# DDU KAUSHAL Kendra

Centre for Physiotherapy and Rehabilitation Sciences

Jamia Millia Islamia

New Delhi-110025

(Syllabus)

w.e.f Academic Session 2019-2020

## B. Voc. Medical Electrophysiology

## (B. Voc. - MEP)

| Semester – 1st | | | | | | |
|---|---|---|---|---|---|---|
| **Paper Code** | **Paper Name** | **Total Hrs** | **Credit** | **IA** | **SE** | **Total** |
| MEP 101 | Fundamentals of Human Anatomy | 42 | 3 | 25 | 75 | 100 |

**Objective** – Students will become aware of the terminology used in human anatomy. They will also develop the basic knowledge of body plan and organization of human body, structure of cells, tissues, organs, organ systems and their coordination with each other .

**Outcome intended** – students will be able to identify the various anatomical structures in the human body and communicate scientifically with other health-care personnel as a result of the terms and nomenclature taught during anatomy tutorials.

**Unit I: General & Systemic Anatomy:** Introduction to anatomical terms and organization of the human body. Tissues –Definitions, Types, characteristics, classification, location, functions and formation.

**Unit I**I: **Musculoskeletal system:** Bones – Types, Structure**,** Axial & Appendicular Skeleton, Bone formation and growth, Joints – Classification and Structure, Types and structure of muscles, Movements at the joints and muscles producing movements.

**Unit III: Nervous System:** Structure of Neuroglia & neurouns Parts, Clsssification CNS – Structure of Brain and spinal cord and their functions, PNS - Cranial nerves and spinal nerves ANS - Sympathetic and Parasympathetic. Structure of Skin, Eye, Nose, Tongue (Auditory and Olfactory apparatus)

**Unit IV: Cardiovascular System:** Circulatory system – Structure of the Heart, Structure of Blood Vessels – arterial and venous system, Gross and microscopic structure of lymphatic tissue.

**Unit V: Respiratory System:** Parts, Nasal cavity and Paranasal air sinuses, trachea, Gross and microscopic structure of lungs, Diaphragm and Pleura.

**Unit VI: Digestive System:** Parts, Structure of Tongue, Salivary glands, stomach, Intestines, Liver, Pancreas.

**Unit VII: Urinary & Reproductive System:** Parts, structure of Kidney, Ureters, Urinary Bladder and Urethra, Parts of both male and female reproductive organs, Gross structure of both male and female reproductive organs.

**Unit VIII: Endocrine System:** Gross structure of Pituitary, Thyroid, Parathyroid, Pancreas, Adrenal glands

**Essential Reading:**

1. Chaurasia B D, (2016), Human Anatomy, 7th edition
2. Ross & Wilson,(2014),Anatomy & Physiology in health & illness,11th edition
3. Gray's anatomy for students
4. Text book of anatomy – VISHRAM SINGH
5. Text book of anatomy – VOL 1,2 – INDERBIR SINGH

**Suggested Readings –**

1. Text book of Anatomy – W.J. Hamilton

| Paper Code | Paper Name | Total Hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|
| MEP 102 | Fundamentals of Human Physiology | 42 | 3 | 25 | 75 | 100 |

**Objective –** This paper provide the knowledge of human systems physiology. To understand the functions of all physiological systems including the cardio-respiratory, renal, reproductive and metabolic systems, to perform, analyze and report on experiments and observations in physiology.

**Intended Outcome – At** the end of semester students should have an enhanced knowledge of Human Physiology and understand the function of all physiological systems. Students should also understand how these specific systems interact to yield integrated physiological response. They should be able to perform, analyze and report on experiment and observation in Physiology.

**Unit I: Blood –** Plasma & Cellular Components - RBC, WBC & Platelet (Morphological features and functions), Haemopoiesis, Haemoglobin – Structure, Abnormal haemoglobins- Sickle-cell anemia and Thalassemia. Different types of anaemia and their causes. Hemostasis – factors, mechanism, anticoagulants, procoagulants.

**Unit II: Muscle Physiology –** Microscopic and electron microscopic structure of skeletal, smooth and cardiac muscles, Single-unit and multi-unit smooth muscle. Properties of skeletal muscle: excitability, contractility, all or none law, summation of stimuli. Muscle proteins. Mechanism of skeletal and smooth muscle contraction and relaxation: Excitation- contraction coupling.

**Unit III : Nervous system Physiology –** Functions of Brain, Spinal Cord, ANS & Cranial Nerves, Structure, classification and functions of neurons and neuroglias, Myelinogenesis, Resting membrane potential, Action potential. Properties of nerve fibers : excitability, conductivity, all or none law, accommodation, adaptation,

summation, refractory period, fatigability, Neuromuscular junction : structure, transmission.

**Unit IV : Cardiovascular System –** Physiology of the heart, Properties of cardiac muscle, Origin and propagation of cardiac impulse, Conduction System of Heart, Cardiac Cycle- Pressure and Volume changes, Heart sounds, Cardiac output.

**Unit V : Respiratory System –** Principles of respiration, respiratory muscles, Transport of oxygen and carbon dioxide, Brief account of respiratory regulation, Definition of hypoxia, Cyanosis, asphyxia, Dead space and uneven ventilation, Oxygen dissociation curve of hemoglobin and myoglobin – factors affecting, Carbon dioxide dissociation curve.

**Unit VI : Gastro Intestinal Tract -** Functions of alimentary canal, Digestive glands – Salivary glands, Pancreas, Liver, Deglutition, Movements of alimentary canal, Composition, functions and secretion of salivary, gastric, pancreatic and intestinal juices and bile, Digestion and absorption of carbohydrates, lipids, proteins and nucleic acids. Defecation.

**Unit VII** : **Urogenital & Endocrine System –** Structure of Nephron, measurement and regulation of GFR, mechanism of urine formation, Clearance tests & values of inulin, PAH and urea clearance, functions of ovaries , sex hormones, menstrual cycle, pregnancy, parturition, lactation, Male sex hormones and spermatogenesis, Endocrine glands & their secretions, functions of various hormones

**Essential Reading –**

1. MEDICAL PHYSIOLOGY – INDU KHURANA
2. TEXT BOOK OF PHYSIOLOGY – PROF A. K. JAIN
3. A TEXT BOOK OF PRACTICAL PHYSIOLOGY – PROF. A.K. JAIN
4. ESSENTIAL OF MEDICAL PHYSIOLOGY – K SEMBULINGAM, PREMA SEMBULINGAM
5. REVIEW OF MEDICAL PHYSIOLOGY – GANONG'S

**Suggested Readings –**

1. HARRISON'S PRINCIPLES OF INTERNAL MEDICINE
2. TEXT BOOK OF MEDICAL PHYSIOLOGY – GUYTON A TEXT BOOK OF PRACTICAL PHYSIOLOGY – C. L. GHAI

| Paper Code | Paper Name | Total Hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|
| MEP 103 | Basic Biochemistry | 42 | 3 | 25 | 75 | 100 |

**Objective:** The students will understand the chemical nature, function, metabolic pathways and biological importance of carbohydrates, proteins, lipids, vitamins and enzymes.

**Intended outcome:** The students will understand the structure, function and biological importance of carbohydrates, proteins, lipids, nucleic acids, enzymes, vitamins and the regulation of *biochemical* processes . They will also become aware how deficiency or excess of these will cause disease.

**Unit I : Carbohydrates:** Definition, function and classification of carbohydrate. Monosaccharide, glycoside formation, oligosaccharides and polysaccharides. Glycolysis, catabolic fates of pyruvate, metabolic fate of Acetyal-CoA and Citric acid cycle, gluconeogenesis, glycogen metabolism, pentose phosphate pathway.

**Unit II : Biological Oxidation:** Enzyme, coenzyme and electron carriers involved in biological oxidation. Electron transport chain, Oxidative phosphorylation, Substrate level phosphorylation. Inhibitors of electron transport chain.

**Unit III : Amino acids and proteins:** Definition, structure, classification, essential & non essential amino acids. Proteins definition and classification. Primary, secondry, tertiary and quaternary of proteins of proteins

**Unit IV : Vitamins:** Definition and classification of vitamins, difference between fat soluble and water soluble vitamins. Water soluble vitamins and fat soluble vitamins

**Unit V : Lipids:** Definition, classification and function of lipids. Fatty Acids, Triacylglycerols or Triacylgcerides or neutral fat. Fatty acid metabolism. Ketone body metabolism.

**Unit VI : Enzymes :** Introduction, definition, classification, coenzymes, active site of enzyme, cofactors of coenzyme, isoenzymes, properties, mechanism of enzyme action.

**Essential readings:**


1. Lehninger,(2013),Principles of Biochemistry,6th edition, W H Freeman
2. Satyanarayan,(2008), Essentials of Biochemistry,2nd edition, Standard Publishers
3. Biochemistry for students, V.K. Malhotra


**Suggested readings:**


1. Pankaja Naik, Biochemistry , 4th ed

| Paper Code | Paper Name | Total Hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|
| MEP 104 | Cell Biology & Medical Genetics | 42 | 3 | 25 | 75 | 100 |

**Objective** – To develop an understanding that cell is the fundamental unit of life . The students will also learn the structure and function of cells. In genetics, the students will learn the basis of heredity and variation in humans.

**Outcome intended** – Students will be able appreciate the general properties shared by all cells and the highly complicated functions of some specialized cells. They will also learn how changes in the human genome result in disease and disability.

**Unit I :** Cell Structure: Cell as a basic unit of life - discovery of cell, prokaryotic and eukaryotic cell; unicellular and multicellular organisms; Microscopic Study of Cell: tools and techniques (compound microscope, electron microscope and cell fractionation); Ultrastructure of prokaryoytic and eukaryotic cell - cell wall, cell membrane - unit membrane concept (fluid mosaic model); membrane transport; cellular movement (exocytosis, endocytosis);

**Unit II :** Organelles of Cell: Cell organelles and their functions- nucleus, mitochondria, plastids, endoplamasic reticulum, Gogli complex, lysosomes, centrosome, mesosomes, vacuole, cytoskeleton, cilia and flagella, ribosomes.

**Unit III :** Cell Cycle**:** Eukaryotic Cell Cycle, Regulation of Cell cycle progression, Cell division, Mitosis & meiosis , Events of Mitotic , events of Meiosis , non disjunction , Fertilization. Programmed Cell Death -- Apoptosis , Stem Cells - Embryonic , Tissue and induced pluripotent stem Cells , cloning - reproductive and therapeutic

**Unit IV :** Chromosomes : structure of DNA & RNA , chromatin , comparison between Bacterial and eukaryotic chromosome , human genome ,Karyotyping , autosomes ,sex chromosomes , Chromosomal basis of inheritance, linkage and crossing over , mutations , Menelian inheritance ,other patterns of inheritance - incomplete dominance, multiple allelism, quantitative inheritance. Human genetics - methods of study, overview of genetic disorders.

**Essential Readings**:


1. S.C.Rastogi , (2005),Cell Biology, 3rd ed.
2. Manu L .Kothari , Lopa A. Mehta , Sadhana S.Roychoudhury ,Essentials of Human Genetics,
   ( 2009) , 5th ed .

| Paper Code | Paper Name | Total Hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|
| MEP 105 | Fundamentals of Computer &IT | 42 | 3 | 25 | 75 | 100 |

**Objective** – To develop a basic understanding of computers and their role in the practice of modern medicine.

**Outcome intended** – The students will get an idea of the computer hardware , software , programming languages , networking and applications in a clinical setting.

**Unit I :** John Von Neumann Architecture ,_Different Type of Computer Hardware , CPU, Input Devices, Output Devices, Storage Devices , Communication Devices, Configuration of hardware devices and their applications , convert decimal to binary and vice versa.

**Unit II :** Networking - Basic idea of Local Area Network (LAN) , MAN , Wide Area Network (WAN),E-mail , browsers and servers, Multimedia ,Operating System: Software needs, application software, programming language , artificial intelligence . Windows, print , control panel, Paint , calculator, desktop, find, Run ,Snipping tool ,Sticky note , Word pad ,Notepad ,Gadgets , Windows defender ,Firewall.

**Unit III :** Microsoft Word - basic commands, Formatting-text and documents, sorting and tables, background images , hyperlinks , Mail merge , Graphics ,columns , Smart Art , spelling & grammer , Thesaurus , Translate , watermarks , borders , Drop Cap

**Unit IV :** Microsoft Excel - Conditional formatting , Formulas , Functions , Fill features, Sort & Filter , Wrap text , Merge & Centre . Insert – Tables ,illustrations, charts , Links , Text ,Background. Remove duplicates

**UNIT V :** Microsoft powerpoint – Designs, slide transition, Smart Art , animation , hyperlinks , automatic slide advance , background images

**List of Practicals :**

1. Microsoft Word
2. Microsoft Powerpoint
3. Microsoft Excel
4. Microsoft Access

**Essential reading**:


1. Compuetrs Fundamentals by P.K.Sinha , 6th edition , BPB Publications
2. Fundamentals of Computers by E Balagurusamy

| Paper Code | Paper Name | Total Hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|
| MEP 106 | English | 42 | 3 | 25 | 75 | 100 |

**Objective** – The students will learn to communicate in English , make simple sentences and understand the significance of English comprehension in healthcare industry .

**Outcome intended** – The students will be able to speak ,write and understand simple English and improve their vocabulary required for personal and professional life .

**Unit I: English grammar:** Articles, Preposition, Tenses, Voice, Direct and Reported Speech

**Unit II: Vocabulary:** Common Vocabulary, Word Often Confused, Some Common Errors

**Unit III: Paragraph Writing:** Process Writing, Descriptions Summarizing and Writing in brief of Medical passages, Note- taking Exercise, Formal Correspondence ( Letter and application)-Application for job, for higher studies- Letter to The Editor, Ordering Equipments, Requesting for Information

**Unit IV: SPOKEN ENGLISH:** Communicative Skills, Discussion Sessions, Dialogue Sessions

**Essential reading**:

1. High School English Grammar & Composition by Wren & Martin , Blackie ELT Books
2. Business English .Department of English ,University of Delhi , Pearson

**Suggested reading :**

1. English Grammar Composition & Usage by J.C. Nesfield, Macmillan Publishers

| Paper Code | Paper Name | Total Hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|
| MEP 107P | Practical I (MEP101, MEP102) | 84 | 6 | 25 | 75 | 100 |

**List of Practicals :**

**Fundamentals of Human Anatomy:**

1. Demonstration and study of all the bones in human body.
2. Demonstration and study of various upper and lower synovial joints through models.
3. Demonstration and study of various organ systems of human body through models.
4. Demonstration and study of various tissues through permanent slides.
5. Demonstration and study of various special organs through models.

**Fundamentals of Human Physiology:**

1. Study the Basic structure of microscope and its uses
2. Estimation of Hemoglobin
3. RBC count
4. WBCs Count
5. Bleeding Time, Clotting Time
6. Blood Group
7. Arterial Blood pressure

| Paper Code | Paper Name | Total Hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|
| MEP 108P | Practical II (MEP 103, MEP 104) | 84 | 6 | 25 | 75 | 100 |

**List of Practicals :**

**Cell biology & Medical Genetics:**

1. Parts of a microscope, usage & caring for the microscope
2. Differences between prokaryotic and eukaryotic cells
3. Buccal smear - characteristic features of human cheek cells
4. Mitosis in onion root tip – demonstration by teaching slides
5. Mitosis in onion root tip – preparation and observation of a crush smear
6. Meiosis in grasshopper testes

**Basic Biochemistry:**

1. Preparation of 1000 ml of TAE electrophoresis buffer
2. Titrate a agiven volume of acetic acid with 0.2 M NaOH and find pH with the help of pH meter.
3. To detect the presence of carbohydrates in a given solution – Molisch's test
4. Identification of reducing sugar in a given solution -Benedict's test
5. Identification of ketose sugars –Seliwanoff's test
6. Identification of reducing sugars - Osazone
7. Identification of cholesterol – Salkowski's test
8. Biuret's test for identification of proteins

| Semester – 2nd | | | | | | |
|---|---|---|---|---|---|---|
| **Paper Code** | **Paper Name** | **Total Hrs** | **Credit** | **IA** | **SE** | **Total** |
| MEP 201 | General & Systemic Pathology | 56 | 4 | 25 | 75 | 100 |

**Objective** – to develop the basic understanding of why and how diseases develop and the changes that occur at the macroscopic, tissue and cellular level**.**

**Outcome intended** – At the end of the semester, the student will become familiar with the terminology used in pathology, identify changes that occur at the macroscopic and microscopic level, perform various basic clinical pathology tests like routine examination of urine and body fluids.

**Unit 1 – General Pathology** -

Introduction to pathology – study of pathology , an overview – health and disease - Determinants of health-- Etiology – cause of disease - multi – factorial causation of disease– significance of etiology , natural history of disease , pathogenesis , clinical manifestations- signs and symptoms , morphological changes in disease at macroscopic and microscopic level - common terms in pathology

**Unit 2 – Cell Injury - Etiology of Injury** -

Reversible And Irreversible Injury, Morphology Of Reversible Injury --Hydropic ,Hyaline Mucoid And Fatty Change Intracellular Accumulation, Endogenous And Exogenous Pigments, Morphology Of Irreversible Injury – Cell Death – Autolysis – Apoptosis – Necrosis – Coagulative , Liquifactive , Caseous , Fibrinoid - Cellular Adaptations - Atrophy, Hypertrophy, Hyperplasia, Metaplasia.

**Unit 3 - Inflammation and Healing** –

Types of inflammation -Acute and Chronic, chemical mediators of inflammation, Inflammatory Cells, Morphology and Fate of inflammation -Chronic inflammation – non specific and Granulomatous . Healing – Regeneration, Repair, Healing in Skin -- Healing by primary and secondary intention, healing in other tissues

**Unit 4 - Pathophysiology of Haemodynamics** –

Fluid Compartments Of The Body –Types Of Pressure Gradients --- Disturbance Of Body Water – Pathogenesis Of Oedema –Types Of Oedema , Haemorrhage ,Hyperaemia And Congestion,Thrombosis ,Embolism , Ischaemia & Infarction - Neoplasia – Overview ,Benign And Malignant Tumours , Classification And Nomenclature Of Neoplastic Disease , Chemical, Physical And Biological Cacinogenesis -- Clinical And Gross Features --Dysplasia- Invasion And Metastasis --Cytological Features Of Malignancy.

**Unit 5 Systemic Pathology –**

**Cardiovascular** system-atherosclerosis, ischaemic heart disease, **Respiratory diseases**- chronic obstructive lung disease, chronic restrictive lung disease, respiratory infections **Musculoskeletal system** - neurogenic disease , myopathies-muscular dystrophy, **The nervous system**— infective diseases, ischaemic brain damage, cerebral infarction, intracerebral Haemorrhage, degenerative diseases **Digestive System-** Disease of Oesophagus , Stomach ,Hepatitis, Cirrhosis of Liver, Neoplasm of GIT, **Excretory System-** Glomerulonephritis ,Nephritic & Nephrotic Syndrome, Pyelonephritis, Renal Arteriosclerosis, Hydronephrosis ,Renal neoplasms

**Essential reading:**

1. Harshmohan (2017), Textbook of Pathology, 7th edition, Jaypee Publications
2. Robbins,(2012), Text book of Pathology, 3rd edition, Elsevier Publications

**Suggested reading:**

1. Boyd's Textbook of Pathology (Systemic Pathology) , 10th ed , Dr. J.R. Bhardwaj
2. Essentials of Clinical Pathology, Kawthalkar, Shirish M

| Sl. No. | Paper Code | Paper Name | Total Hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|---|
| 2 | MEP202 | Electronics & Instrumentation | 56 | 4 | 25 | 75 | 100 |

**Objectives:** To familiarise students with various basic electrical quantities and circuits, and to make them aware of basic electrical safety techniques regarding various medical equipments.

**Outcomes:** After successful completion of the semester, the students will be able to understand the underlying circuits and operate various medico-electrical devices with proper safety and precautions.

**Unit I: -Basic Concepts –**

Definition and Units of Basic Electrical Quantities: Voltage, Current, Charge, Power, Resistance, Capacitance, Impedance Reactance, AC and DC, Power Factor, RMS, Average and Maximum Value of AC. Waves Form: Sine Wave, Square Wave, Triangular Waves, Ramp Signals. Basic Circuit Elements: Resistors, Capacitors, Inductors-Types Symbol, Colour Code Representation Series and Parallel Combination and Their Equivalent. Transformer. Circuit Laws: Ohm's Law, Wheat Stone Bridge. Motors: Types and Uses. Thermocouples.

**Unit II:** - **Elements of Electronics.** –

Material Classification According to their Conduction. Semi-Conductors- Intrinsic, Extrinsic, P Type, N Type, Diodes, Transistors, Characteristics & Schematic

Representation. Application of Diodes as a Switch & Rectifier, HWR – Half Wave Rectifier, FWR – Full Wave Rectifier, Bridge Rectifier. Application of Transistor, Amplifier. Power Supply Unit, Introduction to Integrated Circuit, Introduction To Operational Amplifiers - Adder, Subtractor Multiplier, Generator - Sine Wave, Square Wave, Triangular Wave**.**

**Unit III: - Digital Circuits** -

Binary Number System, Bits, Bytes, Octal, Hexadecimal, Addition, Subtraction, 1"S Complement and 2"S Complement. Gates: Universal Gates Or and Not. Exor, Exnor. Truth Table and Boolean Expression. A-D Convertor, D-A Converter.

**Unit IV: – Electrical Safety and Medical Equipments-**

Physiological Effect of Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention. Classification of Medical Equipments According to the 1. Type of Protection 2. Mode of Protection.

**Essential books:** Theraja B.L, Basic Electronics, S Chand & Co Ltd

| Sl. No. | Paper Code | Paper Name | Total Hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|---|
| 3 | MEP203 | Introduction to Electrophysiology | 56 | 4 | 25 | 75 | 100 |

**Objectives -** To make the students understand basic human physiology underlying electrophysiological techniques and to give them an overview of various electrophysiological measures used in medical sciences.

**Outcomes -** The students will be able to understand the underlying physiology of common medico-electrical techniques and they will get familiarized with EMG, NCV and EEG principles and equipments.

**Unit 1 - Cellular Neuro-electrophysiology –**

Structure of cell membrane, Transport of substances across cell membrane, Sodium and potassium ion channels, Voltage and chemical gating of ion channels, Nernst potential, Electrochemical equilibrium, Resting membrane potential, Postsynaptic potentials, Action potential, Compound action potential, Synaptic transmission, Structure of skeletal muscle, Neuromuscular junction, Motor unit, Motor unit action potential, Recruitment of motor units.

**Unit – 2 Techniques in Neuro-electrophysiology –**

Non-invasive electrophysiological recording techniques: Advantages of non-invasive procedures, Recent clinical neuro-electrophysiological approaches i.e. Electroencephalography, Electromyography, Nerve conduction studies and Event-related potentials. Invasive electrophysiological recording techniques: Electro-corticorticography- definition, procedure and clinical application, Intramuscular Electromyography- uses, advantages and disadvantages.

**Unit - 3 Basic Electromyography –**

Definition, Type of recording procedure, surface electromyography- silver/silver chloride disc electrodes, electrodes montages, Advantages of bipolar derivation, Differential amplification of signal, Frequency filters, Signal to noise ratio, Signal analysis for amplitude and frequency, recruitment of motor units during the voluntary activity. Needle electromyography- insertional and spontaneous activity, motor unit action potential, clinical application of the invasive procedures.

**Unit – 4 Basic Electroencephalography –**

Definition, Origin of electrical signal, Dendritic postsynaptic potential, Cortical organization and cortical dipole, brain waves- alpha, beta, theta and delta, Surface electrodes, 10-20 international system of electrode placement, Bipolar and referential montages, Sine wave calibration, Impedance, Amplification of signal, Frequency filters, Signal analysis, Research and clinical applications in sleep studies and epilepsy. Available invasive procedure and their applications.

**Essential Books –**


1. Sembulingam. K, (2012) Essentials of Medical Physiology, 6th edition, Jaypee B. M. P. (P) Ltd, New Delhi
2. Hall, John, E. (2016), Guyton and Hall Medical Physiology, Elsevier Churchill
3. Cooper, R. (2005), Techniques in Clinical Neurophysiology, Elsevier Churchill

4. Suggested books: Sembulingam. P, (2009), Viva voce in Physiology, 2nd edition, Jaypee B. M. P. (P) Ltd, new Delhi
5. Misra, U.K., (2014) Clinical Neurophysiology, Elsevier Churchill
6. Chatterjee, K. (2015), Manual of Electrophysiology, Jaypee B.M.P. (P) Ltd, New Delhi


| Sl. No. | Paper code | Paper name | Total hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|---|
| 4 | MEP 204 | Cardiology & Electrocardiography-I | 56 | 4 | 25 | 75 | 100 |

**Objective-**Provide students with a basic Cardiac Anatomy and Physiology. Demonstrate clinical skills of medical history and physical examination, with specific attention to electrocardiography. Students will be expected to perform and interpret 12-lead ECGs, on normal subjects in their Practical Classes.

**Intended Outcome -** Students will be able to give a detailed account of normal cardiac anatomy, physiology and blood flow through the heart, Calculating heart rate, Give a detailed account of conduction system of heart, Classify normal and abnormal rhythm and components on ECG i.e. Assessment of rhythm , Measure intervals and segments and evaluate other relevant waves.

**Unit – 1 :-Cardiac Cycle – Excitation & Contraction –**

Events During Cardiac Cycle, Sinoatrial node function, Cardiac conduction system, Atrioventricular node function, Electrical Potential in Cardiac Muscle, Origin & distribution of Cardiac Impulse, Assessment of cardiac output - Fick principle, Thermodilution and indicator dilution methods, Heart Rate, Autonomic regulation of the heart rate, Cardiovascular Regulation-Neural, Humoral & Local Control, Arterial Pulse, Jugular Venous Pulse, Heart Sounds (S1,S2,S3,S4).

**Unit-2:- Hemodynamic & Cardiac Output –**

Relationship between pressure, flow and resistance Frank-Starling law preload, afterload and contractility control of stroke volume and Cardiac Output, Regulation of Cardiac Output,Types of Blood Flow, Pressure and Flow(Arteries, Arteriols & Microcirculation), Blood Pressure(Determinants, Variations-Hypertension & Hypotension),Regulation of blood Pressure.

**Unit-3:- Introduction to Electrocardiography –**

Recording of ECG-ECG Leads, Electrocardiograph, Normal Electrocardiogram, Calibration of Time & Voltage, Waves of ECG, Interval & Segments of ECG and Characteristic Features of ECG Complex in Unipolar Chest Leads & Limb Leads.

**Unit-4:- Vectorial Analysis of ECG & Vector Cardiography –**

Concept of Cardiac Vectors, Mean Electrical Axis, Abnormalities of Mean Electrical Axis (RAD & LAD), Vector Cardiography, His Bundle Electrocardiogram, Clinical Application of Electrocardiography-Cardiac Arrhythmia &Heart Block.

**Essential Reading -**

MASTER VISUAL DIAGNOSIS OF ECG – SHAHZAD KHAN, REN JIANG HUA
BEDSIDE CARDIOLOGY – CARDIOLOGY – AN ILLUSTRATED TEXT BOOK VOL. 1,2 – KANU CHATTERJEE, MARK ANDERSON, DONALD HIISTAD, RICHARD E KERBER
ESSENTIAL OF CLINICAL CARDIOLOGY – JAYANT C BHALE RAO
HARRISON'S PRINCIPLES OF INTERNAL MEDICINE

**Suggested Readings –**

MEDICAL PHYSIOLOGY – INDU KHURANA
TEXT BOOK OF PHYSIOLOGY – PROF A. K. JAIN
TEXT BOOK OF MEDICAL PHYSIOLOGY – GUYTON
A TEXT BOOK OF PRACTICAL PHYSIOLOGY – C. L. GHAI
A TEXT BOOK OF PRACTICAL PHYSIOLOGY – PROF. A.K. JAIN
ESSENTIAL OF MEDICAL PHYSIOLOGY – K SEMBULINGAM, PREMA SEMBULINGAM
REVIEW OF MEDICAL PHYSIOLOGY – GANONG'

| Sl. No. | Paper Code | Paper Name | Total Hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|---|
| 5 | MEP205 | Medical Emergencies & Patient Care | 56 | 4 | 25 | 75 | 100 |

**Objective -** The primary objectives of Medical Emergency & Patient Care are to train the students to reduce the effects of emergency incidents in Electrophysiology Labs and prevent exposures from turning into larger emergency incidents. It also prepares students to manage the emergency's immediate consequences. Patient care part of the paper trains students to utilize excellent communication skills with patients, families and other members of the health care team and also teach ethical principles and their professional responsibilities.

**Intended Outcome –** Students will be able to perform Foley's Catheterization, RT Insertion, Cannulation, IV/IM Injections etc), chart patient information and handle critically ill, geriatric group and Pediatric Patients. Students will aware of different departments and units of Hospitals.

**Unit – 1 Introduction to Emergency Services –**

Organization of Emergency Department, Guidelines in Emergency, Clinical Monitoring of patients, Fluid Therapy and Blood Transfusion, Airway Management, Cardiopulmonary Resuscitation, Principal of Mechanical Ventilation, Injection - (I/M, I/V, S/C), Infusion Method, Management of Acid Base and Electrolyte Imbalance

**Unit –2 Handling of Different Emergencies –**

Head Injuries, Vasovagal Syncope, Seizer, Epilepsy, Conjunctival and Corneal Foreign Body, Foreign Body in Nose & in Ear, Epistaxis, Haemoptysis, Tear Gas Exposure, Poisoning – Classification of Poisons, Clinical Signs of poisoning and management, Food Poisoning, Diarrhea, Urine Retention, Hypo & Hyperthermia

**Unit – 3 Fundamentals of Patient Care –**

Concept of health & Illness, Health Determinants, Concept of Patients & Their Types, Patient Centred Care & Fundamentals of Communications, Reporting & Recording of Patients, Rights of Patients , Concepts of Disease & Its Types, General Concept, Care & Prevention of Accident, Trauma & Infections

**Unit – 4 Patients Care, Associated Units & Departments -**

Ambulatory Units, Critical Care Units, Paediatric, Neonatal Intensive Care Unit (NICU), Emergency Department, Inpatient Units, Haematology/Oncology and Immunology Unit, Orthopaedic Unit, Psychiatry Unit ,Neurology and Neurosurgical

Unit, Renal, Dialysis Unit, Gastroenterology/Endocrinology Unit, Life Flight Critical Care Transport Program, Radiology Department, Surgical Units, Cardiac Catheterization Lab, Operating Room, Post Anaesthesia Care Unit, Managing patients with disabilities, Geriatric Care, Care of Critically Ill Patients, Tracheotomise Patients. Nutritional Support in ICU

**Essential Reading -**

Text book of Adult Emergency Medicine – Peter Camron, George Jelimek, Anne-Maree Kelly, Anthony Brown, Mark Little
Medical Emergencies In General Practice – S. P. Gupta, D.K. Gupta
Critical Care Emergency Medicine – David A. Farcy, WILLIAM C. Chiu, Jhon P. Marshall, Tiffany M. Osborn

**Suggested Readings –**

Oxford hand book of Emergency Medicine – Joathan Wyatt, Robin Illingworth, Colin Graham, Kerstin Hogg

| Sl. No. | Paper Code | Practical | Total Hrs | Credit | IE | SE | Total |
|---|---|---|---|---|---|---|---|
| 6 | MEP 206P | Practical III (MEP 203, MEP 204) | 98 | 8 | 50 | 150 | 200 |

**Exercise Related to MEP 203 –**

1. To verify ohm's law, and to find the value of unknown resistance using ohm's law (Experimentally & graphically).
2. To draw the characteristic curve pn junction diode in forward bias.
3. To draw the characteristic curve of pn junction diode in reverse bias.
4. To study the characteristics of half and full wave rectifiers.
5. To study the Basic Logic Gates.

**Exercise Related to MEP 204 –**

1. To introduce different component connections of EMG machine.
2. To introduce the optimum setting and calibration of EMG machine.
3. To record normal electrical activity of particular muscle.
4. To introduce different component connections of EEG machine.
5. To introduce the optimum setting and calibration of EEG machine
6. To record normal electrical activity of brain from the scalp.

**Essential Books –**


1. Sembulingam. K, (2012) Essentials of Medical Physiology, 6th edition, Jaypee B. M. P. (P) Ltd, New Delhi
2. Hall, John, E. (2016), Guyton and Hall Medical Physiology, Elsevier Churchill
3. Cooper, R. (2005), Techniques in Clinical Neurophysiology, Elsevier Churchill
4. Suggested books: Sembulingam. P, (2009), Viva voce in Physiology, 2nd edition, Jaypee B. M. P. (P) Ltd, new Delhi
5. Misra, U.K., (2014) Clinical Neurophysiology, Elsevier Churchill Chatterjee, K. (2015), Manual of Electrophysiology, Jaypee B.M.P. (P) Ltd, New Delhi
6. Theraja B.L, Basic Electronics, S Chand & Co Ltd

| Sl. No. | Paper code | Paper name | Total hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|---|
| 7 | MEP 207P | Practical IV MEP204 & MEP205 | 98 | 8 | 50 | 150 | 200 |

**Exercises related to MEP204 –**

1. Study the features of ECG Machine (Single/ Multi channel), ECG paper (Calibration), Gel & Electrodes.
2. Placements of Limb & Chest Electrodes.
3. Study the concept of 12 leads ECG (Standered, Augmented & Chest Leads).
4. Study the normal features of ECG Waves.
5. Study the normal features of Intervals & Segments.
6. Determination of Cardiac Rhythm, Rate & Axis.

**Exercises related to MEP205**

1. Clinical Examination of CVS,
2. Only Demonstration of following Skills -

a) Endotracheal Tube Insertion,
b) Tracheostomy,
c) Nasogastic tube Insertion,
d) Foley's Catheterization,
e) Fluid Therapy

**Essential Reading –**

MASTER VISUAL DIAGNOSIS OF ECG – SHAHZAD KHAN, REN JIANG HUA
BEDSIDE CARDIOLOGY – CARDIOLOGY – AN ILLUSTRATED TEXT BOOK VOL. 1,2 – KANU CHATTERJEE,
MARK ANDERSON, DONALD HIISTAD, RICHARD E KERBER
MEDICAL EMERGENCIES IN GENERAL PRACTICE – S. P. GUPTA, D.K. GUPTA
CRITICAL CARE EMERGENCY MEDICINE – DAVID A. FARCY, WILLIAM C. CHIU, JHON P. MARSHALL, TIFFANY M. OSBORN
ESSENTIAL OF CLINICAL CARDIOLOGY – JAYANT C BHALE RAO
PRINCIPLES OF INTERNAL MEDICINE - HARRISON

**Suggested Readings –**

A TEXT BOOK OF PRACTICAL PHYSIOLOGY – C. L. GHAI
A TEXT BOOK OF PRACTICAL PHYSIOLOGY – PROF. A.K. JAIN
ESSENTIAL OF MEDICAL PHYSIOLOGY – K SEMBULINGAM, PREMA SEMBULINGAM
REVIEW OF MEDICAL PHYSIOLOGY – GANONG'S

| Semester – 3rd | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sl. No.** | **Paper code** | **Paper name** | **Total hrs** | **Credit** | **IA** | **SE** | **Total** |
| 1 | MEP 301 | Cardiology & Electrocardiography-II | 56 | 4 | 25 | 75 | 100 |

**Objective –**

Theory classes of Cardio pathology will train students to know about Clinical signs and symptoms, pathogenesis of Congenital, Hereditary & Acquired Cardiovascular Conditions and prepare them for diagnostic skills i.e. ECG, Echocardiography, Angiography & Cardio Radio imaging. Only theoretical knowledge of Echocardiography, Angiography and Radio Imaging Techniques will be given in their theory classes. Students will have the opportunity to observe these procedures during their clinical postings. They will be expected to perform and interpret 12-lead ECGs, analyze the ECG in Coronary Heart Diseases and Cardiac Arrhythmias and to observe abnormal waveforms in their practical classes.

**Outcome Intended –**

Students will be able to give a detailed account of Congenital, Hereditary & Acquired Cardiovascular Conditions and abnormal components of ECG related with cardiac pathologies with conduction defects. They will know the proper use of the TMT, Holter and ECG machine, preparation of patients for tests and precautions before, during and after tests.

**Unit-1:- Congenital and Heredofamilial Disorder –**

**Cyanotic Congenital Heart Diseases**(Tetralogy of Fallot, Transposition of the great vessels, Total anomalous pulmonary venous return, Truncus arteriosus, Pulmonary atresia, Hypoplastic left heart syndrome, Tricuspid valve abnormalities, Ebstein's Anomaly), Noncyanotic Congenital Heart Diseases**(**Left to right shunting heart defects include - Ventricular septaldefect(VSD), Atrial septal defect (ASD), Atrioventricular septal defect (AVSD), Patent ductus arteriosus (PDA), levo-Transposition of the great arteries (l-TGA), Acyanotic heart defects without shunting include - Pulmonary stenosis, Aortic stenosis, Coarctation of the aorta, Heredofamilial Disorder (Prolonged Q-T Syndrome, Marfan’s Syndrom, Brugada Syndrome, Wolff –Parkinson –White Syndrome.)

**Unit-2:- Acquired Heart Disease -**

Hypertrophic Cardiomyopathies, Dilated Cardiomyopathies, Myocarditis, Endocarditis, Pericarditis, Kawasaki Disease, Rheumatic Fever, Acute Cor Pulmonale, Artherosclerosis Angina pectoris Myocardial Infarction, Peripheral Vascular Disease.

**Unit-3:- Electrocardiographic Manifestations -**

P Wave Abnormalities, ECG Changes in Ventricular Hypertrophy, Electrocardiographic Manifestation of Myocardial Ischemia, Myocardial Infarction.

**Unit-4:- Miscellaneous Disorder -**

Hyper/ Hypothyroidism, Acromegaly, Cashing Syndrome, Pheochromacytoma, Electrolyte Disturbances-Hypo/Hyperkalaemia, Hypo/Hypercalcemia, Hypo/Hypermagnesemia

**Essential Reading –**

MASTER VISUAL DIAGNOSIS OF ECG – SHAHZAD KHAN, REN JIANG HUA
BEDSIDE CARDIOLOGY – CARDIOLOGY – AN ILLUSTRATED TEXT BOOK VOL. 1,2 – KANU CHATTERJEE, MARK ANDERSON, DONALD HIISTAD, RICHARD E KERBER
ESSENTIAL OF CLINICAL CARDIOLOGY – JAYANT C BHALE RAO
PRINCIPLES OF INTERNAL MEDICINE - HARRISON

**Suggested Readings –**

MEDICAL PHYSIOLOGY – INDU KHURANA
TEXT BOOK OF PHYSIOLOGY – PROF A. K. JAIN
TEXT BOOK OF MEDICAL PHYSIOLOGY – GUYTON
A TEXT BOOK OF PRACTICAL PHYSIOLOGY – C. L. GHAI
A TEXT BOOK OF PRACTICAL PHYSIOLOGY – PROF. A.K. JAIN
ESSENTIAL OF MEDICAL PHYSIOLOGY – K SEMBULINGAM, PREMA SEMBULINGAM
REVIEW OF MEDICAL PHYSIOLOGY – GANONG'S

| Sl. No. | Paper Code | Paper Name | Total Hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|---|
| 2 | MEP 302 | Neuromuscular Disorders | 56 | 4 | 25 | 75 | 100 |

**Objective -** To make the students understand various disorders and underlying pathology of peripheral nervous system, muscular system and neuro-muscular junction

**Outcome -** Students will be able to differentiate between various clinical presentations of neuropathies, myopathies and neuromuscular junction diseases.

**Unit – 1 Neuro-muscular Anatomy & Physiology –**
Review of nervous system with emphasis on peripheral nervous system, muscular system, and normal functioning of neuro-muscular junction, Assessment techniques unique to peripheral nervous system.

**Unit - 2 Neuropathies –**
Mono-neuropathies, Polyneuropathies, radiculopathies, Mononeuritis multiplex, Poliomyelitis, Gullian-Barre syndrome, Diabetic neuropathy, AIDPs, Motor Neuron Diseases

**Unit – 3 Myopathies –**
Duchene's muscular dystrophy, Becker's muscular dystrophy, Fasio-scapulo-humeral dystrophy, Limb-girdle myopathies, Inflammatory myopathies.

**Unit – 4 Neuromuscular Junction Disorders –**
Myasthenia gravis, Lambert-Eaton myasthenic syndrome, Neuromyotonia, Botulism.

**Essential Books –**

Fuller, G. (2017), Neurological Examination Made Easy, Lippinott Williams and Wilkin Amato, Anthony, A. (2008), Neuromuscular disorders, Mc Graw Hill MedicalRoger Bannister, Brain and Bannister's Clinical Neurology (Oxford Medical Publications) 7th Edition

**Suggested Books –**

Kenkre, Rajendra Bhalchandra (2008), Neurological Examination Made Easy, Jaypee B. M. P. (P) Ltd, New Delhi

| Sl. No. | Paper Code | Paper Name | Total Hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|---|
| 3 | MEP303 | Electromyography & Nerve Conduction Studies | 56 | 4 | 25 | 75 | 100 |

**Objective -** To make the students learn how to operate and record on EMG and NCV machines to diagnose various neuro-muscular pathologies

**Outcome -** Students will be able to record and analyse neuro-muscular diagnostic techniques such as EMG and NCV, and differentiate between normal and pathological findings.

**Unit – 1 Neuromuscular Physiology –**

Anatomy of nerve and muscle, Normal neuromuscular function, Motor function, Sensory function, Neuron cell body dysfunction, Peripheral nerve axon dysfunction, Peripheral nerve myelin dysfunction, Neuromuscular junction dysfunction, Muscle dysfunction, Motor units.

**Unit – 2 Nerve Conduction Basics –**

Motor nerve conduction study, Sensory nerve conduction study, Electrodes, Electrode Position, Stimulus Characteristics, Procedure, Measurements, Types of abnormalities, Late responses, F-wave study, H-reflex, Blink reflex, Tests for neuromuscular junctions, Repetitive nerve stimulation.

**Unit – 3 Electromyography Basics –**

Conventional needle EMG, Macro EMG, Surface EMG, Single-fibre EMG, Electrodes, Filters, Amplifier, Display, Averager, Gain and Sweep time, Electrode position, Procedures, Rest, Insertion, Single motor unit activation, Maximal contraction, Normal and abnormal responses.

**Unit – 4 Approach to Clinical Questions –**

Common clinical presentations, Evaluation of individual nerves, Evaluation of individual muscles, Evaluation of neuromuscular transmission, Electromyographic findings in myopathic, neurogenic and neuromuscular disorders, Clinical correlations of nerve conduction and EMG.

**Essential Books -** Shapiro, B and Preston, D. (2013), Electromyography and Neuromuscular disorders- Clinical electrophysiological correlation, Elsevier

**Suggested Books -** Misra, U.K., (2014) Clinical Neurophysiology, Elsevier Churchill Chatterjee, K. (2015), Manual of Electrophysiology, Jaypee B.M.P. (P) Ltd, New Delhi.

| Sl. No. | Paper Code | Practical | Total hrs | Credit | IE | SE | Total |
|---|---|---|---|---|---|---|---|
| 4 | MEP 304P | Practical V ( MEP301) | 56 | 4 | 50 | 50 | 100 |

**Exercises related to MEP 301 –**

1. Study the Pathological features of P Wave
2. Study the Pathological features of QRS Complex / Waves
3. Study the Pathological features of T Wave
4. Study the Pathological features of PR Interval
5. Study the Pathological features of ST Segment

**Essential Reading –**

MASTER VISUAL DIAGNOSIS OF ECG – SHAHZAD KHAN, REN JIANG HUA
BEDSIDE CARDIOLOGY – CARDIOLOGY – AN ILLUSTRATED TEXT BOOK VOL. 1,2 – KANU CHATTERJEE, MARK ANDERSON, DONALD HIISTAD, RICHARD E KERBER
ESSENTIAL OF CLINICAL CARDIOLOGY – JAYANT C BHALE RAO
PRINCIPLES OF INTERNAL MEDICINE - HARRISON

**Suggested Readings –**

MEDICAL PHYSIOLOGY – INDU KHURANA
TEXT BOOK OF PHYSIOLOGY – PROF A. K. JAIN
TEXT BOOK OF MEDICAL PHYSIOLOGY – GUYTON
A TEXT BOOK OF PRACTICAL PHYSIOLOGY – C. L. GHAI
A TEXT BOOK OF PRACTICAL PHYSIOLOGY – PROF. A.K. JAIN
ESSENTIAL OF MEDICAL PHYSIOLOGY – K SEMBULINGAM, PREMA SEMBULINGAM
REVIEW OF MEDICAL PHYSIOLOGY – GANONG'S

| Sl. No. | Paper Code | Practical | Total hrs | Credit | IE | SE | Total |
|---|---|---|---|---|---|---|---|
| 5 | MEP 304P | Practical VI ( MEP302, MEP 303) | 98 | 8 | 100 | 100 | 200 |

**Spotting related to MEP 302 –**

1. Neuro-Muscular Physiology,
2. Neuropathies,
3. Myopathies
4. Neuromuscular Junction Disorders

**Exercises related to MEP 303 –**

1. To record and analyse electromyography from proximal and distal muscles.
2. To record and analyse motor nerve conduction study of peripheral nerves.
3. To record and analyse sensory nerve conduction study of peripheral nerves.
4. To record and analyse F-wave in normal subject from peripheral nerves.
5. To record and analyse H-reflex in normal subject from peripheral nerves.
6. To record and analyse repetitive nerves stimulation from peripheral nerve.

**Essential Books –**

Fuller, G. (2017), Neurological Examination Made Easy, Lippinott Williams and Wilkin Amato, Anthony, A. (2008), Neuromuscular disorders, Mc Graw Hill MedicalRoger Bannister, Brain and Bannister's Clinical Neurology (Oxford Medical Publications) 7th Edition, Shapiro, B and Preston, D. (2013), Electromyography and Neuromuscular disorders- Clinical electrophysiological correlation, Elsevier

**Suggested Books –**

Kenkre, Rajendra Bhalchandra (2008), Neurological Examination Made Easy, Jaypee B. M. P. (P) Ltd, New Delhi, Misra, U.K., (2014) Clinical Neurophysiology, Elsevier Churchill Chatterjee, K. (2015), Manual of Electrophysiology, Jaypee B.M.P. (P) Ltd, New Delhi.

| Sl. No. | Paper Code | Paper Name | Total Hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|---|
| 6 | MEP 306P | Evaluative Clinical Training – I | 126 | 6 | - | 100 | 100 |

**Exercise related to MEP203, MEP204 & MEP205**

1. Training of ECG Recording in Wards,
2. ICU, Emergency,
3. Recording of Arterial Blood Pressure,
4. Oxygen Therapy,
5. Intramuscular, intravenous, subcutaneous injection,
6. Ven flon Insertion,
7. Only can assist in Endotracheal Tube Insertion, Wound Care, Nasogastric Tube Insertion, Care of critically ill, tracheotomise patient,
8. Surface EMG Recording,
9. Assist Intramuscular EMG Recording,
10. EEG Recording.

| Semester – 4th | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sl. No.** | **Paper code** | **Paper name** | **Total Hrs.** | **Credit** | **IA** | **SE** | **Total** |
| 1 | MEP 401 | Cardiovascular Techniques & Fitness | 56 | 4 | 25 | 75 | 100 |

**Objectives -** Objective of this paper is to give the basic knowledge of Cardio Pharmacology and the indications/ contraindications, principles, precautions, preparation, procedure of Cardiac Ablation, Catheterization, Pacemaker/ICD Implantation and Coronary Angioplasty/Stenting. Students will observe these procedures being performed but will not be directly involved in performing any invasive procedures during clinical training. Students will have the opportunity to perform and interpret 12-lead ECG, Cardiac Exercise Testing – TMT, Holter Monitoring, Handling of Cardiac Monitoring, and Defibrillation in their practical classes on normal subjects/mannequins.

**Intended Outcome –** Students will be able to give a detailed account of Congenital, Hereditary & Acquired Cardiovascular Conditions, Give a detailed account of abnormal components of ECG related with cardiac pathologies and conduction defects. Students will investigate basic non-invasive procedures by using Holter monitors, administrating stress tests and checking pacemaker functions. In an invasive cardiac technology student learn only theoretically how to perform heart catheterizations, preparation for an invasive procedure, use of radiographic equipment.

**Unit-1:- Cardiovascular Pharmacology & Invasive Techniques –**

Anti-anginal agents - Beta blockers, Nitrates, Calcium channel blocker, Anti-failure agents Diuretics, Angiotensin convertying enzyme (ACE) inhibitors. ARB (Angiotensin Receptor Blocker), ACE inhibitors for diabetics and hypertensive renal disease, Digitalis and acute ionotropes, Anti-hypertensive drugs, Anti- arrhythmic agents, Antithrombotic agents, Anticoagulants, Lipid lowering and anti-atherosclerotic drugs

**Unit-2:- Cardiac Imaging& Echocardiography –**

Chest Film Techniques, Overview of Cardiomediastinal Anatomy, Imaging in Cardiac Disease, Contrast-Enhanced Echocardiography, Transthoracic, Stress, Transesophageal & Three Dimensional Echocardiography.

**Unit-3:- Exercise Electrocardiography & Holter Monitoring -**

Exercise Test, Indication of Test, Safety & Risk, Method, Protocol, Preparation, Lead System, Techniques, Electrocardiographic Manifestation of Stress Testing, ST Segment Changes, T, U, Q & QRS Complexes Changes, Exercise induced arrhythmia, Pharmacological Methods of Stress Testing, Holter Recording System (Continuous & Event), Patient's Dairy, Analysis, Artifacts &Errors.

**Unit-4:- Artificial Pacemaker, Cardiac Arrest &Resuscitation –**

Artificial Pacemaker-Types, Components, Method of pacing, Physiology of Pacemaker, Electrocardiographic Pattern, Pacemaker Syndrome , Catheter Ablation of Arrhythmias, Cardiac Resynchronization Therapy, Cardiac Arrest & Resuscitation.

**Unit-5:- Preventive Strategies, Exercise and Rehabilitation –**

Prevention of Shock and Heart Failure, Smoking & Cardiac Disease, Definition, Goals, Phases & Core Components Of Rehabilitation, Exercise Physiology & Athlete's Heart.

**Essential reading –**

MASTER VISUAL DIAGNOSIS OF ECG – SHAHZAD KHAN, REN JIANG HUA
BEDSIDE CARDIOLOGY – CARDIOLOGY – AN ILLUSTRATED TEXT BOOK VOL. 1,2 – KANU CHATTERJEE, MARK ANDERSON, DONALD HIISTAD, RICHARD E KERBER
ESSENTIAL OF CLINICAL CARDIOLOGY – JAYANT C BHALE RAO
PRINCIPLES OF INTERNAL MEDICINE - HARRISON

**Suggested Readings –**

MEDICAL PHYSIOLOGY – INDU KHURANA
TEXT BOOK OF PHYSIOLOGY – PROF A. K. JAIN
TEXT BOOK OF MEDICAL PHYSIOLOGY – GUYTON
A TEXT BOOK OF PRACTICAL PHYSIOLOGY – C. L. GHAI
A TEXT BOOK OF PRACTICAL PHYSIOLOGY – PROF. A.K. JAIN
ESSENTIAL OF MEDICAL PHYSIOLOGY – K SEMBULINGAM, PREMA SEMBULINGAM
REVIEW OF MEDICAL PHYSIOLOGY – GANONG'S

| Sl. No. | Paper code | Paper name | Total hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|---|
| 2 | MEP 402 | Respiratory Care Technologies | 56 | 4 | 25 | 75 | 100 |

**Objective** – In this paper students learn respiratory applied anatomy and physiology as well as experience with clinical signs and symptoms of acute/chronic respiratory disease, such as Asthma, Chronic Bronchitis, Tuberculosis, Pneumonia etc. They also learn the management and handling of Respiratory emergencies. Students will perform Pulmonary Function Test on normal subjects, Oxygen Therapy (Demonstration) and interpret chest radiograph in their practical classes.

**Intended Outcome –** Students will be able to give a detailed account of applied respiratory anatomy/physiology and respiratory pathologies. Students will investigate respiratory defect with the help of PFT and chest Radiography.

**Unit-1:- Functional Anatomy of Respiratory System –**

Respiratory Passage, Pleura & Pleural Cavity, Respiratory Parenchyma, Mechanism of Breathing, Pressure & Volume Change During Respiration, Lungs volume & Capacities(Static & the dynamic), Pulmonary Elastance & Compliance, Regulation of Respiration

**Unit-2:- Physiology of Diffusion & Transport of Gases –**

Alveolar Ventilation, Alveolar Ventilation Perfusion Ratio, Respiratory Membrane, Factor affecting Diffusion, Diffusion Capacity of Lung, Transport of Oxygen, Transport of Carbon dioxide.

**Unit-3:- Respiratory Pathologies and Imaging Techniques –**

Tuberculosis, Pneumonia, Asthma, Bronchiectasis, Lung Abscess, COPD, Pulmonary Embolism, Chest Radiograph, Computed Tomography, HRCT-High Resolution Computed Tomography.

**Unit-4:- Respiration: Applied Aspects –**

Abnormal Respiratory Pattern (Apnoea, Hypo/Hyperventilation, Dyspnoea, Periodic Breathing), Disturbances Related To Respiratory Gases (Hypoxia, Hyper/Hypercapnia, Asphyxia), High Altitude Physiology, Artificial Respiration (Mechanical Ventilation), Oxygen Therapy, Non-Invasive Positive Pressure Ventilation-CPAP,Bi-PAP).

**Essential reading –**

PRINCIPLE OF RESPIRATORY MEDICINE – FAROKH ERACH, ZARIR F UDWADIA, ANIRUDH F KOHLI
RESPIRATORY MEDICINE – EMMA BAKER, DILYS LAI
ESSENTIAL OF ANESTHESIA & CRITICAL CARE – ANSHUL JAIN

**Suggested Readings -**

MEDICAL PHYSIOLOGY – INDU KHURANA
TEXT BOOK OF PHYSIOLOGY – PROF A. K. JAIN
TEXT BOOK OF MEDICAL PHYSIOLOGY – GUYTON
A TEXT BOOK OF PRACTICAL PHYSIOLOGY – C. L. GHAI
A TEXT BOOK OF PRACTICAL PHYSIOLOGY – PROF. A.K. JAIN
ESSENTIAL OF MEDICAL PHYSIOLOGY – K SEMBULINGAM, PREMA SEMBULINGAM

| Sl. No. | Paper Code | Paper Name | Total Hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|---|
| 3 | MEP 403 | Neurological Disorders | 56 | 4 | 25 | 75 | 100 |

**Objectives -** To make the students aware and understand various neurological disorders associated with central nervous system.

**Outcome -** Students will be able to identify and assess various CNS disorders, and differentiate between normal and abnormal clinical presentations.

**Unit – 1 – Neurological Assessment –**

History taking, examination of consciousness, sensory assessment, motor assessment, UMN vs LMN, reflexes, balance and coordination assessment

**Unit – 2 Strokes –**

Definition, Classification of stroke, Pathophysiology, Diagnosis, Management of acute stroke, Primary Prevention, Secondary Prevention stroke, TIA

**Unit – 3 Seizures and Epilepsy –**

Seizures, Epilepsy, status Epilepticus, Types and clinical characteristics of seizures, Pathophysiology, Diagnosis, Management of seizures and epilepsy, Post seizure care.

**Unit – 4 Dementia –**

Alzheimer's Disease, Dementia with Lewy Bodies, Frontotemporal Dementia, Vascular Dementia, Normal Pressure Hydrocephalus, Creutzfeldt Jakob Disease, Mild cognitive impairment, Secondary dementia.

**Unit – 5 Movement Disorders –**

Classification of Movement disorder, Specific movement disorder, Tremor, Parkinson's disease, Parkinson's plus syndrome, Hereditary Ataxia, Huntington's Disease, Tardive Dyskinesia, Dystonias, Wilsons Disease Gilles de la Taurette's Syndrome Myoclonus, Chorea, Athetosis, Tics.

**Unit – 6 Multifocal CNS Disorder –**

CNS infections, Tumours and space occupying lesions, Spinal cord injury, Multiple sclerosis.

**Essential books:** Roger Bannister, Brain and Bannister's Clinical Neurology (Oxford Medical Publications) 7th Edition

**Suggested books:** Kumar, A. (2014) Textbook of Movement Disorder, Jaypee B.M.P. (P) Ltd, New Delhi.

| Sl. No. | Paper Code | Paper Name | Total Hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|---|
| 4 | MEP 404 | Brain Waves & Electroencephalography | 56 | 4 | 25 | 75 | 100 |

**Objective:** To make the students learn various cortical potentials and operate, record and analyze brain electrical activity via Electroencephalography.

**Outcome:** Students will be able to identify normal brain electrical activity, record EEG, identify artefacts and differentiate between normal and abnormal findings.

**Unit – 1 EEG Basics -** Generation of EEG rhythms, Cortical potentials, Scalp potentials, Basic EEG rhythms, Alpha rhythm, Beta rhythms, Theta rhythms, Delta rhythms, Generation of Epileptiform activity, Spikes and sharp waves. Technical aspects of EE, EEG equipment, Electrodes, Montages, Routine EEG, Calibration, Sensitivity, Duration, Filters, Activation methods, Photic stimulation, Hyperventilation, MEG

**Unit – 2 Normal EEG -** EEG in adults, Anterior cerebral activity, Posterior cerebral activity, EEG in children, Maturation of the posterior rhythm, Normal transient and variants, Lambda waves, Mu rhythm, Wicket spikes, Slow alpha variant, Rhythmic mid-temporal theta, Subclinical rhythmic electrographic discharges, Non-cerebral potentials, Eye and muscle artefacts, Movement and machine artefacts, Electrocardiogram and pulse artefacts.

**Unit – 3 Abnormal EEG -** Slow activity, Diffuse slowing, Focal slowing and polymorphic delta activity, Intermittent rhythmic delta activity, Slow activity as a seizure discharge, Spike and sharp waves, Focal sharp activity, Generalized sharp activity, Periodic patterns, Periodic lateralized epileptiform discharges. Normal photic response, Photo-myoclonic response, Photo-convulsive response.

**Unit – 4 Special EEG studies -** Neonatal EEG, Recording procedures, Guidelines for interpretation, Maturation of the EEG, Abnormality of maturation, Epileptiform activity, Background abnormality. Brain death, Guidelines for determination of brain death in adult and children, EEG monitoring, Methods and interpretation, Quantitative EEG, Spike detection, Power spectral analysis, Brain mapping.

**Essential books -** C. Chicot J. Vas, (2013) Clinical EEG, Ane Books Pvt Ltd, New Delhi

**Suggested books -** Kurupath Radhakrishnan, Jagarlapudi M K Murthy, Chaturbhuj Rathore, EEG in Clinical Practice Satish Khadilkar, Girish Soni, Pravina Shah, EEG Simplified

| Sl. No. | Practical Code | Paper name | Total hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|---|
| 5 | MEP 405P | Practical VII (MEP 401, MEP402 ) | 98 | 8 | 100 | 100 | 200 |

**Exercises related to MEP 401 –**

1. Multi parameter Patient Monitoring – Study the electrical and pressure waveforms of the cardiovascular system, Hemodynamic monitoring - blood pressure . Body temperature monitoring,
2. Treadmill Testing - Investigated the exercise performance in a healthy Subjects, Cardiac stress testing,
3. Ambulatory Electrocardiography – Holter Monitoring
4. Defibrillator – Study the features of Resuscitation Device

**Exercises related to MEP 402 –**

1. Examination of Respiratory System,
2. Pulse Oximetry - Measurement of the saturated percentage of oxygen in the blood, referred to as SpO2,
3. Respiratory rate monitoring
4. Spirometry Test,
5. Oxygen therapy and Study of Oxygen therapy Equipments

**Essential reading –**

A TEXT BOOK OF PRACTICAL PHYSIOLOGY – PROF. A.K. JAIN
A TEXT BOOK OF PRACTICAL PHYSIOLOGY – C. L. GHAI
MASTER VISUAL DIAGNOSIS OF ECG – SHAHZAD KHAN, REN JIANG HUA
BEDSIDE CARDIOLOGY – CARDIOLOGY – AN ILLUSTRATED TEXT BOOK VOL. 1,2 – KANU CHATTERJEE, MARK ANDERSON, DONALD HIISTAD, RICHARD E KERBER
ESSENTIAL OF CLINICAL CARDIOLOGY – JAYANT C BHALE RAO
PRINCIPLES OF INTERNAL MEDICINE - HARRISON
PRINCIPLE OF RESPIRATORY MEDICINE – FAROKH ERACH, ZARIR F UDWADIA, ANIRUDH F KOHLI
RESPIRATORY MEDICINE – EMMA BAKER, DILYS LAI
ESSENTIAL OF ANESTHESIA & CRITICAL CARE – ANSHUL JAIN

**Suggested Readings -**
MEDICAL PHYSIOLOGY – INDU KHURANA
TEXT BOOK OF PHYSIOLOGY – PROF A. K. JAIN
TEXT BOOK OF MEDICAL PHYSIOLOGY – GUYTON
ESSENTIAL OF MEDICAL PHYSIOLOGY – K SEMBULINGAM, PREMA SEMBULINGAM

| Sl. No. | Paper Code | Paper Name | Total Hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|---|
| 6 | 406P | Practical VIII | 98 | 8 | 100 | 100 | 200 |

**Exercise related to MEP403 –**

**Neurological Assessment**

1. History Taking,
2. Examination Of Consciousness,
3. Sensory Assessment,
4. Motor Assessment,
5. UMN Vs LMN, Reflexes,
6. Balance And Coordination Assessment

**Spotting related to –**

1. Strokes
2. Seizures and Epilepsy
3. Dementia
4. Movement Disorders
5. Multifocal CNS Disorders

**Exercise related to MEP404 –**

1. To record single channel EEG in normal subject .
2. To study the effect of visual information and mental task on the alpha activity of EEG in normaln healthy subjects.
3. To demonstrate various eye movment artifacts during routine EEG recording in normal healthy subjects.
4. To demonstrate the EMG and ECG potentials during routine EEG recording in normal subjects.
5. To perform different activation procedures on fronto-parietal EEG in normal healthy subjects.
6. To study age dependent variations in wake EEG using previously recorded and printed EEG curves.
7. To study the pathological variations in EEG using previously recorded and printed EEG curves.

**Essential books:** Roger Bannister, Brain and Bannister's Clinical Neurology (Oxford Medical Publications) 7th Edition

**Suggested books:** Kumar, A. (2014) Textbook of Movement Disorder, Jaypee B.M.P. (P) Ltd, New Delhi.

| Semester – 5th | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sl. No.** | **Paper Code** | **Paper Name** | **Total Hrs** | **Credit** | **IA** | **SE** | **Total** |
| 1 | MEP 501 | Sensory Physiology & Evoked Potentials | 84 | 6 | 25 | 75 | 100 |

**Objectives:** To make the students aware of special human senses like vision, auditory, gustation and olfaction, and various techniques used to differentiate normal and abnormal senses.

**Outcome:** Students will be able to perform and record various types of evoked potentials to assess different human senses.

**Unit – 1 Basic Sensory Physiology** –
Taste & Olfaction: Sensory receptors- Touch, Pressure, Pain and Temperature, Somatic and Visceral Senses, Exteroceptors, Viseroreceptor, Proprioceptors. Taste Receptors, Taste Pathway, Physiology of Taste, Applied – Ageusea, Hyogeusia & Dysgeusia. Olfactory Receptors, Physiology of Olfaction, Olfactory Pathway, Applied – Anosmia, Parosmia & Hyposmia.

**Unit – 2 Physiologies of Eye & Ear –**
Visual Pathway, Image Forming Mechanism, Photochemistry of Vision, Electrophysiology of Vision, Photopic and Scotopic Vision, Adaptation, Colour Vision, Colour Blindness, Nystagmus. Auditory Pathway, Physical Properties of Sound, Mechanism of Hearing, Electrophysiology of Hearing, Auditory Cortex, Applied Aspect – Deafness, Tinnitus. Audiometry.

**Unit – 3 Visual and Auditory Evoked Potentials -**
Neural generators, General principles, Methods, Electrode placement and montages, Recording parameters, Interpretation, waveform identification, Variant waveform, Clinical correlations, Optic neuritis, Multiple sclerosis, Tumors, Ocular disorders, Acoustic neuroma, Brainstem tumor, Stroke, Multiple sclerosis, Coma and brain death.

**Unit – 4 Somatosensory Evoked Potentials –**
Neural generators, General principles, Median SEP Tibial SEP Methods, Acquisition of signal, Waveform identification and interpretation, Clinical correlations, Normal and abnormal responses.Transverse myelitis, Multiple sclerosis, Peripheral neuropathy, B12 deficiency Spinal cord injury, Brain death and Stroke, IOM

**Essential books -** Cooper, R. (2005), Techniques in Clinical Neurophysiology, Elsevier Churchill
Jain, AK, Textbook of Physiology, Avichal Publishing Company, 5th edition
John E Hall, Guyton and Hall Textbook of Medical Physiology (Guyton Physiology), 13th edition

**Suggested books -** Varshney, VP, Ghai's textbook of Practical Physiology, 9th edition, Jaypee B.M.P. (P) Ltd, New Delhi

| Sl. No. | Paper Code | Paper Name | Total Hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|---|
| 2 | MEP 502 | Polysomnography & Sleep Studies | 84 | 6 | 25 | 75 | 100 |

**Objective -** To make the students aware of various subjective and objective assessment measures of sleep, and to make them learn, record and analyze overnight and day-time sleep studies.

**Outcome -** Students will be able to record and analyse quality and quantity of sleep using various questionnaires and polysomnography, and identify abnormal findings regarding sleep and its architecture.

**Unit – 1 Sleep Physiology**

Normal sleep wake cycle, Sleep stages, Wake state, Non REM sleep, Sleep stage 1, Sleep stage 2, Sleep stage 3, Sleep stage 4, REM sleep, Neurophysiological mechanisms of Non REM and REM sleep, Sleep wake regulation, Neurotransmitter involved, Indications for sleep studies.

**Unit – 2 Polysomnography**

Physiological measurements EEG, Electro-oculogram (EOG), Submental EMG, ECG, Respiration, Blood oxygen saturation, Expired CO2, Body and limb movement, Audio-visual monitoring, Time, Recording protocol for a standard nocturnal study, Interpretation.

**Unit – 3 Sleep Disorders**

Classification of sleep disorders, Epidemiology of sleep disorders, Non-REM, or isolated, narcolepsy, REM, or compound, narcolepsy, Obstructive sleep apnea (OSA), Central or non-obstructive sleep apnea, Mixed sleep apnea. Treatment and preventive measures

**Unit – 4 Sleep Studies**

Multiple sleep latency tests, Maintenance of wakefulness test, Out of Sleep Centre Test, Subjective evaluation of sleepiness, Sleep scoring, Actigraphy, Methods, Interpretation, Sleep deprivation, Clinical application of sleep studies.

**Essential Books -** Robertson, B. (2014), Polysomnography for the sleep technologist, Elsevier Churchill
Chokroverty, S. (2009), Sleep disorders medicine, 3rd edition, Saunders, Elsevier

**Suggested Books -** Christian Guilleminault, (2005) Clinical Neurophysiology of Sleep Disorders, Volume 6, 1st Edition

| Sl. No. | Paper code | Paper name | Total hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|---|
| 3 | MEP 503 | Public Health | 56 | 4 | 25 | 75 | 100 |

**Objective –** Main objective of this paper is to train the students to improve the quality of life through prevention of disease by taking precaution during invasive and non invasive procedures in Cardio/ Neuro Labs. To teach the students how they can help in treatment by making electrophysiological investigatory procedure more accurate for diagnosis. Statistic analysis trains the students to collect patient-oriented data used in support of analytical and/or research projects.

**Intended Outcome –** Students will be able to identify current public health problems nationally and globally. Students will aware of food borne, waterborne disease, food safety, water safety, vaccination, exercise, obesity, exposure to toxins and hospital and lab waste management. Students will make an oral presentation, in which they will compare the developed country health care system with another country.

**Unit-1:- Concept of Health and Disease –**

Concept, Dimensions, Determinants & Indicator of Health, Health Promotion, Concept of Disease, Concept of Causation-Germ Theory, Epidemiological Triad, Natural History of Disease—Repathogenesis, Pathogenesis (Agent, Host, environmental & Risk Factors), Spectrum of Disease, Iceberg of Disease, Disease Elimination and Eradication, Monitoring and Surveillance, Prevention(Primary, Secondary and Tertiary).

**Unit-2:- Health Programme & Organization –**

National Vector Borne Disease Control Programme-Malaria, Lymphatic Filariasis, Kala Zar, Japanese Encephalitis & Dengue Fever, Revised National Tuberculosis Control Programme, National AIDS Control Programme, Iodine Deficiency Disorders

**Unit-3:- Hospital Waste Management –**

Health Hazards of Health Care waste, Treatment and Disposal Technologies, Incineration and its Type, Biomedical Waste Management in India.

**Unit-4:- Basic Medical Statistics -**
Presentation of Statistical Data-Tabulation(Simple &Frequency Distribution Table), Chart and Diagram-Bar charts(Simple bar, Multiple Bar & Component Bar), Histogram, Line Diagram, Pie chart, Pictogram, Statistical Averages- The Mean, The Median, The Mode.

**Essential reading –**
PARK'S TEXT BOOK OF PREVENTIVE & SOCIAL MEDICINE – K. PARK
INTRODUCTION TO PUBLIC HEALTH – MARRY-JANE SCHNEIDER

**Suggested Readings-**

OXFORD TEXTBOOK OF GLOBAL PUBLIC HEALTH—ROGER DETELS, MARTIN GULLIFOR QUARRAISHA ABDOOL KARIM, CHORH CHUAN TAN
PUBLIC HEALTH NUTRITION FROM PRINCIPLE TO PRACTICE—MARK LAWRENCE & TONY WORSLE

| Sl. No. | Paper Code | Paper name | Total hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|---|
| 5 | MEP 504P | Practical IX (MEP501, MEP502) | 98 | 8 | 100 | 100 | 200 |

**Exercise Related to MEP501 -**

1. To examine cranial nerves
2. To study, record and analyse visual evoked potentials.
3. To study record and analyse brainstem evoked potentials.
4. To study, record and analyse Audiometry.

**Essential books -** Cooper, R. (2005), Techniques in Clinical Neurophysiology, Elsevier Churchill
Jain, AK, Textbook of Physiology, Avichal Publishing Company, 5th edition
John E Hall, Guyton and Hall Textbook of Medical Physiology (Guyton Physiology), 13th edition

**Suggested books -** Varshney, VP, Ghai's textbook of Practical Physiology, 9th edition, Jaypee B.M.P. (P) Ltd, New Delhi

**Exercise Related to MEP502 –**

1. To assess quality and quantity of sleep using sleep diary, and to get familiarized with sleep hygiene techniques.
2. To subjectively assess sleep using various validated sleep questionnaires.
3. To record and analyse polysomnography of a normal subject.
4. To record and analyse multiple sleep latency test of a normal subject.
5. To record and analyse maintenance of wakefulness test of a normal subject.

**Essential reading –**
PARK'S TEXT BOOK OF PREVENTIVE & SOCIAL MEDICINE – K. PARK
INTRODUCTION TO PUBLIC HEALTH – MARRY-JANE SCHNEIDER
**Suggested Readings-**

OXFORD TEXTBOOK OF GLOBAL PUBLIC HEALTH—ROGER DETELS, MARTIN GULLIFOR QUARRAISHA ABDOOL KARIM, CHORH CHUAN TAN
PUBLIC HEALTH NUTRITION FROM PRINCIPLE TO PRACTICE—MARK LAWRENCE & TONY WORSLE

| Sl. No. | Paper code | Paper name | Total hrs | Credit | IA | SE | Total |
|---|---|---|---|---|---|---|---|
| 6 | MEP 506P | Evaluative Clinical Training II | 252 | 8 | | 100 | 100 |

**Exercises Related to Neuro /Cardio electrophysiology -**

1. Treadmill Test
2. Pulmonary Function Test
3. Defibrillation of Heart
4. Bedside Cardiac Monitoring in ICU & Emergency
5. Sensory & Motor Nerve Conduction Studies
6. F Wave & H Reflex Studies
7. Repetitive Nerve Stimulation Test
8. 16 Channel EEG Recording EEG Activation Procedures
9. EEG Artefacts Rectification Method

| Semester 6th | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sl. No.** | **Paper Code** | **Paper name** | **Total hrs** | **Credit** | **IA** | **SE** | **Total** |
| 1 | MEP 601 | Quality Assurance & Medical Ethics | 56 | 4 | 25 | 75 | 100 |

**Objectives -** Quality Assurance prepare students to detect, reduce and correct deficiencies in laboratories analytical process to release patient results and improve the quality of test result. Quality assurance (QA) is aimed at ensuring quality test results. Bioethicists often refer to the four basic principles of health care ethics which teach students to respect all four principles - autonomy, justice, beneficence, and non-maleficence.

**Intended Outcome -** Student will become able to monitor and evaluate the quality of the total testing process as well as to recognize the importance of ethical issues within everyday lab investigations and the ethical concerns of patients, as well as participants in research.

**Unit-1:- Quality in Health Care-**
Dimensions, International Scenario for Quality in Health Care, Indian Scenario, Cost of Quality (Economic Feasibility), Improvement of Quality of Services, Certification/Accreditation, Patient Safety Goal

**Unit-2:- Programme for Improvement of Services-**
Patient Safety Management Programme, Disaster Management Programme, Infection Control Programme, Bio Medical Waste Management programme, Equipment management programme, Training Programme, Patient's information & Education Programme, Rights & Responsibilities of patient's.

**Unit-3:- Evaluation of Performance –**
Evaluation through Statistical Approach-Criteria & Standard, Comparison of pre & Post Data, Through Medical Audit-Objectives, Process & Indicator, Through Equipment Audit-Benefits, Process & Indicators, Through Patient's Satisfaction Survey-Process & Methodology.

**Unit-4:- Basic Concept of Ethics –**
Principle of Ethics-Autonomy, Beneficence, Non-Maleficence, Justice, Accountability, Fidelity &Veracity, Ethical Guidelines or Codes in Treatment & Research, Importance of MLC & Consent Form.

**Essential Reading -**
QUALITY MANAGEMENT IN HOSPITAL – S K JOSHI
QUALITY ASSURANCE IN HOSPITALS: STRATEGIES FOR ASSESSMENT & IMPLEMENTATION—GRAHM, NANCY O.

**Suggested Readings –**
HOSPITAL QUALITY ASSURANCE; RISK MANAGEMENT & PROGRAMME EVALUATION—JESUS J.PENA
QUALITY ASSURANCE IN HOSPITAL NUTRITION SERVICES—RENNER Mc CAFFREY

| Sl. No. | Paper Code | Paper Name | Total Hours | Credit | IE | SE | Total |
|---|---|---|---|---|---|---|---|
| 2 | MEP 602 P | Evaluative Clinical Training & Internship | 588 | 18 | ------ | 300 | 300 |

**Exercise Related to Cardio electrophysiology –**

1. Training of ECG Recording in Wards, ICU, Emergency,
2. Recording of Arterial Blood Pressure,
3. Treadmill Test,
4. Pulmonary Function Test,
5. Can assist Defibrillation,
6. Defibrillators – Study the features and use resuscitation devices,
7. Bed side patient monitoring,
8. Treadmill Testing - Investigated the exercise performance in a healthy Subjects,
9. Cardiac stress testing, Ambulatory Electrocardiography - Holter Monitor Electrocardiography.
10. One case study (Cardiac Disease)/Presentation

**Exercise Related to Neuro electrophysiology –**

1. Surface EMG Recording,
2. Assist Intramuscular EMG Recording,
3. EEG Recording, Sensory and Motor Nerve Conduction Studies,
4. F Wave and H Reflex Studies,
5. Repetitive nerve stimulation test,
6. 16 Channel EEG Recording,
7. EEG activation procedure,
8. EEG Artifacts Rectification Methods,
9. Sleep Study
10. One case study (Neurological/ Neuromuscular Disorder)/ Presentation

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