B. Voc. Medical Electrophysiology

(B. Voc. - MEP)

Syllabus

w.e.f Academic Session 2025-2026

DDU KAUSHAL KENDRA

Jamia Millia Islamia

NewDelhi-110025

Hony. Director
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New Delhi-110025

B.VOC. Medical Electrophysiology (B.VOC. MEP)
Duration: Three Years (6 semesters)

Sem.	S. N.	Paper Code	Paper Name	Total Hrs.	Credit	IE	SE	Total
1	1	MEP 101	Fundamentals of Human Anatomy	48	4	25	75	100
	2	MEP 102	Fundamentals of Human Physiology	48	4	25	75	100
	3	MEP 103	Basic Biochemistry	48	4	25	75	100
	4	MEP 104	Cell Biology & Medical Genetics	48	4	25	75	100
	Skill Components							
	5	MEP 105	Fundamental of Computer & IT	48	4	25	75	100
	6	MEP 106	English-I	48	4	25	75	100
	7	MEP107P	Practical I (MEP 101, MEP 102)	84	6	25	75	100
	8	MEP108P	Practical II (MEP 103, MEP 104)	84	6	25	75	100
			Total	**456**	**36**	**200**	**600**	**800**

Sem.	S. N.	Paper Code	Paper Name	Total Hrs.	Credit	IE	SE	Total
2	1	MEP 201	General and Systemic Pathology	56	4	25	75	100
	2	MEP 202	Electronics & Instrumentation	56	4	25	75	100
	3	MEP 203	Introduction to Medical Electrophysiology	56	4	25	75	100
	4	MEP 204	Cardiology & Electrocardiography-I	56	4	25	75	100
	5	MEP 205	Medical Emergencies & Patient Care	56	4	25	75	100
	Skill Components							
	6	MEP 206	English- II	48	4	25	75	100
	7	MEP 207P	Practical III (MEP 202, MEP 203)	98	8	50	150	200
	8	MEP 208P	Practical IV (MEP 204, MEP 205)	98	8	50	150	200
			Total	**524**	**40**	**250**	**750**	**1000**

Sem.	S. N.	Paper Code	Paper Name	Total Hrs.	Credit	IE	SE	Total
3	1	MEP 301	Cardiology & Electrocardiography-II	56	4	25	75	100
	2	MEP 302	Neuromuscular Disorders	56	4	25	75	100
	3	MEP 303	Electromyography & Nerve Conduction Studies	56	4	25	75	100
	Skill Components							
	4	MEP 304P	Practical V (MEP 301)	56	4	50	50	100
	5	MEP 305P	Practical VI (MEP 302, 303)	98	8	100	100	200
	6	MEP 306P	Evaluative Clinical Training I	126	6	- - -	100	100
			Total	**448**	**30**	**225**	**475**	**700**

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Sem	S. N.	Paper Code	Paper Name	Total Hrs.	Credit	IE	SE	Total
4	1	MEP 401	Cardiovascular Techniques & Fitness	56	4	25	75	100
	2	MEP 402	Respiratory Care Technology	56	4	25	75	100
	3	MEP 403	Neurological Disorders	56	4	25	75	100
	4	MEP 404	Brain Waves & Electroencephalography	56	4	25	75	100
	Skill Components							
	4	MEP 405P	Practical VII (MEP 401, 402)	98	8	100	100	200
	5	MEP 406P	Practical VIII (MEP 403, 404)	98	8	100	100	200
			Total	**420**	**32**	**300**	**500**	**800**
5	**S. N.**	**Paper Code**	**Paper Name**	**Total Hrs.**	**Credit**	**IE**	**SE**	**Total**
	1	MEP 501	Sensory Physiology & Evoked Potential	84	6	25	75	100
	2	MEP 502	Polysomnography & Sleep Studies	84	6	25	75	100
	3	MEP 503	Public Health	56	4	25	75	100
	Skill Components							
	4	MEP 504P	Practical IX (MEP 501)	98	8	100	100	200
	5	MEP 505P	Evaluative Clinical Training II	252	8	- - -	100	100
			Total	**574**	**32**	**175**	**425**	**600**
6	**S. N.**	**Paper Code**	**Paper Name**	**Total Hrs.**	**Credit**	**IE**	**SE**	**Total**
	1	MEP 601	Quality Assurance & Medical Ethics	56	4	25	75	100
	Skill Components							
	2	MEP 602P	Evaluative Clinical Training & Internship	588	18	- - -	300	300
			Total	**644**	**22**	**25**	**375**	**400**
			Grand total (Semester I-VI)	**3066**	**192**	**1150**	**3050**	**4200**

Total skill component credits in all (I-VI) semesters: **108 Credits**

Total knowledge component credits in all (I-VI) semesters: **84 Credits**

Total credits (I-VI) semesters = **192**

Total marks (I-VI) semesters = **4300**

Total hours (I-VI) semesters = **3066** (Skill components **1922** hrs. & knowledge components **1144** hrs.

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Semester–1st						
Paper Code	**Paper Name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
MEP 101	Fundamentals of Human Anatomy	48	4	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 II: **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.

Unit III: Nervous System and Endocrine System: Structure of Neuroglia & neurons, Classification of nervous system, 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, Auditory and Olfactory apparatus. Gross structure of Pituitary, Thyroid, Parathyroid, Pancreas, Adrenal glands

Unit IV: Cardiovascular and Respiratory System: Circulatory system – Structure of the Heart, Structure of Blood Vessels – arterial and venous system, Gross and microscopic structure of lymphatic tissue. Nasal cavity and Para-nasal sinuses, trachea, Gross and microscopic structure of lungs, Diaphragm and Pleura.

Unit V: Digestive System and Uro-genital system: Parts, Structure of Tongue, Salivary glands, stomach, Intestines, Liver, Pancreas, Spleen, Gross structure of Kidney, Ureters, Urinary Bladder and Urethra, Gross structure of both male and female reproductive organs.

Essential Reading:

1. Chaurasia B D, (2024), Human Anatomy (Vol 1,2,3,4),10th edition
2. Ross & Wilson, (2022), Anatomy & Physiology in health & illness,14th edition
3. Gray's anatomy for students (2020), 42nd Edition
4. Text book of anatomy (Vol 1,2,3)– Vishram Singh, 4th Edition.
5. Text book of anatomy – VOL 1,2 – Inderbir Singh, 6th Edition.

Suggested Readings –

1. Textbook of Anatomy–W.J. Hamilton

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Semester–1st						
Paper Code	**Paper name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
MEP 102	Fundamentals of Human Physiology	48	4	25	75	100

Objective – This paper lay out 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: Functions and composition of Blood, morphological features of blood cells, Hematopoiesis, structure of Hemoglobin and its abnormalities. Types of anemia and their causes, Hemostasis.

Unit II: Nerve Muscle Physiology – Structure and functions of neurons and neuroglial cells, 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. Microscopic and electron microscopic structure of skeletal, smooth and cardiac muscles, Single-unit and multi-unit smooth muscle. Muscle proteins and Properties of skeletal muscle. Mechanism of skeletal and smooth muscle contraction and relaxation.

Unit III: Cardiovascular and Respiratory System – Properties of cardiac muscle, Origin and propagation of cardiac impulse, Conduction System of Heart, Cardiac Cycle, Heart sounds. Functions of respiratory muscles, Respiratory and Volume capacities, exchange of oxygen and carbon dioxide, Brief account of respiratory regulation, Hypoxia and its types, Cyanosis, asphyxia, Dead spaces, Factors affecting Oxygen dissociation curve of hemoglobin and myoglobin, factors affecting Carbon dioxide dissociation curve.

Unit IV: Digestive System- Functions of alimentary canal, Physiology of 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 V: **Excretory and reproductive system –** Structure and functions of kidney, components of Nephron, measurement and regulation of GFR, Renin Angiotensin system mechanism of urine formation, Clearance tests, functions of ovaries, sex hormones, menstrual cycle, pregnancy, parturition, lactation, contraception, male sex hormones and spermatogenesis.

Essential Reading:

1. Medical Physiology. Indu Khurana
2. Textbook of Physiology. Prof A.K. Jain
3. A Textbook 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. Textbook of Medical Physiology. Guyton
3. A Textbook of practical physiology. C. L. Ghai

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Semester–1st						
Paper Code	**Paper Name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
MEP103	Basic Biochemistry	48	4	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 and function of carbohydrate, classification of carbohydrates: Monosaccharide, oligosaccharides and polysaccharides. Glycoside formation. Metabolism of carbohydrate: Glycolysis, catabolic fates of pyruvate, metabolic fate of Acetyl-CoA and Citric acid cycle, gluconeogenesis, glycogen metabolism, pentose phosphate pathway.

Unit II: Biological Oxidation and Enzyme: Definition and classification of enzymes, coenzyme, active sites of enzymes, isoenzymes, properties and mechanism of enzyme action, enzyme inhibition, 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 of amino acids-essential & non-essential amino acids. Proteins-definition and structure- primary, secondary, tertiary and quaternary of proteins of proteins, peptide bonds, properties of protein, classification of protein, denaturation of protein.

Unit IV: Vitamins: Definition and classification of vitamins, fat soluble and water-soluble vitamins, biochemical functions and deficiency symptoms of common individual vitamins.

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

Essential readings:

1. Lehninger (2021) Principles of Biochemistry,8th edition, W H Freeman
2. Satyanarayan (2021), Essentials of Biochemistry, 3rd edition, Standard Publishers
3. Biochemistry for students, V.K. Malhotra, 12th Edition.

Suggested readings:

1. Pankaja Naik, Biochemistry, 4th ed

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Semester–1st						
Paper Code	**Paper Name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
MEP 104	Cell Biology & Medical Genetics	48	4	25	75	100

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

Outcome intended – Students will be able to 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 Organelles: Prokaryotic and eukaryotic cells. Endosymbiotic theory of evolution. Structure and function of Endoplasmic reticulum and Golgi apparatus. Lysosomes (role in degradation and LSDs). Intracellular vesicular trafficking. Mitochondria (structure and basic idea of function)

Unit II: Cytoskeleton Network: Structure, organization and role of Microfilaments, Intermediate filaments and microtubules. Mitotic spindle (MTOCs), Cilia, Flagella, Filopodia, Microvilli structure

Unit III: Membrane Transport and Cell Signaling: Lipid bilayer and membrane proteins. Cell junctions. Membrane transport (simple, facilitated, active and voltage gated). Signaling molecules and receptors (GPCR, Tyrosine kinase based). Signal transduction, second messengers.

Unit IV: Nucleus Organization and Cell Cycle: Structure and function of nucleus. Nuclear membrane and transport, nuclear pore complex, Chromatin structure and positioning. Cell cycle: Controls and checkpoints. Cell division - Mitosis and Meiosis (stages and the process of crossing over). Apoptosis. Stem Cells - Embryonic, Tissue, and induced pluripotent stem cells. Cloning - reproductive and therapeutic

Unit V: Medical Genetics: Structure of DNA & RNA, Chromosomes and Karyotyping, Basics of human genome. Mendelian and non-Mendelian patterns of inheritance. Mutations. Genetic disorders (types and examples).

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,
3. (2009), 5th ed.
4. Kapur & Suri's Basic Human Genetics, Dipali S. Trivedi

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Semester–1st						
Paper Code	**Paper Name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
MEP 105	Fundamentals of Computer & IT	48	4	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. Windows, print, control panel, Paint, calculator, desktop, find, Run, Snipping tool, Sticky note, Word pad, Notepad, Gadgets, Windows defender, Firewall.

Unit III: Microsoft Office-
Ms Word - basic commands, Formatting-text and documents, sorting and tables, background images, hyperlinks, Mail merge, Graphics, columns, Smart Art, spelling & grammer, Thesaurus.
Ms Excel - Conditional formatting, Formulas & Functions, Sort & Filter, Wrap text, Merge & Centre. Insert- Tables, illustrations, charts, Background, Remove duplicates.
Ms PowerPoint – Designs, slide transition, Smart Art, animation, hyperlinks, automatic slide advance, background images

Unit IV: Biological data and Internet-
Introduction to Bioinformatics, Scope of Bioinformatics, Growth of databases, basics of internet, www, IP address, domain, Network-based services (Cloud & Grid Computing).

Unit V: **AI, Machine Learning, and NGS-**
An introduction to Artificial Intelligence (AI) and Machine Learning (ML), Overview of ML (supervised, unsupervised), AI application in data analysis and healthcare solutions, the basics of Next-Generation Sequencing (NGS) and its significance.

List of Practical:

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

Essential reading:

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

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Semester–1st						
Paper Code	**Paper Name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
MEP 106	English - I	48	4	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, Verb, Conjunctions, Tenses, Voices, Direct and Indirect Speech, Subject- Verb Agreement

Unit II: Vocabulary: Common Vocabulary, Words Often Confused, Common Errors, Prefixes, Suffixes

Unit III: Formal Correspondence: Letters and Applications, Letter to the Editor, Professional letters-sales, enquiry, order, complaints and other. Applications for jobs-cover letter/ resume/ CV

Unit IV: Spoken English: Speech/ Extempore/ Group Discussions/ Interview/ Dialogue Sessions

Unit V: Reading Comprehension and Unseen Passages: Vocabulary- Understanding the meaning of most words in the text**,** Fluency- Recognizing words quickly, including words that can't be sounded out**,** Sentence structure and cohesion- Understanding how sentences are built and how ideas connect within and between sentences. Understanding the main idea- Identifying the main thought of a passage. Drawing inferences- Drawing inferences from a passage about its contents**,** Visualizing**:** Visualizing the text. Recalling prior knowledge- Recalling prior knowledge connected to the text**.** Recognizing confusion- Recognizing confusion or attention problems**.** Recognizing literary devices- Recognizing the literary devices or propositional structures used in a passage**.** Determining tone- Determining the tone of a passage

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

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Semester–1st						
Paper Code	**Paper Name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
MEP 107P	Practical I (MEP101, MEP102)	84	6	25	75	100

List of practical:

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 Grouping
7. Arterial Blood pressure

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Semester–1st						
Paper Code	**Paper Name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
MEP108P	Practical II (MEP103, MEP 104)	84	6	25	75	100

List of Practical:

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.
7. Introduction of isolation of genetic material from different clinical samples and their detection by conventional and Real time PCR.

Basic Biochemistry:

1. Preparation of 1000ml of TAE electrophoresis buffer
2. Titrate a given volume of acetic acid with 0.2M 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 I: General Pathology: Introduction to pathology, study of pathology, Determinants of health, etiology of disease, multi – factorial causation of disease, natural history of disease, pathogenesis, clinical manifestations- signs and symptoms, morphological changes-macroscopic and microscopic, common terms in pathology

Unit II: Cell injury*:* Etiology of injury, reversible and irreversible Injury, morphology of reversible injury, hydropic, hyaline, mucoid and fatty change. Intracellular Accumulation, e ndogenous and exogenous pigments, morphology of irreversible injury, cell death, autolysis, apoptosis, necrosis, coagulative, liquefactive, caseous, fibrinoid. Cellular adaptations, Atrophy, Hypertrophy, Hyperplasia, Metaplasia.

Unit III: **Inflammation and Hemodynamics:** Immune system, normal immune response, hypersensitivity, Types of inflammation, Acute and Chronic, chemical mediators of inflammation, Inflammatory Cells, morphology and fate of inflammation. Chronic inflammation, chemical mediators, Granulomatous. Healing- regeneration, repair, healing in skin, healing by primary and secondary intention, healing in other tissues. Pathophysiology of hemodynamics, fluid compartments of the body, types of pressure gradients, pathogenesis of oedema –types of edemas, hemorrhage, hyperemia and congestion, Thrombosis, embolism, ischemia, infarction, shock.

Unit IV: Neoplasia: Overview, Types- benign and malignant tumors, classification and nomenclature of neoplastic disease. Chemical, physical and biological basis of carcinogenesis. Clinical and gross features of neoplasia, dysplasia, invasion and metastasis, cytological features of malignancy.

Unit V: **Systemic Pathology**: An overview of the systems and pathologic conditions Cardiovascular system-atherosclerosis, ischemic heart disease, respiratory diseases- chronic obstructive lung disease, chronic restrictive lung disease, respiratory infections. Thyroid-Goiter, Hashimoto's thyroiditis. Breast- benign conditions and carcinoma, types of surgeries in breast carcinoma. The nervous system— infective diseases, ischemic brain damage,

cerebral infarction, intracerebral hemorrhage, degenerative diseases. Digestive System- Disease of esophagus, stomach, hepatitis, cirrhosis of liver, neoplasm of GIT, excretory System- glomerulonephritis, nephritic & nephrotic Syndrome, pyelonephritis, hydronephrosis, renal neoplasms

Essential reading:

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

Suggested reading:

1.Boyd's Textbook of Pathology (Systemic Pathology),10thed, D.J. Bhardwaj
2.Essentials of Clinical Pathology, Kawthalkar, Shirish M

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Semester–2nd						
Paper Code	**Paper Name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
MEP 202	Electronics & Instrumentation	56	4	25	75	100

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

Outcomes: After successful completion of the semester, the students will be able to understandtheunderlyingcircuitsandoperatevariousmedico-electricaldeviceswith 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 of resistors and cells and Their Equivalent. Transformer. Circuit Laws: Ohm's Law, Kirchoff's law, Lenz's law, Faraday's law. 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, elementary ideas of LED, LCD, photodiode and solar cells.

Unit III Digital Circuits: Binary Number System, Bits, Bytes, Octal, Hexadecimal, Addition, Subtraction, 1" S Complement and 2" S Complement. Gates: Universal Gates OR, NOT, XOR, XNOR, NAND. Exor, Exnor. Truth Table and Boolean Expression. A-D Convertor, D-A Converter, Flip-Flops

Unit IV: Electrical Safety and Medical Equipment: 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:

1. Theraja B.L. Basic Electronics, S Chand &Co Ltd.

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Semester–2nd						
Paper Code	**Paper Name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
MEP 203	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 equipment.

Unit I: Fundamentals of 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 II: Diagnostic Techniques in Neuro-electrophysiology: Non-invasive electro-physiological recording techniques: Advantages of non-invasive procedures, Electro-encephalography, Electromyography, Nerve conduction studies and Event- related potentials. Invasive electrophysiological recording techniques: Electro-cardiotocography- definition, procedure and clinical application, Intramuscular Electromyography- uses, advantages and disadvantages. Infection control.

Unit IV: Basic Electromyography and Nerve Conduction Studies: 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, Different Types and components of NCS, Clinical applications and limitations of NCS.

Unit IV: 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, clinical applications in sleep studies and epilepsy. Available invasive procedure and their applications.

Unit V: Intraoperative Neurophysiological Monitoring (IOMN) and neuro-electrophysiology lab: Principles and techniques use in IONM, Applications of IONM and risk associated, the basic unit of neuro-electrophysiology lab and its setup, equipment and servicing, Medico-legal considerations.

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.

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Semester–2nd						
Paper code	**Paper name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
MEP 204	Cardiology & Electrocardiography-I	56	4	25	75	100

Objective: Bestow students with a basic cardiac anatomy and physiology. Demonstrate clinical skills of medical history and physical examination, with specific attention to electro cardiography. 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, heart rate calculation, with a detailed account of conduction system of heart, classifying normal and abnormal rhythm and components on ECG, assessing rhythm, measuring intervals, segments and evaluate other relevant waves.

Unit I: 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 II: Hemodynamic & Cardiac Output: Relationship between pressure, flow and resistance Frank-Starling law preload, after load and contractility control of stroke volume and Cardiac Output, Regulation of Cardiac Output, Types of Blood Flow (Arteries, Arterioles & Micro-circulation), Blood Pressure (Determinants, Variations- Hypertension & Hypotension), Regulation of blood Pressure.

Unit-III: Introduction to Electrocardiography: Recording of ECG Leads, Electro cardiograph, 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 IV: Vectorial Analysis of ECG & Vector Cardiography: Concept of Cardiac Vectors, Determination of Mean Electrical Axis, Abnormalities of Mean Electrical Axis (RAD & LAD), Vector Cardiography (VCG), His Bundle Electrocardiogram (HBE).

Unit-V: Clinical Application of Electrocardiography: Determination of rhythm along with calculation of heart rate, Sinus rhythm, Sinus bradycardia, Sinus tachycardia, types of conduction defects, Myocardial Ischemia/Infarction, Cardiac Arrhythmias.

Essential Reading:

1. Master visual diagnosis of ECG. Shahzad khan, Ren Jiang Hua
2. Bedside cardiology. An illustrated textbook vol. 1,2 – Kanu Chatterjee, Mark Anderson, Donald Hiistad, Richard E Kerber
3. Essential of clinical cardiology. Ayant C. Bhalerao
4. Harrison's principles of internal medicine

Suggested Readings–

1. Medical physiology–Indu Khurana
2. Text book of Physiology. Prof A. K. Jain
3. Text book of medical physiology. Guyton
4. A Textbook of practical physiology –C.L. Ghai
5. A Text book of practical physiology – Prof. A.K. Jain
6. Essential of Medical Physiology. K. Sembulingam, Prema Sembulingam
7. Review of medical physiology. Ganong

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Semester–2nd						
Paper Code	**Paper Name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
MEP 205	Medical Emergencies & Patient Care	56	4	25	75	100

Objective: The primary objective of Medical Emergency & Patient Care is 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 I: Introduction to Emergency Services: Organization of Emergency Department, Guidelines in Emergency, Clinical Monitoring of patients, Types of Fluid and Fluid Therapy and Blood Transfusion, Airway Management, Cardiopulmonary n Resuscitation, Principal of Mechanical Ventilation, Injection- (I/M, I/V, S/C), Infusion Method, Management of Acid Base and Electrolyte Imbalance

Unit II: Handling of Different Emergencies: Head Injuries, Vasovagal Syncope, Seizer, Epilepsy, Conjunctival and Corneal Foreign Body, Foreign Body in Nose & in Ear, Epistaxis, Hemoptysis, Tear Gas Exposure, Poisoning – Classification of Poisons, Clinical Signs of poisoning and management, Food Poisoning, Diarrhea, Urine Retention, Insect bite (snake), Dog bite, Hypertensive Emergencies, Gynecological and Obstetrics emergencies, Drug overdose, Anaphylaxis, Heart attack, Burn and Trauma.

Unit III: Emergency Room Triage: The importance of prioritizing patient care in emergency department, the triage process in emergency room, key factors considering in triage patients, triage categories and their significance.

Unit IV: Fundamentals of Patient Care: Concept of health & illness, health determinants, concept of patients & their types, patient centered 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: V: Patients Care, Associated Units & Departments: Ambulatory units, pediatric, neonatal intensive care unit (NICU), critical care units (CCU), emergency department, inpatient units, hematology, oncology and immunology unit, orthopedic unit, psychiatry unit, neurology and neurosurgical unit, renal, dialysis unit, department of gynecological

and obstetrics, gastroenterology/endocrinology unit, life flight critical care transport program, radiology department, surgical units, cardiac catheterization lab, operating room, post anesthesia care unit, managing patients with disabilities, geriatric care, care of critically ill patients, tracheotomies patients, ICU, CCU, microbiology lab, biochemistry lab, pathology lab.

Essential Reading-

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

Suggested Readings–

1. Oxford handbook of Emergency Medicine –Joathan Wyatt, Robin Illingworth, Colin Graham, Kerstin Hogg

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Semester–2nd						
Paper Code	**Paper Name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
MEP 206	English-II	48	4	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: Medical Vocabulary and Terminology: terms associated with medical professions, correct usage of the medical terminology, essential concepts of punctuations in medical field, an understanding of principles of medical word formation, familiarity with many prefixes, roots and suffixes that commonly appear in medical terminology, knowledge of basic(and some not so basic) medical term, an understanding of other aspects of medical terminology such as abbreviations and nomenclature, knowledge of strategies and resources for further terminology

Unit II: **Effective Medical Communication**: Communication- meaning, types, level, understanding 7c's of professional communication and 5c's of communication in medical fields, formal and informal communication, barriers/challenges to communication and the strategies to overcome them, communication process.

Unit III: **Writing Skills**: Paragraph writing, Description and Report Writing, Note-taking/ Summary/ Paraphrasing/ Briefs of Medical Passages.

Unit IV: Understanding Research and its process in Medical Field: Research Papers for Journals and papers to be published and presented in Seminars/ Conferences/ Workshops, Process and method of writing abstract, articles and research paper, Understanding Chicago style (CSE), Understanding American Medical Association (AMA), Understanding American Psychological Association (APA), Understanding Vancouver style.

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Semester–2nd						
Paper Code	**Practical**	**Total Hrs.**	**Credit**	**IE**	**SE**	**Total**
MEP 207 P	Practical III (MEP 202, MEP 203)	98	8	50	150	200

Exercise Related to MEP 202:

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 p n junction diode in forward bias.
3. To draw the characteristic curve of p n 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 203:

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.

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Semester–2nd						
Paper code	**Paper name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
MEP 208 P	Practical IV MEP 204 & MEP 205	98	8	50	150	200

Exercises related to MEP 204:

1. Study the features of ECG Machine (Single/Multichannel), ECG paper (Calibration), Gel & Electrodes.
2. Placements of Limb & Chest Electrodes.
3. Study the concept of 12 leads ECG (Standard, 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 MEP 205

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

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

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Semester–3rd						
Paper code	**Paper name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
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 I: 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 Septal Defect (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 Syndrome, Brugada Syndrome, Wolff –Parkinson –White Syndrome.)

Unit II: Acquired Heart Disease: Hypertrophic Cardiomyopathies, Dilated Cardiomyopathies, Myocarditis, Endocarditis, Pericarditis, Kawasaki Disease, Rheumatic Fever, Acute Cor Pulmonale, Atherosclerosis, Angina pectoris, Myocardial Infarction, Peripheral Vascular Disease.

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

Unit IV: Endocrine Heart Disease: Hyper/ Hypothyroidism, Acromegaly, Cashing Syndrome, Pheochromocytoma, Carcinoid Syndrome, Metabolic Syndrome

Unit-V: Fluid and Electrolytes in Cardiology: Electrolyte Disturbances with clinical manifestation, Hypo/Hyperkaliemia, Hypo/Hypercalcemia, Hypo/Hypermagnesemia, Hyponatremia and Congestive Heart Failure, Anemia in Patients with CHF, Cardiorenal Syndrome.

Essential Reading:

1. Master Visual Diagnosis of ECG. Shahzad khan, Ren Jiang Hua.
2. Bedside Cardiology- An illustrated Textbook (Vol 1,2). Kanu Chatterjee, Mark Anderson, Donald Hiistad, Richard E. Kerber.
3. Essential of Clinical Cardiology–Jayant C Bhalerao
4. Principles of Internal Medicine - Harrison

Suggested Readings:

1. Medical Physiology by Indu Khurana.
2. Text book of Physiology. Prof A. K. Jain
3. Textbook of Medical Physiology. Guyton
4. A Textbook of Practical Physiology. C.L. Ghai.
5. A Textbook of Practical Physiology. Prof. A.K. Jain.
6. Essential of Medical Physiology. K. Sembulingam, Prema Sembulingam
7. Review of Medical Physiology. Ganong's

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Semester–3rd						
Paper Code	**Paper Name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
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 I: Basic Anatomy & Physiology of Neuro-muscular System: Review of nervous system with emphasis on Peripheral Nervous system, Skeletal muscle, Neuromuscular Junction, Cranial Nerves, and Spinal nerves, Structure of synaptic cleft, Acetylcholine and Norepinephrine as Neurotransmitter.

Unit-II: Neuropathies: Mono-neuropathies, Polyneuropathies, radiculopathies, Mononeuritis multiplex, Poliomyelitis, Gillian-Barre syndrome, Diabetic neuropathy, AIDPs, Motor Neuron Diseases, Nerve biopsy.

Unit-III: Radiculopathies and Plexopathies: Cervical, Thoracic and Lumbosacral Radiculopathies, Brachial Plexus and Lumbar Plexus anatomy, Immune mediated Brachial Plexus Neuropathy, Brachial Plexopathies associated with Neoplasms, Median Sternotomy, Lumbosacral Plexopathies.

Unit IV: Myopathies: Duchene's muscular dystrophy, Becker's muscular dystrophy, Fasio-scapulo- humeral dystrophy, Limb-girdle myopathies, Myotonic Dystrophy type 1 & 2, Inflammatory myopathies.

Unit V: Neuromuscular Junction Disorders: Myasthenia gravis, Lambert-Eaton myasthenic syndrome (LEMS), Neuromyotonia, Botulism, Isaacs syndrome.

Essential Books:

Fuller, G. (2017), Neurological Examination Made Easy, Lippinott Williams and Wilkin Amato, Anthony, A. (2008), Neuromuscular disorders, Mc Graw Hill Medical Roger 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

Semester–3rd						
Paper Code	**Paper Name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
MEP 303	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 analyze neuro-muscular diagnostic techniques such as EMG and NCV, and differentiate between normal and pathological findings.

Unit I: Review of Neuromuscular Physiology and Anatomy: Anatomy of nerve and muscle, Normal neuromuscular function, Motor function, Sensory function, Function of Neuron cell body, Peripheral nerve axon and Peripheral nerve myelin structure, Pathophysiology of various Neuromuscular Junction dysfunction, Motor units.

Unit II: Nerve Conduction Studies: Motor nerve conduction study, Sensory nerve Conduction study, Electrodes, Electrode Position, Stimulus Characteristics, Procedure, Measurements, Types of abnormalities, Tests for neuromuscular junctions, Repetitive nerve stimulation.

Unit III: Late Responses- F waves and H reflexes: Introduction to late responses, mechanism and types of late responses, electrophysiological techniques for recording of late responses, F wave, H reflex.

Unit– IV: Electromyography: Conventional needle EMG, Macro EMG, Surface EMG, Single-fiber EMG, Electrodes, Filters, Amplifier, Display, Average Gain and Sweep time, Electrode position, Procedures, Rest, Insertion, Single motor unit activation, Maximal contraction, Normal and abnormal responses.

Unit V: Clinical Case Studies: 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.

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Semester–3rd						
Paper Code	**Practical**	**Total Hrs.**	**Credit**	**IE**	**SE**	**Total**
MEP 304P	Practical V (MEP 301)	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

Semester–3rd						
Paper Code	**Practical**	**Total Hrs.**	**Credit**	**IE**	**SE**	**Total**
MEP 305 P	Practical VI (MEP302, MEP303)	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 analyze electromyography from proximal and distal muscles.
2. To record and analyze motor nerve conduction study of peripheral nerves.
3. To record and analyze sensory nerve conduction study of peripheral nerves.
4. To record and analyze F-wave in normal subject from peripheral nerves.
5. To record and analyze H-reflex in normal subject from peripheral nerves.
6. To record and analyze repetitive nerves stimulation from peripheral nerve

Semester–3rd						
Pape Code	**Paper Name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
MEP 306 P	Evaluative Clinical Training–I	126	6	-	100	100

Exercise related to MEP 203, MEP 204 & MEP 205

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. Endotracheal Tube Insertion, Wound Care, Nasogastric Tube Insertion, Care of critically ill, tracheotomize patient,
8. Surface EMG Recording,
9. Assist Intramuscular EMG Recording,
10. EEG Recording.

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Semester–4th						
Paper code	**Paper name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
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. Provide 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 I: Cardiovascular Pharmacology & Invasive Techniques: Anti-anginal agents -Beta blockers, Nitrates, Calcium channel blocker, Drugs for Heart Failure, Diuretics, Angiotensin Converting Enzyme (ACE) inhibitors. ARB (Angiotensin Receptor Blocker), ACE inhibitors for diabetics and hypertensive renal disease, Digitalis and Acute Inotropes. Anti-hypertensive drugs, Anti- arrhythmic agents, Antithrombotic agents and Vit. K, Anticoagulants, Lipid lowering and anti- atherosclerotic drugs

Unit II: Cardiac Imaging & Echocardiography: Chest Film Techniques, Overview of Cardio-mediastinal Anatomy, Imaging in Cardiac Disease, Contrast-Enhanced Echo-cardiography, Transthoracic Echocardiography (TTE), Stress, Transesophageal (TEE) & 3-Dimensional Echocardiography, Cardiac C T scan Cardiac MRI, PET scan.

Unit III: Exercise Electrocardiography & Holter Monitoring: Exercise Test, Indication of Test, Safety & Risk, Method, Protocol, Preparation, Lead System, Techniques, Electro-cardio graphic Manifestation of Stress Testing, ST Segment Changes, T, U, Q & QRS Complexes Changes, Exercise induced arrhythmia, Prognostic utilization of Stress testing, Pharmacological Methods of Stress Testing, Screening, Complications of Stress Testing, Holter Recording System (Continuous & Event), Patient's Diary, Analysis, Artifacts & Errors.

Unit IV: 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 V: Preventive Strategies, Exercise and Rehabilitation: Prevention of Shock and Heart Failure, Smoking & Cardiac Disease, Definition, Goals, Phases & Core Components of Rehabilitation, Exercise Physiology, body heat, body fluid and salt in exercise & Athlete's Heart.

Essential Reading:

1. Master Visual Diagnosis of ECG. Shahzad khan, Ren Jiang Hua.
2. Bedside Cardiology- An illustrated Textbook (Vol 1,2). Kanu Chatterjee, Mark Anderson.
3. Essential of Clinical Cardiology–Jayant C Bhalerao
4. Principles of Internal Medicine - Harrison

Suggested Readings:

1. Medical Physiology by Indu Khurana.
2. Text book of Physiology. Prof A. K. Jain
3. Textbook of Medical Physiology. Guyton
4. A Textbook of Practical Physiology. C.L. Ghai.
5. A Textbook of Practical Physiology. Prof. A.K. Jain.
6. Essential of Medical Physiology. K. Sembulingam, Prema Sembulingam
7. Review of Medical Physiology. Ganong's

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Semester–4th						
Paper Code	**Paper name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
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 I: Functional Anatomy of Respiratory System: Respiratory passage, pleura & pleural cavity, respiratory parenchyma and respiratory membrane, mechanism of breathing,

Unit II: Physiology of Diffusion &Transport of Gases: Alveolar ventilation, alveolar ventilation perfusion ratio, pressure & volume change during respiration, lungs volume & capacities (static & the dynamic), pulmonary elastance & compliance, regulation of respiration respiratory membrane, factor affecting diffusion, diffusion capacity of lung, transport of oxygen, transport of carbon dioxide.

Unit III: Respiratory Pathologies and Imaging Techniques: Tuberculosis, pneumonia, asthma, bronchiectasis, lung abscess, COPD, emphysema, pulmonary embolism, chest radiograph, computed tomography, HRCT-high resolution computed tomography, thoracocentesis, bronchoscopy, bronchoalveolar lavage (BAL), MRI, PET scan.

Unit IV: Respiration: Applied Aspects: Abnormal respiratory pattern (apnea, hypo/ hyperventilation, dyspnea, periodic breathing), disturbances related to respiratory gases (hypoxia, hyper/hypercapnia, asphyxia), high altitude physiology.

Unit V: Treatment modalities in Respiratory Medicine: Artificial respiration, mechanical ventilation, oxygen therapy, non-invasive positive pressure, ventilation- CPAP, BiPAP, lung transplantation.

Essential reading:

1. Principle of Respiratory Medicine. Farokherach, Zarirf Udwadia, Anirudh F Kohli
2. Respiratory Medicine. Emma Baker, Dilys Lai
3. Essential of anesthesia & criticalcare. Anshul Jain

Suggested Readings:

1. Medical Physiology. Indu Khurana
2. Text book of Physiology. Prof A. K. Jain
3. Textbook of Medical Physiology. Guyton
4. A Textbook of Practical Physiology. C.L. Ghai
5. Essential of Medical Physiology. K. Sembulingam, Prema Sembulingam

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Semester–4th						
Paper Code	**Paper Name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
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 I: Cerebrovascular disorders: Definition and classification of hypoxia, ischemia, infarction and stroke, pathophysiology, diagnosis, management and prevention of acute stroke, TIA, spinal cord injury, hemorrhage and hematoma, cerebral palsy.

Unit II: Seizures and Epilepsy: Seizures- definition and causes, epilepsy, status epilepticus, types and clinical characteristics of seizures, pathophysiology, diagnosis, management of seizures and epilepsy, post seizure care.

Unit III: Neurodegenerative disease: Dementia, Alzheimer's disease, dementia with Lewy bodies, frontotemporal dementia, vascular dementia, normal pressure hydrocephalus, Creutzfeldt Jakob disease, mild cognitive impairment, secondary dementia, ALS (amyotrophic lateral sclerosis), spinal muscular atrophy, multiple sclerosis.

Unit IV: Movement Disorders: Classification of movement disorder, specific movement disorder, tremor, Parkinson's disease, Parkinson's plus syndrome, hereditary ataxia, Huntington's disease, tardive dyskinesia, dystonia, Wilsons disease, Gilles de la Taurette's syndrome myoclonus, chorea, athetosis, tics.

Unit V: Infections and Tumors: CNS infections- acute and chronic meningitis, brain abscess, tuberculosis, neurosyphilis, polio, rabies, prions disease, tumors and space occupying lesions- gliomas and malignant tumors.

Essential books:

1. Roger Bannister, Brain and Bannister's Clinical Neurology (Oxford Medical Publications) 7th Edition
2. Harrison's principle of Internal Medicine. 21st ed.

Suggested books:

1. Kumar, A. (2014) Textbook of Movement Disorder, Jaypee B.M.P.(P)Ltd, New Delhi.

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Semester–4th						
Paper Code	**Paper Name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
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 and interpretation of abnormal EEG readings.

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

Unit I: EEG Basics: Neuroanatomy of brain**,** generation of EEG rhythms, cortical potentials, scalp potentials, basic EEG rhythms, alpha rhythm, beta rhythms, theta rhythms, delta rhythms, gamma waves, clinical and research applications of EEG.

Unit II: Technical aspects of EEG: EEG equipment, electrodes, routine EEG, calibration, sensitivity, duration, filters, activation methods, photo-stimulation, hyperventilation.

Unit III: 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, technical and biological artifacts.

Unit IV: 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 V: 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

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Semester–4th						
Paper Code	**Paper name**	**Total hrs.**	**Credit**	**IA**	**SE**	**Total**
MEP 405 P	Practical VII (MEP 401, MEP 402)	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 Equipment.

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Semester–4th						
Paper Code	**Paper Name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
MEP 406 P	Practical VIII (MEP 403, MEP 404)	98	8	100	100	200

Exercise related to MEP 403:

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 MEP 404:

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 normal healthy subjects.
3. To demonstrate various eye movement artifacts during routine EEG recording in normal healthy subjects.
4. To demonstrate the EMG and ECG potentials during routine EEG record 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.

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Semester–5th						
Paper Code	**Paper Name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
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 I: Basic Sensory Physiology: Basic function of nervous system, synapse classification properties, receptors, classification of sensory receptors-Touch, Pressure, Pain and Temperature, Somatic and Visceral Senses, Exteroceptors, Viseroreceptor, Proprioceptors. Taste Receptors, Taste Pathway, Physiology of Taste, Applied – Ageusia, Hypogeusia & Dysgeusia. Olfactory Receptors, Physiology of Olfaction, Olfactory Pathway, Applied – Anosmia, Parosmia & Hyposmia.

Unit II: Physiology of Eye: Physiology of vision, significance, layers of retina, extra ocular muscle, visual association area, rhodopsin, retinal Visual Cycle, visual Pathway, Image Forming Mechanism, Photochemistry of Vision, Electrophysiology of Vision, Photopic and Scotopic Vision, Adaptation, Colour Vision, Colour Blindness, theories of colour vision optic neuritis, ocular disorders, Nystagmus.

Unit III: Physiology of Ear: Ear structure and function of external middle and internal ear-cochlea, organ of corti, Auditory Pathway, Auditory association areas, Physical Properties of Sound, Mechanism of Hearing, Electrophysiology of Hearing, pitch discrimination, volley principle, factors affecting pitch of sound, Applied Aspect – Deafness, Tinnitus. Audiometry, Acoustic neuroma.

Unit IV: Evoked Potentials- Visual, Auditory and Somatosensory: Neural generators, General principles, Acquisition of signal, Recording parameters, Waveform identification and interpretation, Electrode placement and montages.

Unit V: Clinical Correlation: Visual Evoked potentials, Auditory Evoked potentials Somatosensory Evoked Potentials in Peripheral neuropathy, Stroke, Coma, Brain death B12 deficiency, Spinal cord injury & Multiple sclerosis

Essential books-

1. Cooper, R. (2005), Techniques in Clinical Neurophysiology, Elsevier Churchill
2. Jain, A K, Textbook of Physiology, Avichal Publishing Company,5thedition
3. John E Hall, Guyton and Hall Textbook of Medical Physiology (Guyton Physiology), 13th edition

Suggested books:

1. Varshney, V P, Ghai's textbook of Practical Physiology,9th edition, Jaypee B.M.P. (P) Ltd, New Delhi

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Semester–5th						
Paper Code	**Paper Name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
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 analyze quality and quantity of sleep using various questionnaires and polysomnography, and identify abnormal findings regarding sleep and its architecture.

Unit I: Sleep Physiology: Normal sleep wake cycle, types of sleep, wake state, stages of sleep, 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 II: Subjective sleep assessment: Importance of sleep in overall health, overview of subjective vs objective sleep, sleep assessment, role of subjective assessment in clinical/ research settings, methods, sleep diaries and questionnaires, PSQI, ESS, SSS, sleep quality vs sleep quantity, limitations and challenges of subjective sleep assessment.

Unit III: Polysomnography: Physiological measurements EEG, electro-oculogram (EOG), submental EMG, ECG, respiration, blood oxygen saturation, expired CO 2, body and limb movement, audio-visual monitoring, time, recording protocol for a standard nocturnal study and interpretation.

Unit IV: 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 V: Non-Nocturnal Sleep Studies: Multiple sleep latency tests, maintenance of wakefulness test, out of sleep center test, subjective evaluation of sleepiness, sleep scoring, actigraphy, methods, interpretation, sleep deprivation, clinical application of sleep studies.

Essential Books –

1. Robertson, B. (2014), Polysomnography for the sleep technologist, Elsevier Churchill
2. Chakravorty, S. (2009), sleep disorders medicine,3rdedition, Saunders, Elsevier

Suggested Books –

1. Christian Guillemin Ault, (2005) Clinical Neurophysiology of Sleep Disorders, Volume 6, 1st Edition

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Semester–5th						
Paper code	**Paper name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
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 could help in treatment by making electrophysiological investigation more accurate for diagnosis. Statistical 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 problem 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 I: 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—Pathogenesis (Agent, Host, environmental & Risk Factors), Spectrum of Disease, Iceberg of Disease, Disease Elimination and Eradication, Monitoring and Surveillance, Prevention (Primary, Secondary and Tertiary), Immunizing Agents (Vaccines, Immunoglobulins, and antisera).

Unit II: Health Program & Organization: National Vector Borne Disease Control Program-Malaria, Lymphatic Filariasis, Kala Zar, Japanese Encephalitis & Dengue Fever, Revised National Tuberculosis Control Program, National AIDS Control Program, Iodine Deficiency Disorders, National Viral Hepatitis Control Program.

Unit III: Epidemiology of Chronic Non-Communicable Diseases and Conditions- Hypertension, Diabetes Mellitus, Obesity, Visual Impairment, and Blindness.

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

Unit V: 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:

1. Park's Textbook of Preventive & Social Medicine. K. Park
2. Introduction to Public Health. Marry-Jane Schneider

Suggested Readings-

1. Oxford Textbook of Global Public Health. Roger Detels, Martin Gullifor Quarraisha Abdool Karim.
2. Public Health Nutrition from Principle to Practice. Mark Lawrence & Tony Worsle

Semester–5th						
Paper Code	**Paper name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
MEP 504P	Practical IX (MEP 501, MEP 502)	98	8	100	100	200

Exercise Related to MEP 501:

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

Exercise Related to MEP 502–

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 analyze polysomnography of a normal subject.
4. To record and analyze multiple sleep latency test of a normal subject.
5. To record and analyze maintenance of wake fulness test of a normal subject.

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Semester–5th						
Paper code	**Paper name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
MEP 505 P	Evaluative Clinical Training II	252	8		100	100

Exercises Related to Neuro/Cardio electrophysiology:

1. Treadmill Test
2. Pulmonary FunctionTest
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

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Semester–6th						
Paper Code	**Paper name**	**Total Hrs.**	**Credit**	**IA**	**SE**	**Total**
MEP 601	Quality Assurance& Medical Ethics	56	4	25	75	100

Objectives - Quality Assurance prepares students to detect, reduce and correct deficiencies in laboratories analytical processes to release patient results and improve the quality of test results. 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 - Students 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 I: Quality in Health Care: Concept of Quality of Life, Dimensions, International Scenario for Quality in Health Care, Indian Scenario, Cost of Quality (Economic Feasibility), Improvement of Quality of Services, Quality improvement tools, Certification /Accreditation, Patient Safety Goal.

Unit II: 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 patients.

Unit III: Basic Concept of Ethics: Medical Ethics Definition and code of conduct**,** Principle of Ethics-Autonomy, Beneficence, Non-Maleficence, Justice, Accountability, Confidentiality, Ethical Guidelines, Good Clinical practices (GCP), Protocol, Standard operating procedure (SOP), Inclusion Exclusion criteria, Informed consent form, Ascent form, Case record form, Ethics committee, reporting of Adverse event and serious adverse events.

Unit IV: Medical Records: Introduction to Medicolegal Aspects, Structure and Maintenance of Medical Records, Confidentiality of Medical Records, Privileged Communication, Release of Medical Information, Retention and Disposal of Medical Records, Medicolegal Cases I involving Medical Records, Digital Health Records and Legal Considerations, Medical Records in Research and Public Health, Regulatory and Accreditation Standards.

Unit V: Basic biostatistical approaches: Types of Data and Presentation, Comparison of pre & Post Data, Hypothesis Testing.

Essential Reading-

1. Quality management in hospital–S. K Joshi
2. Quality assurance in hospitals: strategies for assessment & implementation—Grahm, Nancy o.

Suggested Readings–

1. Hospital quality assurance; risk management & programme evaluation—Jesus jebena
2. Quality assurance in hospital nutrition services.

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Semester–6th						
Paper Code	**Paper Name**	**Total Hrs.**	**Credit**	**IE**	**SE**	**Total**
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 FunctionTest,
5. Can assist Defibrillation,
6. Defibrillators–Study the features and use resuscitation devices,
7. Bedside patient monitoring,
8. Treadmill Testing-Investigate the exercise performance in a healthy Subject.
9. Cardiac stresstesting,AmbulatoryElectrocardiography-HolterMonitorElectrocardiography.
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 z 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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