial articulations, superior and inferior radioulnar joints; mobility and stability of the elbow complex; the effects of immobilization and injury.
- The wrist and hand complex: Structural components and functions of the wrist complex; structure of the hand complex; functional position of the wrist and hand.
- The hip complex: structure and function of the hip joint; hip joint pathology- arthrosis, fracture, bony abnormalities of the femur.

Unit III

- The knee complex: structure and function of the knee joint – tibiofemoral joint and patellofemoral joint; effects of injury and disease.
- The ankle and foot complex.: structure and function of the ankle joint, subtalar joint, talocalcaneonavicular joint, transverse tarsal joint, tarsometatarsal joints, metatarsophalangeal joints, interphalangeal joints, structure and function of the plantar arches, muscles of the ankle and foot, deviations from normal structure and function – Pes Planus and Pes Cavus

Unit IV

Analysis of Posture and Gait –

Static and dynamic posture, postural control, kinetics and kinematics of posture, ideal posture analysis of posture, effects of posture on age, pregnancy, occupation and recreation; general features of gait, gait initiation, kinematics and kinetics of gait, energy requirements, kinematics and kinetics of the trunk and upper extremities in relation to gait, stair case climbing and running, effects of age, gender, assistive devices, disease, muscle weakness, paralysis, asymmetries of the lower extremities, injuries and malalignments in gait; Movement Analysis : ADL activities like sitting – to standing, lifting, various grips , pinches.

PRACTICAL-

1. Shall be conducted for various joint movements and analysis of the same. Demonstration may also be given as how to analyze posture and gait. The student shall be taught and demonstrated to analysis for activities of daily living – ADL – (like sitting to standing, throwing, lifting etc.) The student should be able to explain and demonstrate the movements occurring at the joints, the muscles involved, the movements or muscle action produced, and mention the axis and planes through which the movements occur. The demonstrations may be done on models or skeleton.

General Surgery including Obstetrics and Gynecology (205)

Unit I

GENERAL SURGERY INCLUDING BURNS AND PLASTIC SURGERY

Fluid, Electrolyte and Acid-Base disturbances – diagnosis and management ; Nutrition in the surgical patient ; Wound healing – basic process involved in wound repair, basic phases in the healing process, clinical management of wounds, factors affecting wound healing, Scars – types and treatment. Hemostasis – components, hemostatic disorders, factors affecting bleeding during surgery. Transfusion therapy in surgery – blood components, complications of transfusion ; Surgical Infections ; General Post – Operative Complications and its management.

Reasons for Surgery; Types of anaesthesia and its affects on the patient; Types of Incisons; Clips Ligatures and Sutures; General Thoracic Procedures – Radiologic Diagnostic procedures, Endoscopy – types, Biopsy – uses and types. Overview and Drainage systems and tubes used in Surgery.

Causes, Clinical Presentation, Diagnosis and treatment of the following Thoracic Trauma situations – Airway obstruction, Pnuemothorax, Hemothorax, Cardiac Tamponade, Tracheobronchial disruption, Aortic disruption, Diaphragmatic disruption, Esophageal disruption, Cardiac and Pulmonary Contusions.

Surgical Oncology – Cancer – definition, types, clinical manifestations of cancer, Staging of Cancer, surgical procedures involved in the management of cancer.

Disorders of the Chest Wall, Lung and Mediastinum.

Unit II

Thoracic surgeries – Thoracotomy – Definition, Types of Incisions with emphasis to the site of insision, muscles cut and complications. Lung surgeries: Pnumonectomy, Lobectomy, segmentectomy – Indications, Physiological changes and Complications; Thoracoplasty, Pleurectomy, Pleurodesis and Decortication of the Lung. Cardiac surgeries – An overview of the Cardio-Pulmonary Bypass Machine – Extracardiac Operations, Closed Heart surgery, Open Heart surgery. Transplant Surgery – Heart, Lung and Kidney – Indications, Physiological changes and Complications.

Diseases of the Arteries and Veins : Definition, Etiology, Clinical features, signs and symptoms, complications, management and treatment of following diseases : Arteriosclerosis, Atherosclerosis, Aneurysm,

	Buerger's disease, Raynaud's Disease, Thrombophlebitis, Deep Vein Thrombosis, Pulmonary Embolism, Varicose Veins. Definition, Indication, Incision, Physiological changes and Complications following Common operations like Cholecystectomy, Colostomy, Ileostomy, Gastrectomy, Hernias, Appendicectomy Mastectomy, Neprectomy, Prostectomy. Burn: Definition, Classification, Causes, Prevention, Pathological changes, Complications, Clinical Features and Management. Skin Grafts – Types, Grafting Procedures, Survival of Skin Graft ; Flaps – Types and uses of Flaps. ENT: Common problems of ear, otitis media, Otosclerosis, functional achonia and deafness, management facial palsy classification, medical and surgical management of lower motor neuron type of facial palsy. Ophthalmology: Ophthalmologic surgical conditions, refraction's, conjunctivitis, glaucoma, corneal ulcer, iritis, cataract, retinitis, detachment of retina, defects of extra-ocular muscles- surgical management. **Unit III** **OBSTETRICS AND GYNECOLOGY** At the end of the course the candidate will be able to: Describe the normal and abnormal physiological events during the puberty, labor, puerperium, post – natal stage and menopause. Discuss the various complications during pregnancy, labour, puerperium and post – natal stage, pre and post-menopausal stage and various aspects of urogenital dysfunction and their management in brief. Acquire the skill of clinical examination of pelvic floor Acquire the skill of clinical examination of pregnant woman. Anatomy and physiology of the female reproductive organs. Puberty dynamics Physiology of menstrual cycle – ovulation cycle, uterine cycle, Cx cycle, duration, amount Hormonal regulation of menstruation, Hormonal disorders of females-obesity and female hormones Pregnancy Diagnosis of pregnancy Abortion Physiological changes during pregnancy Importance of antenatal care exercise High risk pregnancy, prenatal common complications investigation and management Musculoskeletal disorders during pregnancy	

Multiple child birth,Normal labor

Unit IV

Child birth complications, investigation and management

Normal puerperium, lactation and importance of post-natal exercises

Family planning.

Medical termination of pregnancy

Infection of female genital tract including sexually transmitted diseases, low backache

Prolapse of uterus and vagina

Principle of common gynaecological operations – hysterectomy, D&C, D&E, Pop smear

Menopause: Its effect on emotions and musculoskeletal system

Urogenital dysfunction – pre and post-natal condition

Sterility: Pathophysiology, investigations, management, Malnutrition and deficiencies in females.

Surgical procedures involving child birth.

Definition, Indications and Management of the following surgical procedures – pelvic repair, caesarian section, nephrectomy, Hysterosalphyngography, Dilatation and Curettage, Laproscopy, Colposopy, Hysterectomy.

Carcinoma of female reproductive organs – surgical management in brief Mastectomy – Simple, radical. Hysterectomy.

Incontinence – Types, Causes, Assessment and Management.

Practical

1. Type of incisions.
2. Difference between thoracic disorders.
3. Anti-natal care exercises.
4. Pre-natal care exercise.
5. Post-natal care exercise.
6. Demonstration on different surgical procedure.

General Medicine, Paediatrics and Psychiatry (206)

Unit I

Infection : Effects of Infection on the body – Pathology – source and spread of infection – vaccinations – generalized infections – rashes and infection – food poisoning and gastroenteritis
sexually transmitted diseases – HIV infections and Aids.

Poisoning: Clinical features – general management – common agents in poisoning – pharmaceutical agents – drugs of misuse – chemical pesticides – Envenomation.

Food and Nutrition: Assessment – Nutritional and Energy requirements; Deficiency diseases – clinical features and treatment; Protein – Energy Malnutrition: Clinical features and treatment; Obesity and its related disorders: Causes – Complications – benefits of weight loss – management of Obesity – diet, exercise and medications.

Unit II

Endocrine diseases: Common presenting symptoms of Endocrine disease – common classical disease presentations, clinical features and its management; Diabetes Mellitus: Etiology and pathogenesis of diabetes – clinical manifestations of the disease – management of the disease – Complications of diabetes.

Diseases of the blood: Examinations of blood disorders – Clinical manifestations of blood disease; Anemia – signs and symptoms – types and management ; Hemophilia - Cause – clinical features severity of disease – management – complications due to repeated hemorrhages – complications due to therapy.

Diseases of the digestive system : Clinical manifestations of gastrointestinal disease – Etiology, clinical features, diagnosis, complications and treatment of the following conditions : Reflux Oesophagitis, Achlasia Cardia, Carcinoma of Oesophagus, GI bleeding, Peptic Ulcer disease, Carcinoma of Stomach, Pancreatitis, Malabsorption Syndrome, Ulcerative Colitis, Peritonitis, Infections of Alimentary Tract ; Clinical manifestations of liver diseases - Aetiology, clinical features, diagnosis, complications and treatment of the following conditions : Viral Hepatitis, Wilson's Disease, Alpha1-antitrypsin deficiency, Tumors of the Liver, Gall stones, Cholycystitis.

Unit III

Diseases of the Skin: Examination and clinical manifestations of skin diseases; Causes, clinical features and management of the following skin conditions: Leprosy, Psoriasis, Pigmentary Anomalies, Vasomotor

	disorders, Dermatitis, Coccal and Fungal Parasitic and Viral infections. **Pediatrics :** Problems and management of LBW infants, Perinatal problems and management, Congenital abnormalities and management, Respiratory conditions of childhood, Cerebral Palsy causes, complications, clinical manifestations, treatment ; Spina Bifida – management and treatment, Epilepsies – types, diagnosis and treatment; Recognizing developmental delay, common causes of delay ; Orthopedic and Neuromuscular disorders in childhood, clinical features and management ; Sensory disorders – problems resulting from loss of vision and hearing ; Learning and behavioural problems – Hyperactivity, Autism, Challenging behaviours, Educational delay, The Clumsy Child. **Unit IV** **Psychiatric Disorders:** Classifications, Causes, Clinical manifestations and treatment methods used in Psychiatry. Modalities of psychiatric treatment, Psychiatric illness and physiotherapy, Brief description of Etio-pathogenesis, manifestations, and management of psychiatric illnesses -. Anxiety neurosis, Depression, Obsessive compulsive neurosis, Psychosis, Maniac-depressive psychosis, Post-traumatic stress disorder, Psychosomatic reactions: Stress and Health, theories of Stress – Illness. Etio-pathogenesis, manifestations, and management of psychiatric illness • Drug dependence and alcoholism, • Somatoform and Dissociate Disorders – conversion reactions, Somatization, Dissociate Amnesia, and Dissociate Fugue, • Personality disorders • Child psychiatry - manifestations, and management of childhood disorders -attention deficit syndrome and behavioral disorders. • Geriatric psychiatry. **Practical** 1. Practical on delayed miles stones and development of an infant. 2. Practical on CP. 3. BMI 4. Practical on sensory disorders of an infant.	