



B. Voc. Medical Electrophysiology

(B. Voc. - MEP)

Syllabus

w.e.f Academic Session 2026-2027

DDU KAUSHAL KENDRA

Jamia Millia Islamia

New Delhi-110025

B.VOC. Medical Electrophysiology (B.VOC. MEP)

Duration: Three Years (6 semesters)

Medical Electrophysiology (MEP) is a specialized allied health discipline focused on the recording, analysis, and clinical interpretation of bioelectrical signals generated by the human body. It plays a crucial role in the diagnosis, monitoring, and management of neurological, neuromuscular, cardiovascular, respiratory, and sleep-related disorders. The field encompasses essential diagnostic techniques such as electrocardiography (ECG), electroencephalography (EEG), electromyography (EMG), nerve conduction studies (NCS), evoked potentials (EPs), and polysomnography (PSG). Accurate electrode placement, high-quality signal acquisition, and recognition of artifacts are central to reliable testing.

Medical Electrophysiology professionals work at the interface of clinical medicine, physiology, and biomedical instrumentation. Their role requires strict adherence to patient safety, ethical practice, infection control measures, data confidentiality, and quality assurance standards. By providing objective functional assessments, MEP supports clinicians in correlating electrophysiological findings with clinical presentations for evidence-based diagnosis and treatment planning.

The discipline is rapidly evolving due to advances in biomedical technology, digital signal processing, and neuro and cardio diagnostics, alongside the rising burden of cardiovascular, neurological, neuromuscular, and sleep disorders. As a result, there is a growing demand for trained MEP technologists in hospitals, diagnostic laboratories, intensive care units, sleep laboratories, and research environments.

DDU Kaushal Kendra, Jamia Millia Islamia, offers a three-year full-time B. Voc. Medical Electrophysiology program built on a structured, competency-based, and practice-oriented curriculum. The program provides strong foundations in basic medical sciences and instrumentation, followed by progressive specialization through extensive hands-on practical training, supervised clinical postings, and a mandatory final-semester internship. Graduates are prepared with technical competence, ethical grounding, and professional skills to effectively support clinicians in accurate diagnosis, patient monitoring, and delivery of high-quality healthcare services.

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

Sem.	S. N.	Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total	
1	1	MEP 101	Human Anatomy	42	3	40	60	100	
	2	MEP 102	Human Physiology	42	3	40	60	100	
	3	MEP 103	Biochemistry	42	3	40	60	100	
	4	MEP 104	Cell and Molecular Biology	42	3	40	60	100	
	Skill Components								
	5	MEP 105	Information Technology	42	3	40	60	100	
	6	MEP 106	Communication Skills and Professional Ethics	42	3	40	60	100	
	7	MEP 107P	Practical I (MEP 101, MEP 102)	168	6	40	60	100	
	8	MEP 108P	Practical II (MEP 103, MEP 104)	168	6	40	60	100	
Total				588	30	320	480	800	
2	S. N.	Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total	
	1	MEP 201	Concept of Medical Electrophysiology	42	3	40	60	100	
	2	MEP 202	Electronics & Instrumentation	42	3	40	60	100	
	3	MEP 203	Pathology	42	3	40	60	100	
	4	MEP 204	Fundamentals of Cardiology	42	3	40	60	100	
	Skill Components								
	5	MEP 205	Medical Emergencies & Patient Care	42	3	40	60	100	
	6	MEP 206P	Practical III (MEP 201, MEP 202)	168	6	40	60	100	
	7	MEP 207P	Practical IV (MEP 204)	84	3	20	30	50	
Total				462	24	260	390	650	
3	S. N.	Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total	
	1	MEP 301	Applied Electrocardiography	42	3	40	60	100	
	2	MEP 302	Neuromuscular Disorders	42	3	40	60	100	
	3	MEP 303	Electromyography & Nerve Conduction Studies	42	3	40	60	100	
	Skill Components								
	4	MEP 304	Data Analysis and Quality Assurance	42	3	40	60	100	
		MEP 305P	Practical V (MEP 301)	84	3	20	30	50	
	5	MEP 306P	Practical VI (MEP 302, MEP 303)	168	6	40	60	100	
6	MEP 307P	Clinical Training I	224	8	---	200	200		
Total				644	29	220	530	750	

Sem	S. N.	Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total	
4	1	MEP 401	Emerging Cardiovascular Techniques	42	3	40	60	100	
	2	MEP 402	Respiratory Medicine Technologies	42	3	40	60	100	
	3	MEP 403	Neurological Disorders	42	3	40	60	100	
	4	MEP 404	Electroencephalography	42	3	40	60	100	
	Skill Components								
	4	MEP 405	Medical Imaging	42	3	40	60	100	
	5	MEP 406P	Practical VII (MEP 401, MEP 402)	168	6	40	60	100	
	6	MEP 407P	Practical VIII (MEP 403, MEP 404)	168	6	40	60	100	
Total				546	27	280	420	700	
5	S. N.	Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total	
	1	MEP 501	Sensory Physiology & Evoked Potentials	42	3	40	60	100	
	2	MEP 502	Polysomnography & Sleep Studies	42	3	40	60	100	
	3	MEP 503	Public Health	42	3	40	60	100	
	Skill Components								
	5	MEP 504	Entrepreneurship & Management in Healthcare	42	3	40	60	100	
		MEP 505P	Practical IX (MEP 501, MEP 502)	168	6	40	60	100	
	6	MEP 506P	Clinical Training II	224	8	---	200	200	
Total				560	26	200	500	700	
6	S. N.	Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total	
	Skill Components								
	1	MEP 601P	Clinical Training & Internship	616	22	---	400	400	
Total				616	22	---	400	400	
Grand total (Semester I-VI)				3416	155	1280	2720	4000	
Total skill component credits in all (I-VI) semesters: 104 Credits									
Total knowledge component credits in all (I-VI) semesters: 51 Credits									
Total credits (I-VI) semesters = 158									
Total marks (I-VI) semesters = 4000									
Total hours (I-VI) semesters = 3416 (Skill components 2408 hrs. & knowledge Components 1008 hrs.)									

Semester-I						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 101	Human Anatomy	42	3	40	60	100

Unit I: General Anatomy & Musculoskeletal System

Anatomical terms, planes, positions, and body organization, Tissues: definition, classification characteristics, locations, and functions. Skeletal system: Types and structure of bones, Axial and appendicular skeleton, Bone formation and growth; Joints: classification and structural types. Muscular system: Types of muscles, Muscle structure, Basic movements at joints and muscles producing movement.

Unit II: Nervous System & Special Senses

Neurons and neuroglia: structure and classification, Central Nervous System (CNS): brain and spinal cord (gross structure and functions), Peripheral Nervous System (PNS): cranial & spinal nerves, Autonomic Nervous System (ANS): sympathetic & parasympathetic divisions Special senses: Eye, ear, nose; Auditory and olfactory apparatus; Structure of skin.

Unit III: Cardiovascular & Lymphatic Systems

Heart: External and internal structure, chambers, valves, cardiac cycle, functions. Blood Vessels: Arteries, veins, capillaries – structure and functions. Arterial System: Types of arteries, major arteries, functional significance. Venous System: Types of veins, major veins, valves and venous return. Lymphatic System: Lymph, lymphatic vessels, lymph nodes, functions. Lymphoid Tissue: Types of lymphoid organs, microscopic structure of lymph nodes.

Unit IV: Respiratory & Digestive Systems

Respiratory System: Parts of the respiratory tract, Nasal cavity & paranasal air sinuses, Trachea: structure, Lungs: gross and microscopic structure, Diaphragm and pleura Digestive System: Parts of digestive system, Structure of tongue & salivary glands, Stomach, intestines, Liver and pancreas.

Unit V: Urinary, Reproductive & Endocrine Systems

Urinary System: Kidney: gross structure and nephron basics; Ureters, urinary bladder and urethra Reproductive System: Gross structure of male reproductive organs, Gross structure of female reproductive organs. Endocrine System: Pituitary, thyroid, parathyroid, Pancreas (endocrine part), Adrenal glands.

Suggested Reading:

1. Chaurasia, B. D. (2024). Human anatomy (Vols. 1–4, 10th ed.). CBS Publishers.
2. Drake, R. L., Vogl, A. W., & Mitchell, A. W. M. (2020). Gray's anatomy for students (42nd ed.). Elsevier.
3. Hamilton, W. J. (n.d.). Textbook of anatomy.
4. Ross, T., & Wilson, A. (2022). Anatomy and physiology in health and illness (14th ed.). Elsevier.

Semester-I						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP102	Human Physiology	42	3	40	60	100

Unit I: Blood, Homeostasis & Introductory Physiology Concepts

Composition and functions of blood, plasma constituents, and morphological features of blood cells. Haematopoiesis, structure and abnormalities of haemoglobin, physiological and pathological types of anaemia, and mechanisms of haemostasis. Introduction to the concept of homeostasis, internal environment, negative and positive feedback mechanisms, and their relevance in physiological regulation. Brief overview of body fluid compartments, distribution of electrolytes, osmolarity, tonicity, and significance of fluid balance.

Unit II: Nerve and Muscle Physiology

Structure and functional properties of neurons and neuroglial cells, resting membrane potential, action potential, and impulse propagation. Excitability, conductivity, all-or-none law, accommodation, adaptation, summation, refractory periods, and fatigability. Neuromuscular junction structure and synaptic transmission. Microscopic and ultrastructural organization of skeletal, smooth, and cardiac muscle. Single-unit and multi-unit smooth muscle, muscle proteins, properties of skeletal muscle, and mechanisms of contraction and relaxation in skeletal and smooth muscles.

Unit III: Cardiovascular and Respiratory Systems

Properties of cardiac muscle, origin and propagation of cardiac impulse, conduction system of the heart, cardiac cycle, and heart sounds. Regulation of cardiac output and blood pressure (short-term and long-term mechanisms). Respiratory muscles, respiratory volumes and capacities, diffusion and transport of oxygen and carbon dioxide, regulation of respiration, types of hypoxia, cyanosis, asphyxia, anatomical and physiological dead space, oxygen and myoglobin dissociation curves and their modifying factors, and factors affecting the carbon dioxide dissociation curve.

Unit IV: Digestive System

Functions of the alimentary canal, physiology of deglutition, movements of the gastrointestinal tract, composition, secretion, and functions of salivary, gastric, pancreatic, intestinal juices, and bile. Mechanisms of digestion and absorption of carbohydrates, lipids, proteins, and nucleic acids. Physiology of hunger, satiety, and gut hormones. Defecation reflex and associated regulation.

Unit V: Excretory and Reproductive Systems

Structure and functions of the kidneys, components of the nephron, measurement and regulation of glomerular filtration rate, renal blood flow regulation, renin-angiotensin system, mechanisms of urine formation, and renal clearance tests. Acid-base balance and its physiological regulation. Functions of ovaries, sex hormones, menstrual cycle, ovulation, pregnancy, parturition, and lactation. Contraceptive methods and their physiological basis. Male reproductive physiology including testosterone regulation and spermatogenesis.

Suggested Reading:

1. Ghai, C. L. A textbook of practical physiology. Jaypee Brothers Medical Publishers.
2. Guyton, A. C., & Hall, J. E. Textbook of medical physiology. Elsevier.
3. Harrison, T. R. Harrison's principles of internal medicine. McGraw Hill.
4. Jain, A. K. Textbook of physiology. Arya Publications.
5. Khurana, I. Medical physiology. Elsevier.
6. William, F., & Ganong, W. B. Review of medical physiology. McGraw Hill.

Semester-I						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 103	Biochemistry	42	3	40	60	100

Unit I: Carbohydrates, and its Biological Oxidation

Definition, structure, classification, and biological functions of carbohydrates. Carbohydrate metabolism: Glycolysis, Catabolic fates of pyruvate, Formation and metabolic fate of acetyl-CoA, Citric acid (TCA) cycle, Gluconeogenesis, Glycogen metabolism (glycogenesis and glycogenolysis), Pentose phosphate pathway, Electron transport chain and oxidative phosphorylation.

Unit II: Proteins and Protein Metabolism

Amino Acids and Proteins: Structure and classification of amino acids, Structural organization of proteins (primary, secondary, tertiary, and quaternary structures), Structure–function relationships in proteins. Plasma Proteins: Major classes of plasma proteins, Synthesis and functions of plasma proteins, Separation and estimation of plasma proteins, Anticoagulants, Aseptic separation of serum and plasma, Protein Metabolism, Non-protein nitrogenous compounds, Urea and Blood Urea Nitrogen (BUN): Creatine and creatinine: synthesis, clinical significance, and estimation, Uric acid: synthesis, clinical significance, and estimation, Ammonia metabolism, Porphyrins and porphyrin metabolism

Unit III: Lipids and metabolic integration

Lipids: Definition, structure, classification, and biological functions of lipids, Fatty acids: structure and classification, Triacylglycerols (triglycerides or neutral fats). Lipid Metabolism: Fatty acid synthesis and β -oxidation, Ketone body metabolism, Metabolic Integration, Integration of carbohydrate, lipid, and protein metabolism, Metabolic adaptations during fed state, fasting, and starvation, Phases of starvation, Metabolic changes in diabetes mellitus

Unit IV: Vitamins, Minerals, and Nutrition

Vitamins: Classification and functions of vitamins, Deficiency disorders, Nutrition, Balanced diet and its nutritional importance, Calorific value of foods, Basal Metabolic Rate (BMR), Protein-energy malnutrition: Kwashiorkor and Marasmus, Minerals and Bone Metabolism, Classification of minerals, Metabolism of calcium, phosphorus, and sulphur, Disorders associated with abnormal calcium and phosphorus metabolism, Metabolism of trace elements, Bone metabolism and markers of bone turnover

Unit V: Nucleic Acids and Enzymes

Structure of nucleotide bases, nucleosides, and nucleotides, Structure and functions of DNA and RNA, Biosynthesis and degradation of nucleic acids, De novo and salvage pathways of nucleotide synthesis. Enzymes: Basic concepts, roles, and classification of enzymes, Types of enzymes, coenzymes, and isoenzymes, Properties and mechanisms of enzyme action, Factors affecting enzyme activity, Measurement of enzyme activity, Enzyme assays and enzyme kinetics, Diagnostic significance of enzymes

Suggested readings:

- Berg, J. M., Tymoczko, J. L., Gatto Jr., G. J., & Stryer, L. (2023). *Biochemistry* (10th ed.). W.H. Freeman and Company; Macmillan Learning.
- Lieberman, M. A., & Peet, A. (2025). *Mark's basic medical biochemistry: A clinical approach* (7th ed.). Wolters Kluwer Health.
- Nelson, D. L., Cox, M. M., & Hoskins, A. A. (2021). *Lehninger principles of biochemistry* (8th ed.). W. H. Freeman and Company; Macmillan Learning.
- Satyanarayana, U., & Chakrapani, U. (2022). *Biochemistry* (5th ed., updated & revised). Elsevier India.

Semester-I						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 104	Cell and Molecular Biology	42	3	40	60	100

Unit I: The Cell – Structure and Basic Organization

Cell as a basic unit of life, discovery of the cell, comparison of prokaryotic and eukaryotic cells, unicellular and multicellular organisms, microscopic study of the cell (compound microscope, electron microscope, cell fractionation), ultrastructure of cells, cell wall and plasma membrane (unit membrane concept, fluid mosaic model), membrane transport (passive diffusion, facilitated diffusion, active transport), and cellular movement (exocytosis, endocytosis).

Unit II: Organelles of Cells and Their Functions

Structure and function of Nucleus, Mitochondria, Plastids, Endoplasmic Reticulum, Golgi Complex, Lysosomes, Centrosome, Mesosomes, Vacuole, Cytoskeleton (microtubules, microfilaments, intermediate filaments), cilia, flagella, and ribosomes.

Unit III: Cell Cycle, Division, and Cell Death

Phases of the cell cycle, regulation of cell cycle progression, cell cycle checkpoints, mitosis and meiosis (events of mitotic and meiotic phases), non-disjunction, fertilization, programmed cell death (apoptosis and necrosis), cell senescence and aging, stem cells (embryonic, tissue, and induced pluripotent stem cells), cloning (reproductive and therapeutic), and a basic introduction to the biology of cancer cells and oncogenesis.

Unit IV: Organization of the Genome

Molecular composition of nucleic acids, structure of DNA, structure of RNA, chromosome structure, nucleosome and chromatin organization, euchromatin and heterochromatin, structure of gene, operons and gene clusters, exons and introns, genome size and complexity, repetitive DNA sequences, satellite DNA, minisatellites, microsatellites, transposable elements, mitochondrial genome, plastid genome in microbes, central pathway for transfer of genetic information, and genomic variation including SNPs, VNTRs, and structural variants.

Unit V: Transcription, Translation, and Genetic Regulation

Central dogma, DNA replication, replication enzymes, replication errors, transcription of DNA to RNA, RNA polymerases, transcription factors, promoters and enhancers, translation machinery, genetic code, regulation of gene expression, transcriptional control, epigenetic regulation (DNA methylation, histone modification, imprinting), operon concept, DNA mutations (point mutations, frameshift mutations, silent/missense/nonsense mutations), mutagens, and DNA repair mechanisms including base excision repair, nucleotide excision repair, mismatch repair, double-strand break repair, and SOS repair.

Suggested readings:

1. Alberts, B., Johnson, A. D., Lewis, J., Morgan, D., Raff, M., Roberts, K., & Walter, P. (2022). *Molecular biology of the cell* (7th ed.). W. W. Norton & Company.
2. Rastogi, S. C. (2023). *Cell biology* (5th ed.). New Age International Private Limited.
3. Chaudhary, K. *Molecular biology: Fundamental processes*.
4. Chaudhary, M. R. *Laboratory manual for molecular genetic tests*. Jaypee Brothers

Semester-I						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 105	Information Technologies	42	3	40	60	100

UNIT I: Fundamentals of Computers and Operating Systems

Fundamentals of Computers: Definition, characteristics, advantages, limitations, and applications of computers, History and generations of computers, Block diagram of a computer system, Input and output devices, Central Processing Unit: ALU, Control Unit, Memory devices: Primary and secondary memory, Types of Computers. Computer hardware components, Software: System software and application software. Operating Systems: Definition, architecture, functions, and services of operating systems. Introduction to MS Windows and basic commands.

UNIT II: Number Systems, Data Processing, and Programming Concepts

Number Systems: Non-positional and positional number systems, Binary, octal, decimal, and hexadecimal number systems, Conversion between number systems, Fractional number conversion. Data and Information: Concepts and differences, Qualities of good information, Data processing cycle, Types of data processing, Data processing systems, Data Storage Systems. Programming Fundamentals: Introduction to programming concepts. Problem-solving techniques, Algorithms and Flowcharts

UNIT III: Computer Networks, Internet, and Web Technologies

Computer Networks: Basics of computer networks, Types of networks: LAN, MAN, WAN, Network topologies, Networking devices, Network services. Internet and Web Concepts: Definition and brief history of the Internet: WWW, web page, website, URL, IP, HTML, HTTP, TCP/IP, search engine. Cyber Security: Introduction to cyber security, Types of cyber threats, Malware, viruses, and firewalls, Applications of IT in healthcare system.

UNIT IV: Office Automation, Creative Tools, and Data Management

Microsoft Office tools: document formatting, tables, graphics, SmartArt, hyperlinks, and proofreading features. MS Excel: formulas, functions, data formatting, sorting, filtering, charts, and data management. MS PowerPoint: slide design, transitions, animations, and SmartArt. Adobe Photoshop: photo editing, graphic design, and digital illustration. Basic training in data and biological analysis tools: GraphPad Prism, SigmaPlot, and MedCalc.

UNIT V: Data Structures, DBMS, and Artificial Intelligence

Data Structures and File Management: Introduction to data structures. Arrays and strings, Stacks and queues, File organization and management concepts, Types of files. Introduction to Artificial Intelligence: Definition, history, scope, and applications, Intelligent systems and characteristics of AI, Branches of AI, Introduction to Machine Learning, Relationship between AI, ML, and Deep Learning, Types of Machine Learning, Introduction to neural networks and deep learning, Tools and platforms for AI and ML, Ethical issues and social impact of AI, Biological and Data Analysis Software.

Suggested readings:

1. Sinha, P. K., & Sinha, P. (2022). Foundations of Computing: Essential for Computing Studies, Profession and Entrance Examinations. BPB Publications.
2. Balagurusamy, E. (2009). Fundamentals of Computers. McGraw-Hill Education.

Semester-I						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 106	Communication skills and Professional Ethics	42	3	40	60	100

Unit I: Basic Grammar and Structure

Nouns, Pronouns, Adjectives, Adverbs, Verbs (Transitive/Intransitive), Tenses, Sentence Structure: Simple, Compound, and Complex sentences. Active and Passive Voice, Verb agreement, Identifying and correcting common errors in English usage.

Unit II: Vocabulary for the Medical and Scientific Context

Medical Terminology: Definition, importance, word formation, usage in clinical and laboratory settings. Prefixes, Suffixes, and Root Words: Common medical prefixes, suffixes, and roots; combining forms and meanings. Scientific Jargon: Common scientific and laboratory terms, abbreviations, and symbols used in MLS. Synonyms and Antonyms: Common medical Synonyms and antonyms for accurate interpretation and reporting. Formal vs. Informal Language: Use of formal medical language in documentation, reports, and professional communication.

Unit III: Reading Comprehension and Interpretation

Comprehension of Technical Texts: Reading strategies for medical and laboratory-related texts. Scientific Articles: Structure of research papers, interpretation of data, tables, and graphs. Standard Operating Procedures (SOPs): Reading, understanding, and following laboratory SOPs. Research Abstracts: Identification of objectives, methodology, results, and conclusions. Critical Interpretation: Extracting relevant information for clinical and laboratory decision-making.

Unit IV: Formal Correspondence and presentations

Letters and Applications, Letter to the Editor. Professional letter: sales, enquiry, order, complaints and other. Applications for jobs and higher studies: cover letter/ resume/ CV, Structuring a presentation (Introduction, Body, Conclusion) on a technical/scientific topic, speech, extempore, group discussions, Interview, dialogue session. Note-taking/Summary, paraphrasing, briefs of medical passages, E-mail writing, avoiding plagiarism and proper citation of sources.

Unit V: Oral Communication and workplace communication

Pronunciation Practice: Word Accent, Stress, and Intonation, Active listening skills, overcoming communication barriers, and comprehending diverse accents (essential for client/patient interaction). Non-Verbal Communication: Body language, eye contact, gestures, and professional appearance.

Suggested Readings:

1. Chabner, D. E. (2020). The language of medicine (12th ed.). Elsevier.
2. Sharma, R. C., & Mohan, K. (2018). Business correspondence and report writing (6th ed.). Tata McGraw-Hill Publishing Company Limited.
3. Tiwari, A. (2021). Communication skills in English. Khanna Book Publishing Co. Pvt. Ltd.
4. Wren, P. C. (2022). High school English grammar and composition. S. Chand Publishing.
5. Part, A. (2009). English and business communication. S. Chand Publishing.

Semester-I						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 107P	Practical I (MEP 101, MEP 102)	168	6	40	60	100

Human Anatomy:

1. Demonstration of major human tissues through permanent slides.
2. Demonstration of human skeletal system.
3. Demonstration of various joints in the human body.
4. Demonstration of parts of circulatory system through charts and models.
5. Demonstration of parts of respiratory system through charts and models.
6. Demonstration of parts of nervous system through charts and models.
7. Demonstration of parts of eye and ear through charts and models.
8. Demonstration of parts of digestive system through charts and models.
9. Demonstration of parts of urinogenital system through charts and models.

Human Physiology:

1. To estimate the haemoglobin concentration in blood.
2. To determine the total red blood cell (RBC) count.
3. To determine the total white blood cell (WBC) count.
4. To determine bleeding time and clotting time.
5. To determine the blood group of the individual.
6. To measure arterial blood pressure.

Semester-I						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 108P	Practical II (MEP 103, MEP 104)	168	6	40	60	100

Biochemistry:

1. Identification of carbohydrates: Molisch's test, Benedict's test, Fehling's test, Tollen's test, Iodine test, Seliwanoff's test, Barfoed's test, Osazonetest and Bial's test
2. Estimation of blood glucose by GOD POD method.
3. Identification of cholesterol by Salkowski's test.
4. Identification of lipids by Sudan III test.
5. Identification of protein and amino acids by Ninhydrin test, Biuret test, Xanthoproteic test, and Millon's test.
6. Investigating the effect of temperature and pH on enzyme (amylase, urease) activity.
7. Use of anticoagulant (EDTA/citrate/heparin), centrifugation and safe handling of blood specimens.

Cell and Molecular Biology:

1. Parts of a microscope, usage & caring for the microscope.
2. Use of different staining methods (e.g., Methylene Blue, Iodine solution, Acetocarmine, Haematoxylin & Eosin) to highlight different cellular components.
3. Observing stained tissue samples showing signs of apoptosis (programmed cell death) and necrosis (accidental cell death) under the microscope and comparing morphological differences.
4. Mitosis in onion root tip– preparation and observation of a crush smear and comparison with teaching slides.
5. Demonstration of phases of meiosis in grasshopper testes.
6. Agarose Gel electrophoresis and PCR demonstration
7. Analysis of Human Chromosomes using provided photomicrographs.

Semester–II						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 201	Concept of Medical Electrophysiology	42	3	40	60	100

Unit I: Basic Electrophysiology

Cell membrane structure and membrane transport mechanisms, sodium and potassium ion channels, voltage-gated and ligand-gated channels, resting membrane potential, postsynaptic potentials, action potential generation and propagation, compound action potential, synaptic transmission mechanisms and types, skeletal muscle structure and function, neuromuscular junction physiology, motor units and motor unit recruitment, Motor Unit Action potential (MUAP) characteristics and features.

Unit II: Techniques in Neuro-electrophysiology

Overview and types of clinical electrophysiology techniques, introduction to electrophysiology instrumentation, general principles of electrophysiological recording, Classification and techniques of invasive vs. non-invasive recordings. Electro-corticography (ECoG): definition, procedure and clinical application. Intramuscular electromyography: uses, advantages and disadvantages.

Unit III: Basic Electromyography

Definition, type of recording procedure, surface vs. needle EMG, basic procedures and uses, indications, contraindications, advantages, disadvantages, instrumentations, electrode types and placement, signal characteristics, types of muscular activities, insertional activity, spontaneous activity, motor unit action potential, applications in neuromuscular disorders.

Unit IV: Basic Electroencephalography

Definition, origin of EEG signals, cortical and scalp potentials, instruments, electrode placement, 10–20 international system, indications, contraindications, advantages, disadvantages, waveforms (alpha, beta, delta, theta), basic recording setup and montages. Clinical uses in epilepsy sleep disorders, brain monitoring and other conditions.

Unit V: Basic Nerve Conduction Studies

Definition, principle of nerve conduction, motor and sensory pathways, types of nerve conduction studies, motor and sensory conduction studies, orthodromic, antidromic studies, indications, contraindications, advantages, disadvantages. Key parameters and waveform including latency, amplitude, conduction velocity. Clinical relevance in peripheral neuropathies and radiculopathies.

Suggested Readings:

1. Cooper, R. (2005). *Techniques in clinical neurophysiology*. Elsevier Churchill Livingstone.
2. Misra, U. K., & Kalita, J. (2014). *Clinical neurophysiology*. Elsevier Churchill Livingstone.
3. Hall, J. E. (2016). *Guyton and Hall textbook of medical physiology* (13th ed.). Elsevier.

Semester–II						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 202	Electronics & Instrumentation	42	3	40	60	100

Unit I: Basic Electrical Concepts and Circuit Elements

Definition and units of basic electrical quantities including voltage, current, charge, power, resistance, capacitance, impedance, and reactance, AC and DC concepts. Power factor, RMS, average, and maximum value of AC. Waveforms: sine wave, square wave, triangular wave, ramp signal. Basic circuit elements: resistors, capacitors, inductors-Types, symbols, colour code representation, series and parallel combinations and equivalent circuits. Transformer: principle and applications.

Unit II: Circuit Laws, Machines, and Sensors

Ohm's law and its applications. Wheatstone bridge: principle and applications. Electrical machines, motor types and uses. Introduction to sensors and transducers. Thermocouples: principle, construction, and applications. Basic measurement concepts used in laboratory instruments.

Unit III: Semiconductor Devices and Analog Electronics

Classification of materials based on electrical conductivity, semiconductors: intrinsic and extrinsic, P-type and N-type semiconductors, diodes: construction, characteristics, and symbols, applications of diodes: switching, rectification: Half Wave Rectifier (HWR), Full Wave Rectifier (FWR), bridge rectifier. Transistors: construction, characteristics, and basic applications, transistor as an amplifier. Power supply unit: block diagram and working.

Unit IV: Integrated Circuits, Operational Amplifiers, and Signal Generation

Introduction to integrated circuits (ICs), operational amplifiers (Op-Amps): basic concepts and characteristics, applications of Op-Amps: adder, subtractor, multiplier. Signal generators: sine wave, square wave, triangular wave. Relevance of analog electronics in medical and diagnostic instruments.

Unit V: Digital Electronics, Medical Instrumentation, and Electrical Safety

Binary number system, bits and bytes, octal and hexadecimal number systems. Binary arithmetic: addition and subtraction, 1's complement and 2's complement. Logic gates: AND, OR, NOT, NAND, NOR, XOR, XNOR. Truth tables and Boolean expressions. Analog-to-digital (A/D) and digital-to-analog (D/A) converters. Electrical safety: physiological effects of electric current, electrical shock hazards, methods of accident prevention; classification of medical equipment based on type and mode of protection.

Suggested readings:

1. Theraja, B. L. (2006). *Basic Electronics: Solid State*. S. Chand Publishing.
2. Khandpur, R. S. (2014). *Handbook of biomedical instrumentation* (2nd ed.). McGraw Hill Education.
3. Webster, J. G., & Kropf, R. F. (2014). *Medical instrumentation: Application and design* (4th ed.). Wiley.

Semester–II						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 203	Pathology	42	3	40	60	100

Unit I: General Pathology and Cell Injury

Introduction to pathology, its definition and branches. Etiopathogenesis of disease, common terminologies used in pathology. Importance of Pathology in diagnostics. Cellular adaptation: definition and types. Etiology of cell injury and its types. Cellular morphologic changes in reversible and irreversible injury. Cell death and its types. Patterns of necrosis. Intracellular accumulation: etiopathogenesis and its types, endogenous and exogenous pigments.

Unit II: Inflammation

Definition and classification, acute inflammation, hallmarks, phases and role of its chemical mediators, chronic inflammation and its chemical mediators, role of macrophages in chronic inflammation. Granulomatous inflammation: pathogenesis, types, formation of granuloma. Wound repair: types, role of macrophages and fibroblasts, disease associated with abnormal wound repair.

Unit III: Hemodynamic

Normal physiology of fluid balance in tissue and pressure gradients, etiopathogenesis of edema, difference between transudates and exudate with its clinical importance. Hyperaemia and congestion. Thrombosis-Virchow's triads and fate of thrombosis. Ischemia and infarction.

Unit IV: Neoplasia

Definition and overview of neoplasm, classification and nomenclature of tumours. Dysplasia, invasion and metastasis. Pathways of metastasis and its clinical importance. Hallmarks of cancer. Carcinogenesis: overview and types. Diagnosis of cancer: clinical features, laboratory investigation including cancer biomarkers, radiological investigations, gross and microscopic changes. Management of cancer: surgery, chemotherapy, immunotherapy, radiotherapy.

Unit V: Systemic Pathology

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. Nervous system: infective diseases, ischemic brain damage, cerebral infarction, degenerative diseases. Digestive system: Barret's oesophagus, cirrhosis of liver. Excretory system: glomerulonephritis, nephritic & nephrotic syndrome, pyelonephritis, hydronephrosis.

Suggested readings:

1. Mohan, H. (2014). *Textbook of Pathology*. India: Jaypee Brothers Medical Publishers Pvt. Limited.
2. Kumar, V., Abbas, A. K., Fausto, N., & Aster, J. C. (2014). *Robbins and Cotran pathologic basis of disease, professional edition e-book*. Elsevier health sciences.
3. Bhardwaj, J. R. (2013). *Boyd's Pathology*. Wolters kluwer india Pvt Ltd.
4. Kawthalkar, S. M. (2018). *Essentials of clinical pathology*. JP Medical Ltd.

Semester-II						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 204	Fundamentals of Cardiology	42	3	40	60	100

Unit I: Cardiac Cycle

Events during cardiac cycle, cardiac conduction system: electrical potential in cardiac muscle, origin & distribution of cardiac impulse. Assessment of cardiac output: Fick principle, thermodilution and indicator dilution methods. Heart rate and its autonomic and cardiovascular regulation. Pulse, jugular venous pulse, heart sounds (S1, S2, S3, S4).

Unit II: Hemodynamic & Cardiac Output

Hemodynamics-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 (arteries, arterioles and micro-circulation), blood pressure (determinants, variations: hypertension and hypotension), regulation of blood pressure.

Unit III: Introduction to Electrocardiography

Electrocardiography and Electrocardiogram. Leads and electrodes of ECG: types of electrodes and its placement, types of leads. Waves, intervals and segments of normal electrocardiogram. ECG strips: dimensions, speed, squares. Calibration of time and voltage.

Unit IV: Vectorial Analysis of ECG & Vector Cardiography

Concept of cardiac vectors, mean electrical axis: determination and normal range, abnormalities of mean electrical axis: right axis deviation and left axis deviation, causes of abnormal deviation. Vector Cardiography (VCG), His Bundle Electrocardiogram (HBE).

Unit V: Clinical Application of Electrocardiography

Identification of ECG waves of strip paper. Determination of heart rate, rhythm, cardiac axis, intervals (PR, QRS, QT). Sinus rhythm, sinus bradycardia, sinus tachycardia, types of conduction defects, myocardial ischemia/infarction, cardiac arrhythmias. Application of ECG in medical emergency and ICU.

Suggested readings:

1. Chatterjee, K. (2012). *Cardiology: an illustrated textbook* (Vol. 1). JP Medical Ltd.
2. Harrison's Principles of Internal Medicine, 17th Edition. (2008). United Kingdom: Mcgraw-hill.
3. Khan, S., Hua, R. J. (2013). *Master Visual Diagnosis of ECG: A Short Atlas* (Learn ECG Through ECG). India: Jaypee Brothers Medical Publishers Pvt. Limited.
4. Bhalerao, J. C. (2013). *Essentials of Clinical Cardiology*. India: Jaypee Brothers Medical Publishers Pvt. Limited.

Semester-II						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 205	Medical Emergencies & Patient Care	42	3	40	60	100

Unit I: Emergency Department Protocols and Critical Interventions

Organization and operational guidelines of the emergency department. Principles of clinical monitoring and rapid patient assessment. Overview of fluid therapy, airway management techniques. Comprehensive role in cardiopulmonary resuscitation and basic life support. Mechanical ventilation: principles and its use. Safe administration of injections (intramuscular, intravenous, subcutaneous) and infusion therapy. Management of acid-base imbalances and electrolyte disorders.

Unit II: Management of Common and Acute Emergencies

Assessment and management of head injuries. Vasovagal syncope, seizures, and status epilepticus. Management of foreign bodies in the nose and ear, epistaxis, and haemoptysis. Classification and clinical presentation of poisoning. Management of diarrhoea, acute urine retention, and dehydration. First aid and emergency protocols for insect bites (including snakebite) and dog bites. Recognition and initial management of hypertensive crises and anaphylaxis. Principles of burn assessment, trauma care, and initial stabilization.

Unit III: Triage Systems and Prioritization in Emergencies

Concept and importance of triage in emergency department. Steps in the triage process and the role of the triage officer. Key factors for triage: acuity, resource needs, and patient flow. Understanding triage categories (e.g., emergent, urgent, non-urgent) and their implications for patient prioritization and departmental workflow.

Unit IV: Foundational Concepts in Patient Care

Concepts of health, illness, and wellness, and their determinants. Understanding patient types, diversity, and individualized care approaches. Principles of patient-centered care, therapeutic communication, and empathy. Legal and ethical aspects: accurate reporting, documentation, and upholding patient rights. Basic concepts of disease classification. General principles of infection prevention, safety protocols, and care for accident and trauma patients.

Unit V: Interdepartmental Coordination and Specialized Care

Overview of clinical settings and role of allied healthcare providers in specialized units: ambulatory care, paediatric and Neonatal ICU (NICU), Critical Care Units (CCU), emergency department, and inpatient wards. Specialized units: hematology-oncology, orthopaedics, psychiatry, neurology/neurosurgery, renal/dialysis, obstetrics & gynaecology. Understanding diagnostic and procedural areas: radiology, cardiac catheterization lab, Operating Room (OR), and Post-Anesthesia Care Unit (PACU).

Suggested readings:

1. Textbook of Adult Emergency Medicine E-Book. (2019). Netherlands: Elsevier.
2. Gupta, S. P., Gupta, D. K. (1999). Medical Emergencies: In General Practice. India: W.R. Goyal.
3. Farcy, D. A., Chiu, W. C., Flaxman, A., Marshall, J. P. (2011). Critical Care Emergency Medicine. United States: McGraw-Hill Education.
4. Wyatt, J. P., Illingworth, R. N., Graham, C. A., Hogg, K., Robertson, C., Clancy, M. (2012). Oxford Handbook of Emergency Medicine. United Kingdom: OUP Oxford.

Semester-II						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 206P	Practical III (MEP 201, MEP 202)	168	6	40	60	100

Exercise Related to MEP 202:

1. To verify ohm's law, and to find the value of unknown resistance using ohm's law.
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. Introduce different component connections of EMG & NCS machine.
2. Introduce the optimum setting and calibration of EMG & NCS machine.
3. Record normal electrical activity of particular muscle.
4. Record normal nerve conduction of a particular nerve.
4. Introduce different component connections of EEG machine.
5. Introduce the optimum setting and calibration of EEG machine
6. Record normal electrical activity of brain from the scalp.

Semester-II						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 207P	Practical IV (MEP 204)	84	3	20	30	50

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.

Semester–III						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 301	Applied Electrocardiography	42	3	40	60	100

Unit I: Congenital and Hereditary Disorders

Congenital heart diseases: etiologies and its classification, tetralogy of Fallot, transposition of the great arteries, Ebstein's A]anomaly, VSD, ASD, PDA. Congenital obstructive diseases-pulmonary/aortic stenosis and coarctation. Pathophysiology, genetic basis, and ECG manifestations of long QT Syndrome, Brugada Syndrome and Wolff-Parkinson-White Syndrome. Impact of Marfan's Syndrome on aortic root and potential for arrhythmias.

Unit II: Acquired Heart Disease

Cardiomyopathy and its types. Inflammatory electrophysiology: endocarditis and pericarditis. Electrical consequences of Kawasaki Disease and Rheumatic Fever. Ischemic heart disease: angina, and myocardial infarction. Pulmonary hypertension and right heart strain (acute cor pulmonale). Peripheral vascular diseases: overview, diagnosis (ankle brachial index) and management.

Unit III: Electrocardiographic Interpretation and Analysis

P wave abnormalities: correlation with atrial enlargement, ectopic foci, and interatrial conduction blocks. ECG criteria and vectorial analysis for diagnosis of ventricular hypertrophy. Characteristic ECG evolution, localization, and differential diagnosis of myocardial ischemia and infarction.

Unit IV: Endocrine and Metabolic Influences on Cardiac Electrophysiology

Electrophysiological effects of thyroid disorders, atrial and ventricular arrhythmias in hyperthyroidism, bradycardia and QT changes in hypothyroidism. Cardiac conduction and structural changes in acromegaly. Arrhythmogenic potential of Cushing's Syndrome and pheochromocytoma (catecholamine-induced).

Unit V: Electrophysiology of Electrolyte Imbalances and Systemic Interactions

Electrophysiological mechanisms of electrolyte disturbances, effects on action potential, automaticity, and conduction. Analysis of ECG patterns in hypo-/hyperkalemia, hypo-/hypercalcemia, and hypo-/hypermagnesemia. Electrophysiological implications of hyponatremia in heart failure.

Suggested readings:

1. Chatterjee, K. (2012). Cardiology: an illustrated textbook (Vol. 1). JP Medical Ltd.
2. Harrison's Principles of Internal Medicine, 17th Edition. (2008). United Kingdom: Mcgraw-hill.
3. Khan, S., Hua, R. J. (2013). Master Visual Diagnosis of ECG: A Short Atlas (Learn ECG Through ECG). India: Jaypee Brothers Medical Publishers Pvt. Limited.
4. Bhalerao, J. C. (2013). Essentials of Clinical Cardiology. India: Jaypee Brothers Medical Publishers Pvt. Limited.

Semester–III						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 302	Neuromuscular Disorders	42	3	40	60	100

Unit I: Neuro-Muscular Anatomy, Physiology & Pathophysiology

Overview of the nervous system with emphasis on the peripheral nervous system, anatomy and physiology of skeletal muscle and neuromuscular junction, structure and function of motor neurons, motor units and muscle fibers, synaptic transmission and neurotransmitters (acetylcholine, norepinephrine), structure of synaptic cleft, basic mechanisms of demyelination, axonopathy and denervation, clinical assessment of motor and sensory function.

Unit II: Peripheral Neuropathies

Classification of neuropathies, mononeuropathy, polyneuropathy, mononeuritis multiplex, compressive neuropathies (median, ulnar, radial, peroneal, tibial nerve involvement), hereditary neuropathies, Charcot–Marie–Tooth disease, diabetic neuropathy, autoimmune neuropathies, motor neuron diseases, amyotrophic lateral sclerosis, overview of clinical features and basic management.

Unit III: Radiculopathies, Plexopathies & Progressive Neuropathies

Anatomy of cervical, thoracic and lumbosacral nerve roots, radiculopathies and common clinical patterns, brachial and lumbosacral plexus anatomy, immune-mediated brachial plexopathy, plexopathies associated with neoplasms and surgical procedures, acute neuropathies including Guillain–Barré Syndrome (GBS), AIDP, CIDP, poliomyelitis, post-polio syndrome, overview of diagnosis and management principles.

Unit IV: Myopathies

Muscular dystrophies, Duchenne, Becker, Facioscapulohumeral (FSHD), limb-girdle muscular dystrophies, inflammatory myopathies, polymyositis, dermatomyositis, inclusion body myositis, basics of metabolic and mitochondrial myopathies, clinical features and introductory management.

Unit V: Neuromuscular Junction Disorders

Autoimmune NMJ disorders, myasthenia gravis and Lambert-Eaton Myasthenic Syndrome (LEMS), toxin-related and channelopathy-related disorders including botulism, neuromyotonia and Isaacs' syndrome, pathophysiology of NMJ failure, clinical manifestations, basic diagnostic and management approaches.

Suggested Readings:

1. Amato, A. A., & Russell, J. A. (2008). *Neuromuscular disorders*. McGraw-Hill Medical.
2. Bannister, R., & Mathias, C. J. (2002). *Brain and Bannister's clinical neurology* (7th ed.). Oxford University Press.
3. Fuller, G. (2017). *Neurological examination made easy* (6th ed.). Lippincott Williams & Wilkins.

Semester–III						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 303	Electromyography & Nerve Conduction Studies	42	3	40	60	100

Unit I: Neuromuscular Physiology & Functional Basis

Anatomy and physiology of nerve and muscle, neuromuscular transmission, synaptic cleft and neurotransmitters (acetylcholine), motor unit structure and function, functional organization, disorders by functional level, neuron cell body dysfunction, axonal dysfunction, myelin sheath dysfunction, neuromuscular junction disorders, primary muscle disorders, physiological basis of EMG and nerve conduction signals.

Unit II: Fundamentals of Nerve Conduction Studies

Indications and contraindications of nerve conduction studies, Principles of Nerve Conduction Studies (NCS), Motor NCS: techniques, parameters (latency, amplitude, conduction velocity). Sensory NCS: techniques, parameters, sensory nerves commonly tested. Instrumentation and Setup: electrodes: types and placement. Stimulus characteristics: strength, duration, frequency, recording, gain, filters, sweep speed. Common abnormalities in nerve conduction studies.

Unit III: Specialized Techniques

Late responses including F-wave, physiology of F-wave, procedure, interpretation. H-reflex: origin, methodology, significance. Blink reflex: cranial nerve assessment. Tests for neuromuscular junction disorders: Repetitive Nerve Stimulation (RNS). Introduction to single-fiber EMG in NMJ testing, factors affecting nerve conduction: age, temperature, limb length, pathology, troubleshooting artifacts and technical errors.

Unit IV: Fundamentals of Electromyography

Indications & contraindications of EMG, types of EMG, conventional needle EMG, surface EMG (sEMG), macro EMG, basics of single-fiber EMG. Instrumentation: electrodes, filters, amplifier, averager, gain, sweep time, Procedure: Electrode placement, rest activity, insertional activity, minimal and maximal contraction. Identification of normal vs. abnormal motor unit potentials (MUAPs). Spontaneous activities: fibrillations, fasciculations, positive sharp waves and other abnormalities.

Unit V: Clinical applications & interpretations

Clinical presentations and electrophysiological approach: Focal neuropathies (carpal tunnel, ulnar neuropathy), generalized neuropathies (e.g., diabetic polyneuropathy), radiculopathies and plexopathies. Evaluation of specific muscles and nerves. EMG findings in: myopathic disorders, neurogenic disorders, neuromuscular junction dysfunction. Informed consent in clinical practice, case-based interpretation and clinical correlation. Role of EMG/NCS in disease progression and prognosis.

Suggested Readings:

1. Preston, D. C., & Shapiro, B. E. (2013). *Electromyography and neuromuscular disorders: Clinical-electrophysiologic correlations* (3rd ed.). Elsevier.
2. Misra, U. K., & Kalita, J. (2014). *Clinical neurophysiology* (3rd ed.). Elsevier Churchill Livingstone.
3. Kimura, J. (2013). *Electrodiagnosis in diseases of nerve and muscle: Principles and practice* (4th ed.). Oxford University Press.

Semester-III						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 304	Data Analysis & Quality Assurance	42	3	40	60	100

Unit I: Quality in Health Care

Concept of quality of life and its dimensions. Quality in health care: definitions and scope, international perspectives on quality in health care and global quality initiatives. Indian scenario of health care quality systems, cost of quality and economic feasibility of quality improvement, approaches to improvement of health care services, quality improvement tools and techniques. Certification and accreditation systems. Patient safety goals and quality benchmarks in health care.

Unit II: Quality Assurance and Quality Management Systems

Concept and importance of quality assurance (QA) in medical electrophysiology. Quality control (QC) versus quality assurance, Elements of a Quality Management System (QMS). Standard operating procedures (SOPs). Equipment quality control: calibration, preventive maintenance, performance checks, and validation of electrophysiological equipment. Internal quality control and external quality assessment. Documentation, audit, and continuous quality improvement. Patient safety and risk management in electrophysiology laboratories.

Unit-III: Medical Ethics and Records

Medical ethics definition and code of conduct, principle of ethics, accountability, confidentiality, ethical guidelines, good clinical practices, informed consent form, ascent form, case record form, ethics committee, reporting of adverse event. Medical records: introduction to medico-legal aspects, structure and maintenance of medical records, confidentiality of medical records, privileged communication, release of medical information, retention and disposal of medical records, medico-legal cases involving medical records, digital health records and legal considerations, medical records in research and public health, regulatory and accreditation standards.

Unit IV: Data Analysis in Laboratory Quality Assurance

Organization and summarization of laboratory data, descriptive statistics including mean, median, mode, standard deviation, variance, coefficient of variation, frequency distribution, histograms, bar charts, and pie charts. Inferential statistics: hypothesis testing, confidence intervals, p-values, correlation and regression analysis for quality monitoring. Use of software tools for data analysis: MS Excel, SPSS, R.

Unit V: Clinical Applications and Emerging Trends in QA and Data Analysis

Application of QA and QC principles in medical electrophysiology laboratories, monitoring key performance indicators (KPIs). Case studies: laboratory errors, troubleshooting, corrective actions, Laboratory information management systems (LIMS), Automation and point-of-care testing (POCT) quality monitoring, Emerging trends: big data analytics, digital dashboards, automated QC systems, ethical, legal, and regulatory considerations in laboratory QA and data management.

Suggested Readings:

1. Joshi, S. (2014). *Quality management in hospitals* (2nd ed.). Jaypee Brothers Medical Publishers Pvt. Limited.
2. Graham, N. O. (1982). Quality Assurance in Hospitals-Strategies for assessment and implementation. *The Journal for Healthcare Quality (JHQ)*, 4(2), 14.
3. Hospital Quality Assurance: Risk Management and Program evaluation. (1984). United States: Aspen Systems Corporation.
4. Vishwakarma, K. (2015). *Biostatistics: A foundation for analysis in the health sciences* (Indian ed.). CBS Publishers.
5. Mahajan, B. K. (2010). *Statistical methods in health sciences* (7th ed.). Jaypee Brothers Medical Publishers.

Semester-III						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 305P	Practical V (MEP 301)	84	3	20	30	50

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-III						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 306P	Practical VI (MEP 302, MEP 303)	168	6	40	60	100

Spotting & assessment techniques related MEP 302

1. Spotting related to:
 - a. Neuro-Muscular Physiology,
 - b. Neuropathies
 - c. Radiculopathies & Plexopathies
 - d. Myopathies
 - e. Neuromuscular Junction Disorders
2. History taking for peripheral nervous system disorders
3. Clinical assessment and examination for peripheral nervous system

Exercises related to MEP 303:

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

Semester-III						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 307P	Clinical Training-I	224	8	--	200	200

Semester-IV						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 401	Emerging Cardiovascular Techniques	42	3	40	60	100

Unit I: Cardiovascular Pharmacology & Invasive Techniques

Anti-anginal agents such as 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 echocardiography, Transthoracic Echocardiography (TTE), stress, Transesophageal (TEE) and 3-dimensional echocardiography, cardiac CT scan, cardiac MRI, PET scan.

Unit III: 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, 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 and errors.

Unit IV: Artificial Pacemaker, Cardiac Arrest & Resuscitation

Artificial Pacemaker and its types, components, method of pacing, physiology of pacemaker, electrocardiographic pattern, pacemaker syndrome, catheter ablation of arrhythmias, cardiac resynchronization therapy, cardiac arrest and resuscitation.

Unit V: Preventive Strategies, Exercise and Rehabilitation

Prevention of shock and heart failure, smoking and cardiac disease, definition, goals, phases and core components of rehabilitation, exercise physiology, body heat, body fluid and salt in exercise and athlete's heart.

Suggested readings:

1. Chatterjee, K. (2012). Cardiology: an illustrated textbook (Vol. 1). JP Medical Ltd.
2. Harrison's Principles of Internal Medicine, 17th Edition. (2008). United Kingdom: Mcgraw-hill.
3. Khan, S., Hua, R. J. (2013). Master Visual Diagnosis of ECG: A Short Atlas (Learn ECG Through ECG). India: Jaypee Brothers Medical Publishers Pvt. Limited.
4. Bhalerao, J. C. (2013). Essentials of Clinical Cardiology. India: Jaypee Brothers Medical Publishers Pvt. Limited.

Semester-IV						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 402	Respiratory Medicine Technologies	42	3	40	60	100

Unit I: Functional Anatomy of the Respiratory System

Functional anatomy of the respiratory system including respiratory passages from nasal cavity to alveoli, pleura and pleural cavity, respiratory parenchyma, and mechanism of breathing with emphasis on respiratory muscles, thoracic movements, and pressure changes during inspiration and expiration.

Unit II: Physiology of Diffusion and Transport of Gases

Alveolar ventilation, ventilation-perfusion ratio, pressure and volume changes during respiration, lung volumes and capacities (static and dynamic), pulmonary compliance and elastance, regulation of respiration, respiratory membrane, factors affecting diffusion, diffusion capacity of the lungs, and transport of oxygen and carbon dioxide.

Unit III: Respiratory Pathologies and Imaging Techniques

Overview of common respiratory disorders including tuberculosis, pneumonia, asthma, bronchiectasis, lung abscess, chronic obstructive pulmonary disease, and pulmonary embolism; diagnostic and imaging techniques including chest radiograph, computed tomography, magnetic resonance imaging, high-resolution computed tomography, thoracocentesis, bronchoscopy, bronchoalveolar lavage, and positron emission tomography.

Unit IV: Disorders of Respiration and Environmental Physiology

Abnormal respiratory patterns including apnea, hypoventilation, hyperventilation, dyspnea, and periodic breathing; disturbances related to respiratory gases such as hypoxia, hypercapnia, hypocapnia, and asphyxia; high-altitude physiology and acclimatization.

Unit V: Treatment Modalities in Respiratory Medicine

Treatment approaches in respiratory care including artificial respiration, mechanical ventilation, oxygen therapy, non-invasive positive pressure ventilation such as continuous positive airway pressure and bilevel positive airway pressure, and basic concepts and indications of lung transplantation.

Suggested Readings:

1. Udwadia, F. E., Udwadia, F. Z., Kohli, F. A., Shah, K. (2019). *Principles of Respiratory Medicine*. India: Jaypee Brothers Medical Publishers Pvt. Limited.
2. Baker, E., Lai, D. (2010). *Respiratory Medicine, E Textbook: Clinical Cases Uncovered*. Germany: John Wiley & Sons, Incorporated.
3. Jain, A. K. (2007). *Textbook of Physiology*. India: Avichal.
4. Guyton, A. C., Hall, J. E. (2006). *Textbook of Medical Physiology*. India: Elsevier Saunders.
5. Ghai, C. (2012). *A Textbook of Practical Physiology*. India: Jaypee Brothers Medical Publishers Pvt. Limited.

Semester-IV						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 403	Neurological Disorders	42	3	40	60	100

Unit I: Cerebrovascular Disorders

Epidemiology, risk factors, classification and pathophysiology, ischemic and hemorrhagic types. Transient ischemic attack (TIA), intracranial hemorrhage and hematoma, clinical features, complications, principles of diagnosis and basics of emergency and acute management. Spinal cord injury: mechanisms and types of injury, complete and incomplete lesions, clinical features based on level of injury and principles of initial management. Cerebral palsy: etiology, classification, manifestations, associated disabilities and overview of management. Hydrocephalus: classification, causes, pathophysiology, clinical features, diagnostic approach and principles of management.

Unit II: Seizures and Epilepsy

Definition, epidemiology and causes, classification and clinical characteristics of major seizure types, epilepsy and status epilepticus: definition, types and clinical overview, basic pathophysiology of seizures and epilepsy, clinical approach to diagnosis including history, examination, investigations and role of EEG, principles of acute, emergency and long-term management of seizures and epilepsy, safety precautions, patient education and post-seizure care.

Unit III: Neurodegenerative Disorders

Overview of dementia syndromes, Alzheimer's disease: definition, epidemiology, classification, pathophysiology, clinical features, diagnosis and principles of management. Mild cognitive impairment: definition, clinical features, progression and management approach. Secondary dementias: causes, clinical features, diagnostic evaluation and management. Multiple sclerosis: definition, etiology, pathophysiology, clinical manifestations, diagnostic criteria and overview of management.

Unit IV: Movement Disorders

Classification of movement disorders, overview of tremors; Parkinson's disease: etiology, pathophysiology and clinical features. Parkinson's-plus syndromes: types and distinguishing features. Ataxias: classification and clinical manifestations. Huntington's disease: genetics, pathophysiology and clinical presentation. Dystonias: types and clinical features. Wilson's disease: etiology, clinical manifestations and diagnostic overview. Tic disorders: types and clinical characteristics. Myoclonus, chorea and athetosis: definitions and clinical features. Principles of clinical evaluation and basic diagnostic approach to movement disorders.

Unit V: Infections and Tumors of the CNS

Overview of CNS infections, meningitis, tuberculosis of CNS, neurosyphilis, viral infections, Basics of diagnosis and general management principles. CNS tumors and space-occupying lesions, basic imaging considerations and recognition of red-flag symptoms, CSF analysis.

Suggested Readings:

1. Bannister, R., & Mathias, C. J. (2002). *Brain and Bannister's clinical neurology* (7th ed.). Oxford University Press.
2. Jameson, J. L., Fauci, A. S., Kasper, D. L., Hauser, S. L., Longo, D. L., & Loscalzo, J. (Eds.). (2022). *Harrison's principles of internal medicine* (21st ed.). McGraw Hill.
3. Ropper, A. H., Samuels, M. A., Klein, J. P., & Prasad, S. (2019). *Adams and Victor's principles of neurology* (11th ed.). McGraw Hill.

Semester-IV						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 404	Electroencephalography	42	3	40	60	100

Unit I: EEG Fundamentals and Brainwave Generation

Generation of EEG rhythms, basic EEG waveforms, epileptiform discharges: spikes, sharp waves, and complex discharges. Technical aspects of EEG, EEG equipments, electrodes: types and placements (10–20 system), montages: bipolar, referential, and Laplacian, calibration and standard settings, activation procedures & recordings.

Unit II: Normal EEG patterns across lifespan

Anterior and posterior cerebral activity in adults, EEG in children: age-wise maturation of EEG, development of posterior dominant rhythm, normal transients and benign variants: mu rhythm, lambda waves, wicket spikes, rhythmic mid-temporal theta, slow alpha variant, subclinical rhythmic electrographic discharges. Artefacts in EEG: eye movements, muscle artefacts, ECG and pulse artefacts, movement and mechanical artefacts, strategies to recognize and eliminate artefacts.

Unit: III: Abnormal EEG

Diffuse vs. focal slowing, polymorphic delta, intermittent rhythmic delta activity, epileptiform patterns: spikes and sharp waves, focal and generalized, periodic lateralized epileptiform discharges (PLEDs), generalized periodic discharges and triphasic waves. Photic stimulation responses: normal photic driving, abnormal responses, photomyoclonic, photo convulsive responses.

Unit IV: Special EEG Studies and Applications

Neonatal EEG, recording setup and interpretation guidelines, maturation patterns and abnormal background activity, identification of neonatal epileptiform discharges. EEG in altered states: sleep and coma patterns, EEG criteria in encephalopathy and metabolic disorders. Brain death assessment: electrocerebral inactivity, National/international guidelines in adults and children.

Unit V: Advanced EEG Analysis and Clinical Integration

Quantitative EEG (qEEG), brain mapping techniques, concept of event-related potentials, EEG monitoring in ICU and epilepsy units, automated spike detection and computerized and AI interpretation, correlation of EEG with neuroimaging, EEG documentation and report writing basics.

Suggested Readings:

1. Chicot, C., & Vas, J. (2013). *Clinical EEG*. Ane Books Pvt. Ltd.
2. Niedermeyer, E., & da Silva, F. L. (2005). *Electroencephalography: Basic principles, clinical applications, and related fields* (5th ed.). Lippincott Williams & Wilkins.
3. Rowan, A. J., & Tolunsky, E. (2003). *Primer of EEG: With a mini-atlas*. Butterworth- Heinemann.
4. Schomer, D. L., & Lopes da Silva, F. H. (2018). *Niedermeyer's electroencephalography: An atlas and reference* (7th ed.). Oxford University Press.

Semester-IV						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 405	Medical Imaging	42	3	40	60	100

Unit I: Foundations of Medical Imaging and Radiation Safety

Introduction to the field of medical imaging and its role in modern diagnostics. Overview of major imaging modalities: radiography, Computed Tomography (CT), ultrasound, Magnetic Resonance Imaging (MRI), and nuclear medicine. Fundamentals of electromagnetic radiation and sound waves as used in imaging. Essential radiation safety protocols: the ALARA principle (As Low as Reasonably Achievable), use of personal protective equipment (PPE), shielding, and radiation monitoring badges.

Unit II: Radiographic and Fluoroscopic Imaging

Principles of X-ray production and image formation. Components and operation of standard radiographic and fluoroscopic equipment. Techniques for patient positioning for common radiographic examinations. The technician's role in contrast administration for gastrointestinal and genitourinary studies.

Unit III: Computed Tomography (CT) and Image Processing

Principles of CT image acquisition, helical/spiral scanning and multi-slice technology. Common protocols for head, chest, abdomen, and pelvic scans. Techniques for patient preparation, positioning, and instruction for breath-holds. Principles of intravenous and oral contrast media use in CT. Introduction to post-processing techniques, Image archiving and communication: fundamentals of Picture Archiving and Communication Systems (PACS) and Digital Imaging and Communications in Medicine (DICOM) standards.

Unit IV: Ultrasound and Magnetic Resonance Imaging (MRI)

Principles of ultrasound, generation of sound waves, interaction with tissues (reflection, scattering), and image formation. Standard protocols for abdominal, pelvic, obstetric, and vascular ultrasound examinations. Introduction to Magnetic Resonance Imaging (MRI): basic principles of magnetism, radiofrequency pulses, and signal detection. Safety protocols in the MRI suite: screening for ferromagnetic objects, managing implants, and monitoring patients.

Unit V: Diagnostic Support Procedures and Image Analysis

The technician's supportive role in specialized imaging procedures: angiography, myelography, and interventional radiology. Basic principles of image analysis: identifying normal anatomical structures on radiographs, CT, and MRI. Recognition of gross pathological findings (e.g., fractures, masses, effusions, obstructions) to ensure diagnostic quality of images. Introduction to the principles of Mammography and Bone Densitometry.

Suggested Readings:

1. Bushong, S. C. (2012). *Radiologic Science for Technologists*. United Kingdom: Elsevier Health Sciences.
2. Lampignano, J. P., Kendrick, L. E. (2018). *Bontrager's Textbook of Radiographic Positioning and Related Anatomy*. United Kingdom: Elsevier.
3. Grey, M. L., Ailinani, J. M. (2018). *CT & MRI Pathology: A Pocket Atlas*, Third Edition. United States: McGraw Hill LLC.
4. Prakash, D., Kotian, R. P. (2025). *Fundamentals of X-ray Imaging: Basic Principles, Quality Control, Clinical Applications, and Safety*. Singapore: Springer Nature Singapore.
5. *Medical Imaging Methods: Theory and Applications*. (2021). United Kingdom: CRC Press.
6. Comprehensive Textbook of Clinical Radiology Volume VI: Musculoskeletal System - EBook. (n.d.). India: Elsevier Health Sciences.

Semester-IV						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 406P	Practical VII (MEP 401, MEP 402)	168	6	40	60	100

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. Measurement of the saturated percentage of oxygen in the blood(SpO₂)
3. Respiratory rate monitoring.
4. Determination of Forced vital capacity (FVC) through spirometry.
5. Determination of Slow vital capacity (SVC) through spirometry.
6. Determination of Maximum Voluntary Ventilation (MVV) through spirometry.
7. Study of Oxygen therapy equipments

Semester-IV						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 407P	Practical VIII (MEP 403, MEP 404)	168	6	40	60	100

Exercise related to MEP403:

1. Neurological Assessment:

- a. History Taking,
- b. Examination of Consciousness,
- c. Sensory Assessment,
- d. Motor Assessment,
- e. UMN vs LMN, Reflexes,
- f. Balance and Coordination Assessment

2. Spotting related to:

- a. Stroke
- b. Seizures and Epilepsy
- c. Dementia
- d. Movement Disorders
- e. Multifocal CNS Disorders

Exercise related to MEP404:

1. Record single channel EEG in normal subject.
2. Effect of visual information and mental task on the alpha activity of EEG.
3. Demonstrate various eye movement artifacts during routine EEG recording in normal healthy subjects.
4. Demonstrate the EMG and ECG potentials during routine EEG record in normal subjects.
5. Perform different activation procedures on fronto-parietal EEG in normal healthy subjects.
6. Study age dependent variations in wake EEG using previously recorded and printed EEG.
7. Study the pathological variations in EEG using previously recorded and printed EEG.

Semester–V						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 501	Sensory Physiology & Evoked Potentials	42	3	40	60	100

Unit I: Basic sensory physiology

Functions of the nervous system, types and properties of synapses, classification of synapses, sensory receptors and their classification, somatic and visceral sensations, exteroceptors, visceroreceptors and proprioceptors, spinal pathways, sensory tracts, motor tracts,, cranial nerves with special reference to special senses and their sensory pathways.

Unit II: Physiology of Vision

Significance and functions of vision, sensory and motor structures related to the eye, primary visual cortex and visual association areas, visual pathway, photopic and scotopic vision, light and dark adaptation, colour vision and theories of colour perception, colour blindness and its clinical aspects. Optic neuritis and other optic nerve disorders, common ocular disorders including refractive errors, cataract, glaucoma and retinal disorders, disorders of eye movements and nystagmus.

Unit III: Physiology of Hearing

Structure and functions of the external, middle and inner ear, cochlea and organ of Corti, auditory pathway including brainstem nuclei and auditory association areas, mechanism of hearing and sound transduction, hearing loss: conductive and sensorineural types, clinical features and causes, deafness, tinnitus, and acoustic neuroma, other common auditory disorders including presbycusis and otosclerosis. Audiometry techniques: principles, procedure and interpretation of results.

Unit IV: Evoked Potentials (VEP, AEP, SSEP)

Neural generators and physiological basis of evoked potentials, general principles and clinical relevance, indications, contraindications, signal acquisition including recording parameters, filters and artefacts, waveform identification and interpretation, electrode placement and standard montages for visual, auditory and somatosensory evoked potentials, techniques for optimizing signal quality and standardization of recordings for clinical and research applications. Introduction to emerging techniques including Intra-operative neuro monitoring (IONM).

Unit V: Clinical Correlations in Electrophysiology

Clinical correlations in electrophysiology, application and interpretation of VEP, AEP and SSEP. Principles of clinical reasoning and identification of red-flag signs, Quality control in recordings and standardization of procedures, basics of electrophysiological reporting, including documentation and interpretation of results, integration of evoked potential findings into patient assessment and management decisions.

Suggested Readings:

1. Cooper, R. (2005). *Techniques in clinical neurophysiology*. Elsevier Churchill Livingstone.
2. Hall, J. E. (2016). *Guyton and Hall textbook of medical physiology* (13th ed.). Elsevier.
3. Jain, A. K. (2019). *Textbook of physiology* (5th ed.). Avichal Publishing Company.

Semester–V						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 502	Polysomnography & Sleep Studies	42	3	40	60	100

Unit I: Sleep Physiology sleep wake regulation

Normal sleep-wake cycle, circadian and ultradian rhythms, sleep architecture and stages: wake state, NREM stages (N1, N2, N3), REM sleep, sleep onset and transitions. Neurophysiology of NREM and REM: thalamocortical mechanisms, pontine and hypothalamic regulation, neurotransmitters involved in sleep (GABA, serotonin, dopamine, hypocretin).

Unit II: Polysomnography-Principles and Protocols

Indications and contraindications of PSG, components of PSG: EEG, EOG, chin/submental EMG, ECG, nasal/oral airflow, thoracic and abdominal effort belts, blood oxygen saturation (SpO₂), CO₂ monitoring, body position and limb movement sensors, audio-visual and body movement monitoring, PSG setup and calibration, electrode placement (AASM guidelines). Standard overnight study protocol, technical considerations in acquisition and quality assurance. PSG interpretation: sleep staging, event scoring, artifact identification and removal.

Unit III: Sleep Disorders

Classification based on ICSD-3 (International Classification of Sleep Disorders): insomnia disorders, sleep-related breathing disorders such as Obstructive Sleep Apnea (OSA), Central Sleep Apnea (CSA), mixed apnea. Central disorders of hypersomnolence: narcolepsy (Type 1 and 2), idiopathic hypersomnia. Parasomnias: NREM and REM-related,. Circadian rhythm sleep-wake disorders. Sleep-related movement disorders: epidemiology, risk factors, symptoms. Basic management strategies and preventive approaches.

Unit IV : Daytime Sleep Testing and Subjective Assessments

Multiple Sleep Latency Test (MSLT): procedure, indications, interpretation. Maintenance of Wakefulness Test (MWT). Actigraphy: device setup, analysis, interpretation. Subjective sleepiness scales: Epworth sleepiness scale, stanford sleepiness scale, Pittsburgh sleep quality index, out-of-lab/home-based tests: protocols and limitations, sleep diaries and patient questionnaires, clinical application of daytime testing and its integration with PSG.

Unit V: Sleep Scoring, Interpretation, and Clinical Applications

Sleep scoring rules (AASM guidelines), sleep stages (N1, N2, N3, REM), arousals and transitions, respiratory events (apneas, hypopneas, RERAs), limb movements, cardiac rhythm changes. Sleep architecture interpretation: hypnograms and trends. Effects of sleep deprivation and fragmentation, interpretation of case examples and PSG reports. Overview of therapeutic monitoring: CPAP/BiPAP titration, role of sleep studies in neurological & psychiatric conditions.

Suggested Readings:

1. Chakravorty, S. (2009). *Sleep disorders medicine* (3rd ed.). Saunders/Elsevier.
2. Guilleminault, C. (2005). *Clinical neurophysiology of sleep disorders* (Vol. 6). Elsevier.
3. Kryger, M. H., Roth, T., & Dement, W. C. (2017). *Principles and practice of sleep medicine* (6th ed.). Elsevier.
4. Robertson, B. (2014). *Polysomnography for the sleep technologist*. Elsevier Churchill Livingstone.

Semester–V						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 503	Public Health	42	3	40	60	100

Unit I: Concept of Health and Disease

Dimensions of health, determinants and indicators of health, health promotion and health education. Concept and definition of disease and its causation: germ theory and multifactorial causation, epidemiological triad.

Natural history of disease and pathogenesis with reference to agent, host, environmental, and risk factors. Spectrum of disease. iceberg phenomenon of disease. Concepts of disease elimination and eradication. Disease monitoring and surveillance. Levels of prevention: primary, secondary, and tertiary prevention.

Unit II: Prevention and Control of Diseases

Principles of disease prevention and control, infection prevention and control practices in healthcare settings. Disinfection and sterilization: definitions, principles, differences, and classification. Physical and chemical methods of disinfection, disinfection of infective materials received in the laboratory: blood, body fluids, cultures, contaminated glassware, instruments, sharps, and biomedical waste. Standard operating procedures for disinfection at health centre and laboratory level. Hospital-acquired infections (HAIs): sources, transmission, prevention, and control.

Unit III: Health Programmes and Organization

Overview of national health programmes. National Vector Borne Disease Control Programme (NVBDCP): Malaria, Lymphatic Filariasis, Kala-azar, Japanese Encephalitis, and Dengue fever. Revised National Tuberculosis Control Programme (RNTCP): DOTS strategy, case detection, treatment protocols, monitoring, and evaluation to control TB incidence and mortality. National AIDS Control Programme (NACP). National Programme for Prevention and Control of Iodine Deficiency Disorders (NIDDCP).

Unit IV: National and International Healthcare System

Organization of health services, health services at the central and state levels, role of ministry of health and family welfare. Health care delivery systems: primary, secondary, and tertiary. Health Care Infrastructure: structure, roles, and functions of sub-centres, Anganwadi centres, Primary Health Centres (PHC), Community Health Centres (CHC), district hospitals, and apex/tertiary hospitals, staffing patterns and service delivery. Role of WHO and UNICEF in global health promotion, disease prevention, technical support, and collaboration with national health programs. Immunization and universal immunization Program (UIP).

Unit V: Hospital Waste Management

Health hazards of health care waste. Classification and sources and categories of biomedical waste in health care facilities. Principles of biomedical waste management. Treatment and disposal technologies, including incineration, autoclaving, chemical disinfection, deep burial and secured landfilling. Incineration: principles, types, advantages, and limitations. Biomedical waste management in India: rules, color-coded segregation, collection, transportation, treatment, disposal practices.

Suggested Readings:

1. Park, K., & Sunder Lal. (2015). Textbook of Preventive and Social Medicine (3rd ed.). Bhanot Publications.
2. Schneider, M. (2011). Introduction to public health (3rd ed.). Jones & Bartlett Learning.
3. Detels, R., Gulliford, M., Abdool Karim, Q., & Tan, C. C. (Eds.). (2015). Oxford textbook of global public health (6th ed.). Oxford University Press.

Semester–V						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 504	Entrepreneurship & Management in Healthcare	42	3	40	60	100

Unit I: Entrepreneurial Foundations in Healthcare

Concept and importance of entrepreneurship, characteristics, qualities, and competencies of a healthcare entrepreneur. Role of entrepreneurship in healthcare delivery, small business concepts in healthcare (clinics, diagnostic labs, cardiac centres). Government policies for promotion of MSMEs in healthcare, regulatory and statutory clearances required for establishing healthcare enterprises.

Unit II: Business Opportunity Identification and Venture Development in Healthcare

Identification of business opportunities in healthcare sector, market needs in medical electrophysiology and allied services, new venture development process in healthcare, methods and procedures to start and expand healthcare ventures, business life cycle of healthcare organizations, environmental and socio-economic factors affecting success of healthcare startups, reasons for success and failure of healthcare enterprises.

Unit III: Feasibility Analysis and Business Planning in Healthcare

Concept and importance of feasibility study, preparation of feasibility report for healthcare projects, economic, technical, financial, and managerial feasibility in healthcare ventures, location selection for healthcare facilities (hospitals, diagnostic centres), demand analysis and market potential assessment in healthcare services, project costing, capital investment, and working capital requirements.

Unit IV: Financial Management and Institutional Support for Healthcare Enterprises

Sources of finance for healthcare startups, role of financial institutions: SIDBI, NSIC, DIC, SSIB. Government schemes and incentives for healthcare entrepreneurs, role of promotional agencies in entrepreneurship development, basics of financial management: costing, pricing, profit analysis, tax planning and compliance in healthcare organizations.

Unit V: Entrepreneurship Development, Professional Practice, and Sustainability

Entrepreneurship Development Programmes (EDP): phases and relevance, challenges and problems in entrepreneurship development. Quality management and patient safety in healthcare enterprises, ethical, legal, and social responsibilities in healthcare entrepreneurship, sustainable healthcare business models, career pathways and self-employment opportunities in medical electrophysiology,. Case studies of successful healthcare entrepreneurs.

Suggested Readings:

1. Barringer, Bruce R., and Ireland, Duane R., *Entrepreneurship: Successfully Launching New Ventures*, Pearson Education, New Delhi.
2. Gupta, S. L., and Mittal, Arun, *Entrepreneurship Development*, International Book House, New Delhi.
3. Hisrich, Robert D., Peters, P. Michael, and Shepherd, A. Dean, *Entrepreneurship*, McGraw Hill, New Delhi.
4. Jayashree, K., Kumar, S. Anil, Poornima, S. C., and Abraham, M. K., *Entrepreneurship Development*, New Age Publishers, New Delhi.

Semester-V						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 505P	Practical IX (MEP 501, MEP 502)	168	6	40	60	100

Exercise Related to MEP-501:

1. Examine cranial nerves: I-XII
2. Study, record and analyze visual evoked potentials.
3. Study record and analyze brainstem evoked potentials.
4. Study, record and analyze Audiometry.

Exercise Related to MEP-502:

1. Assess quality and quantity of sleep using sleep diary, familiarized with sleep hygiene techniques.
2. Subjectively assess sleep using various validated sleep questionnaires.
3. Record and analyze polysomnography of a normal subject.
4. Record and analyze multiple sleep latency test of a normal subject.
5. Record and analyze maintenance of wakefulness test of a normal subject.
6. Report making using previously recorded and printed PSG.

Semester-V						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 506P	Clinical Training II	224	8	--	200	200

Semester-VI						
Paper Code	Paper Name	Total Hrs.	Credit	IA	SE	Total
MEP 601P	Clinical Training & Internship	616	22	--	400	400

Clinical Training & Internship Guidelines

- The Clinical Training (CT) & Internship is a mandatory, full-time experiential learning phase of five months. This training must be conducted at a University-approved Laboratory, Hospital, or Medical College.
- MEP students will engage in intensive, hands-on clinical rotations. Under the direct supervision of experienced medical professionals and clinical staff, students will observe, assist, and eventually perform procedures.
- Students are required to document their clinical findings or a specific research project in a Dissertation, following the standard Jamia Millia Islamia (JMI) format.
- All data must be verified and authenticated by the designated Supervisor or Departmental In-charge.
- A duly signed and hard-bound dissertation must be submitted to the Centre prior to the commencement of the CT & Internship examination. Completion of this submission is a prerequisite for appearing in the final assessment.
- Upon successful and satisfactory completion of the five-month tenure, the Supervisor/In-charge will issue a Completion Certificate before the submission of dissertation.
- The final assessment of the CT & Internship will be conducted to evaluate both theoretical knowledge and practical proficiency. The examination components include presentation, thesis report and comprehensive oral examination and evaluation by the mentor of Clinical Training & Internship.