ALL INDIA INSTITUTE OF MEDICAL SCIENCES, RISHIKESH

Division of Sleep Medicine

Curriculum

Bachelor of Science (BSc) Sleep Technology

Why is this course required?

Most of the sleep disorders can be diagnosed clinically, however, some require objective assessment for proper diagnosis. Common objective diagnostic methods involve use of actigraphy and polysomnography. Besides diagnosis, these techniques are also required for management of sleep disorders as well as monitoring the therapeutic response.

Sleep Technology is a specialty that requires special training for the assessment and management of disorders. Despite a high prevalence of sleep disorders, there is a dearth of certified sleep technologists in India. It leaves many patients in poorly treated state.

Why B.Sc. in Sleep technology rather than shorter diploma or certificate course?

1. Internationally, sleep technology training course spans over two years. This is the minimum time required to understand nuances of sleep-physiology and sleep disorders.
2. It provides an opportunity to the student to become "graduate" rather than just having "diploma "or "certificate". After graduation, they may also pursue higher education up to doctoral degree to improve their prospects. It will support not only clinical services to the sufferer but also the research in area.
3. Three years course will also provide a chance to learn "Neurophysiology" and "Respiratory Technology". This training will help students to:
    a. Adequate understand of sleep disorders and their interaction with other illnesses
    b. Increase chances for getting a job as student will be able to work in Neurophysiology and Respiratory Laboratories as well in addition to Sleep Laboratory.

Curriculum

1. ***Goals:***

   At the end of the course, student must be able to:
    a. Comprehend nature of sleep disorders based upon history and able to communicate with Sleep Physician
    b. Understand sleep disorders so as to provide patient care as per prevalent standards
    c. Understand nuances of polysomnography technology, neurophysiology and respiratory technology
    d. Conduct diagnostic as well as therapeutic procedures in the sleep laboratory, neurophysiology laboratory and respiratory laboratory in patients of all age groups
    e. Able to generate a comprehensive report based upon the clinical and electrophysiological data for patients of all age groups
    f. Understand latest research and develop research proposals related to the field
    g. Design and engage in public awareness programs related to disciplines
    h. Provide basic life support to the patients admitted in laboratory
    i. Guide and supervise work of younger colleagues
    j. Work as a part of team in various laboratories
    k. Maintain documentation as per prevalent standards of care
    l. Perform periodic audits as a part of self-improvement
    m. Ethically practice the disciplines

2. ***Competencies**:*

At the end of course, student is expected to have at least following competencies:

a. Theoretical knowledge related to
   i. anatomy and physiology of systems in the body
   ii. instruments used in sleep laboratory, respiratory laboratory and Neurophysiology laboratory
   iii. Epidemiology and clinical presentation of sleep disorders, respiratory disorders and epilepsy
   iv. Research methodology
   v. Documentation and guidelines to perform diagnostic and therapeutic procedures included in the course
   vi. Medical ethics

b. Skills: Able to perform following procedures independently:
   i. Hooking up of the patient for sleep study
      1. Attended study
      2. Home Sleep Apnea Testing
   ii. Scoring and reporting of Level 1 Polysomnography data
   iii. Reporting Sleep EEG in cases of Sleep Related Epilepsy
   iv. Troubleshooting in sleep laboratory
   v. Manual titration with PAP
   vi. Follow up of patients using PAP
   vii. Actigraphy
   viii. Spirometry and DLCO
   ix. Electroencephalography
   x. Basic Life Support
   xi. Cognitive Behavior Therapy for various sleep disorders

c. Managerial and administrative work:
   i. Able to maintain documentation and perform periodic audits in Sleep Laboratory
   ii. Able to indent consumables so as to ensure seamless functioning
   iii. Able to maintain inventory of consumables and fixed assets
   iv. Take necessary steps to provide best experience to patients and maintain infection control

d. Research:
   i. Develop and conduct at least one research project in Sleep Laboratory

e. Leadership:
   i. Design and conduct at least one public awareness campaign related to sleep disorders

3. ***Organization of teaching and training:***

To stimulate the learning process and guiding the student, various academic activities shall be periodically conducted in the Division of sleep medicine.

A. **Methods for the transfer of knowledge:**

A.1 For imparting theoretical knowledge:

A.1.1 Didactic lectures: Important topics will be covered in each semester in a series of lectures by faculties. These lectures will cover the topics defined for that semester.

A.1.2 Research Methodology: It will be taught at the end of first semester in a series of lectures taken by faculties and senior residents. Topics will include introduction to research, hypothesis building, research methodology, biostatistics, and critically reading various articles e.g., original article, meta-analysis, randomized control trials and systematic reviews to name a few.

A.1.3 Research discussion: Student present their thesis protocol before submission in front of the department. Inputs from all members are collected. This activity is aimed at improving the methodological strength of the proposal and to address ethical issues before it is submitted to the institutional ethics committee. Thereafter, students are expected to present the progress regarding their thesis every 6 month in the department.

A.1.4 Seminars: There is a one-and-a-half-hour seminar weekly in which student present material on assigned topics in rotation. A topic is assigned to one student along with a faculty as the moderator. The schedule is notified well ahead of time, preferably 2 months before presentation. Student is required to tell extempore and must not copy the material from the source. They should understand the concept and incorporate that in their presentation. Presenter must complete their presentation by half an hour leaving at least one hour for discussion in which all trainees are supposed to participate. The final seminar slides to be presented must be approved by the Faculty/Moderator of the seminar. Generally, the topics covered are those that supplement the formal teaching programme. The presentation of the seminar as well as the participation of other JR in the seminar is subjected to evaluation, the marks of which are added to the scores of internal assessments (Annexure 1). Evaluation is carried out by all faculty members present in the seminar.

A.1.5 Guest lectures: Time to time, department organizes guest lectures where faculties from other institutes are invited to share their knowledge. In addition, on monthly basis one faculty member from other departments of AIIMS, Rishikesh is also invited to discuss inter-disciplinary issues related to Sleep.

A.1.6 Activities outside institute: Students are encouraged to attend conferences and workshops outside institute.

A.1.7 Webinars/ Virtual knowledge network/ Podcasts/ Telemedicine broadcasted from other institutes of importance.

A.2 Methods of imparting clinical skills, conversion of theory in practice and documentation:

Skills related to use of various diagnostic and therapeutic procedures will be imparted by supervised hands-on training. Student needs to be well versed with theoretical aspects of said procedure before indulging in hands-on training.

A.2.1 Hands-on training: This shall be provided in respective laboratories and will include all diagnostic and therapeutic modalities.

A.2.2 Comprehensive After-Care: Each candidate is expected to follow at least twenty cases suffering from different disorders longitudinally to learn about concepts of comprehensive after-care specially PAP clinic.

A.2.3 Case Conference: Interesting cases with diagnostic or therapeutic difficulties, important findings (clinical as well as investigational) are presented on weekly basis. Student will work up the cases under supervision of and guidance of a faculty member.

A.2.4 Activities and training programs organized by the Department of Medical Education of AIIMS, Rishikesh time to time

A.2.5 Activities outside institute: Students are encouraged to attend workshops outside institute.

A.2.6 Each student has to undergo training for "Basic Life Support" within 6 months of the initiation of training.

A.3 Methods for developing soft skills, managerial and leadership skills:

A.3.1 Students will be made in-charge for the individual cases and various functional areas of the division. They are expected to ensure the smooth functioning of the area by taking necessary actions, if required, in consultation with Senior Residents and faculty members.

A.3.2 Feedback related to their soft skills are collected by staff members, colleagues, patients and their relatives. They are given feedback.

A.3.3. They are given responsibilities in various capacities during the activities organized by the department.

A.3.4 Case conferences, seminars also work to improve the communication and oratory skills, which are the part of departmental teaching activity.

A.4 Remedial Measures:

Remedial measures on periodic basis shall be taken for the students who are not performing well in any of the areas. Data for this will be gathered from various assessment methods as mentioned in the curriculum.

B. Postings:

During the 36 months tenure:

B.1 Each student will spend 28 months in Sleep Laboratory, 3 months in Neurophysiology Laboratory and 3 months in Respiratory Laboratory, 1 month in otorhinolaryngology and 1 month in Dentistry department to learn practical work related to sleep disorders.

B.2 To learn theoretical aspects of basic sciences, students will attend Anatomy, Physiology and Biochemistry classes along with students of other BSc courses.

4. ***Year wise distribution of Syllabus***

For the convenience of the training and learning, syllabus is divided on the yearly basis. At the end of each year, there will an examination that will include theoretical as well as clinical aspects to ensure assessment of knowledge as well as skills. Soft skills will be judged on the day to day basis through interaction with colleagues, seniors, faculty members and patients.

4.1 First Year: Following subjects will be taught during first year:

4.1.1 Anatomy
4.1.2 Physiology
4.1.3 Biochemistry
4.1.4 Basics of Sleep Technology

4.1.1 Subject : Anatomy

Course Description: The course is designed to enable students to acquire knowledge of the normal structure of various human body systems & understand the alterations in anatomical structures in disease & practice of sleep technology.

Unit No.	Learning Objectives	Content
1	• Introduce the subjects, sub-divisions & descriptive terms used in Anatomy.	**Introduction to Anatomy & Anatomical Terms** Subdivisions: Topographical or gross anatomy (surface anatomy, neuroanatomy, imaging), microscopic anatomy or histology & embryology Topographical regions: Upper limb, Lower limb, Thorax, Abdomen, Pelvis, Head, Neck Descriptive terms: *Terminologia Anatomica* (Federative Committee on Anatomical Terminology, 1998) Anatomical position (an assumption to avoid ambiguity)- standing erect and facing forwards, upper limbs by the side with palms facing forwards, and lower limbs together with the toes facing forwards Terms- Superior, Inferior, Lateral, Medial, Anterior, Posterior, Ventral , Dorsal, Cranial , Caudal, Proximal, Distal, Median plane, Sagittal plane (midsagittal & parasagittal), Coronal plane, Transverse or horizontal plane, Oblique plane, Medial rotation, Lateral rotation, Abduction, Adduction, Pronation, Supination, Flexion, Extension, External, Internal, Superficial, Deep, Ipsilateral, Contralateral, Bilateral
2	• Describe the anatomical terms, organization of human body and structure of cell, tissues,	**Organization of the human body** Human cell structure: • General characteristics of cells • Plasma membrane- structure, cell junctions (names)

Unit No.	Learning Objectives	Content
	membranes and glands.	• Cytoplasm- endoplasmic reticulum, ribosomes, golgi apparatus, endocytic vesicles, endosomes, lysosomes, peroxisomes, mitochondria, other vacuoles • Cytoskeleton- microfilaments, actin binding proteins, microtubules, intermediate filaments, myosins, microvilli, cilia, flagella, centrioles, cell motility • Nucleus- nuclear envelope, chromatin, chromosomes, karyotype, nucleolus Tissues: • Definition & characteristics • Types- epithelial, connective (special & general), nervous, muscle; tissue markers • Classification of epithelium- simple & stratified; squamous, cuboidal, columnar, pseudostratified, transitional, germinal • General connective tissue- fibroblasts, adipocytes, macrophages, lymphocytes, mast cells, neutrophils, eosinophils, extracellular matrix, regular and irregular connective tissue Glands: Definition, exocrine, endocrine, Basement membrane/ basal lamina
3	• Describe the structure of bones and joints.	**The Skeletal System** • Skeleton: Axial & appendicular (name bones) • Classification & terminology: compact, trabecular; intramembranous, intracartilaginous, diaphysis, metaphysic, epiphysis, woven bone, lamellar bone, circumferential lamellae, osteonic lamellae, interstitial lamellae • Microscopic structure of bone: compact, trabecular • Joints: classification with examples, synovial membrane, synovial fluid, nerve supply of joints Alterations in disease Applications and implications in sleep technology
4	• Describe the structure of muscles • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms	**The Muscular System** • Muscle types: skeletal, smooth, cardiac, microstructure for comparison • Skeletal muscle: general features, microstructure • Smooth muscle: general features, microstructure • Cardiac muscle: general features, microstructure • Related terminology: tendons, synovial bursa, synovial sheaths, aponeurosis, fascia • Classification of skeletal muscles: based on shape, orientation of fibers Alterations in disease Applications and implications in sleep technology

Unit No.	Learning Objectives	Content
	and management of sleep disorders	
5	• Describe the structure of nervous system • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	**The Nervous System** • Neuron: general description, types, cell body, dendrites, axons, synapse • Glial cells: Schwann cells, oligodendrocytes, astrocytes, microglia, ependymal cells, blood-brain barrier, myelin • Subdivisions of nervous system & terminology: CNS, PNS, spinal cord, brain, white matter, grey matter, nuclei, tracts, leminisci, funiculi, decussation, commisure, ganglia, meninges, afferent, efferent, somatic, visceral, general, special • PNS: general organization, structure of peripheral nerve, neuromuscular junction, dorsal root ganglion • CNS: major divisions, rhombencephalon or hindbrain, mesencephalon or midbrain, prosencephalon or forebrain, myelencephalon or medulla oblongata, diencephalon, telencephalon, epithalamus, subthalamus, hypothalamus, cerebral hemispheres, cerebellum, pons, brainstem, ventricular system, motor & sensory homunculus, important sulci/gyri of cerebral hemisphere, cranial nerves • Autonomic nervous system: general overview & divisions, sympathetic nerves, sympathetic ganglia, parasympathetic outflow, cranial and sacral nerves, enteric nervous system Alterations in disease Applications & implications in sleep technology
6	• Describe the structure of sensory organs • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	**The Sensory Organs** • Sensory receptors: general features and modalities of sensation, functional classification (exteroceptors, proprioceptors, interoceptors), classification based on modalities (chemo, osmo, etc.), slowly adapting, rapidly adapting • General sensory endings: structural classification, free nerve endings, special endings associated with epidermal structures, encapsulated nerve endings, epidermal receptors, dermal receptors, joint receptors, muscles spindles, golgi tendon organs, carotid bodies • Special sensations: taste, vision, hearing, smell Alterations in diseases Applications and implications in sleep technology
7	• Describe the structure of	**Circulatory and lymphatic system** • Blood vessels: **B**lood & its components, general features of vascular system (vessel size, vessel number, branching

Unit No.	Learning Objectives	Content
	circulatory and lymphatic system • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders •	patterns, anastomosis, collateral circulation), names of major blood vessels in the body (arteries & veins) • General classification of blood vessels: conducting, distributing, resistance, exchange, capacitance • Circulation: systemic, pulmonary, portal, coronary; hydrostatic pressure, oncotic pressure • Structure of blood vessels: elastic, muscular, arteriole, capillaries, venules, veins; arteriovenous anastomosis • Heart: General structure, muscles, blood supply, nerve supply and microstructure • Lymphatic system: general features of lymphatic vessels, topography of lymph nodes and vessels, major lymph node groups • Lymphoid tissue (microstructure): lymph node, spleen, thymus, palatine tonsil, MALT, peyer's patches Alterations in disease Applications and implications in sleep technology
8	• Describe the structure of respiratory system. • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders •	**The Respiratory System** • Structure of organs of respiration: nose, structure of nasal cavity, general structure of larynx and major cartilages, vocal cords, general features of trachea, bronchi, general features of lungs, functional units of lungs (bronchopulmonary segments), structure of pleura, pleural cavity, normal chest radiograph, general features and location of paranasal sinuses • Muscles of respiration/ breathing: Intercostals muscles, nerve supply of diaphragm, mediastinum Alterations in diseases Applications and implications in sleep technology
9	• Describe the structure of digestive system • Describe and show how the knowledge gained can be used in clinical decision making pertaining to	**The Digestive system** • Oral cavity & related structure: General features, description of terms- oral mucosa, lips, cheek, gums, palate • Salivary glands: General features, parotid gland, submandibular gland, sublingual gland • Teeth: deciduous teeth, permanent teeth, dental formula, • Tongue & pharynx: general features and subdivisions of tongue, pharynx and oesophagus

Unit No.	Learning Objectives	Content
	etiopathology, clinical symptoms and management of sleep disorders •	• Alimentary system: general features & microstructure of alimentary canal, oesophagus, stomach, duodenum, jejunum, ileum, caecum, ileocecal valve, vermiform appendix, colon, rectum, anal canal • Accessory organs of digestion: general description of liver, pancreas, gall bladder, bile ducts Alterations in disease Applications and implications in sleep technology
10	• Describe the structure of excretory system • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders •	**The Excretory System (Urinary)** • Structure of organs of urinary system: General description of urinary system, structure of nephron, juxtaglomerular apparatus, general features of renal calyces & pelvis, ureters & nerve supply, urinary bladder, parts of male urethra, female urethra Alterations in disease Applications and implications in sleep technology
11	• Describe the structure of endocrine system • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	**The Endocrine system** • General features of endocrine glands, location, microstructure, blood supply and nerve supply of: • Pituitary gland • Pancreas • Parathyroid gland • Thyroid gland • Adrenal gland Alterations in diseases Applications and implications in sleep technology

Unit No.	Learning Objectives	Content
12	• Describe the structure of Reproductive system	**The Reproductive system including breast** • Structure female reproductive organs: general features, location, microstructure, blood supply and nerve supply of: • ovary, uterus, cervix, fallopian tubes, vagina; • Structure of male reproductive organs: general features, location, microstructure, blood supply and nerve supply of: • testis, epididymis, vas deferens, seminal vesicles, ejaculatory ducts, prostate, bulbourethral glands, penis, spermatic cord; spermatozoa • Breast: General features, parenchymal structure and ducts, lymphatic drainage, axillary lymph nodes • Introduction to embryology Alterations in diseases Applications and implications in sleep technology
13	• Describe the structure of Integumentary system	• **The Integumentary system :**Structure of skin: Epidermis, Dermis • Appendages of the skin: Hair, Nails, Sebaceous & Sweat glands, Arrectorpili muscles Alterations in diseases Applications and implications in sleep technology
14	• Explain nature, principles & perspectives of heredity • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	**Basics of Genetics** • Concept of Genetics • Practical application of genetics in Sleep technology • Impact of genetics condition on families • Review of cellular division mitosis and meiosis • Characteristics and structure of genes • Chromosomes – sex determination • Chromosomal aberrations Patterns of inheritance ○ Mendelian theory of inheritance ○ Multiple alleles and blood groups ○ Sex linked inheritance ○ Mechanism of inheritance Errors in transmission (Mutations)

4.1.2 Subject : Physiology

Course Description: The course is designed to assist the students to acquire knowledge of the normal physiology of various human body systems & understand the alterations in physiology of diseases & practice of sleep technology.

Unit No.	Learning Objectives	Content
1	• Describe the general physiology	**General Physiology** • Introduction • Homeostasis
2	• Describe the cell physiology, membranes and glands • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	**Cell Physiology** • Function of cell • Transport across membranes • Tissue, glands and membranes • Resting membrane potential
3	• Describe the body fluids and electrolyte and their functions in human body • Describe the blood, its composition and functions	**Body Fluid and Electrolyte** • Composition of body fluids • Regulation of water, electrolyte and acid base balance • Fluid and electrolyte imbalance • Composition and functions of blood • Plasma proteins and its functions • Haemoglobin-normal values, structure, synthesis and breakdown, types of Hb; Thalassemia • Haemopoeisis-RBC, WBC's, Platelets • antibodies and lymphoid tissue • Blood groups-Types, laws, cross matching, Blood transfusion

Unit No.	Learning Objectives	Content
	• Demonstrate blood cell count, coagulation, grouping, Hb • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	• Bleeding disorders Alterations in disease Applications and implications in Sleep technology (Applied physiology)
4	• Describe the functions of heart • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	**Cardiovascular system-** • Heart- functions of cardiac muscles and conduction • Cardiac cycle, Heart sounds • Cardiac output • Blood Pressure and pulse- values, regulation • ECG • Circulation- Arterial pulse, Pressure changes, lymphatic system • Alterations in diseases • Applications and implications in Sleep technology (Applied physiology)
5	• Describe the physiology and	**Respiratory System-** • Functions of respiratory system-Properties of gases

Unit No.	Learning Objectives	Content
	mechanism of respiration. • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	• Mechanics of Respiration- Breathing mechanisms, lung volumes and capacities, alveolar surface tension, surfactants and dead space • Transport of gases in lungs and tissues- oxygen transport, carbon dioxide transport • Regulation of respiration- respiratory centers, nervous regulation, chemoreceptors, chemical regulation, factors affecting respiration • Alterations in diseases and terminology • Applications and implications in Sleep technology (Applied physiology
6	• Describe the physiology of excretory system • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	**Excretory system-** • Formation of urine- Glomerular filtration, Reabsorption and secretion in renal tubules • Composition of urine • Micturition reflex and Micturition • Alterations in diseases • Applications and implications in Sleep technology (Applied physiology)
7	• Describe the regulation of body temperature • Describe and show how the knowledge gained can be used in clinical decision making	**Thermoregulation** • Regulation of body temperature • Hypothermia • Pyrexia • Applications and implications in Sleep technology (Applied physiology)

Unit No.	Learning Objectives	Content
	pertaining to etiopathology, clinical symptoms and management of sleep disorders	
8	• Describe the functions of muscles • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	**Skeletal System** • Functions of muscles • Action potential Applications and implications in Sleep technology (Applied physiology)
9	• Describe the physiology of Endocrine glands • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	**Endocrine system** • Pituitary hormones- anterior pituitary hormones, posterior pituitary hormones • Thyroid gland and its hormones Adrenal gland hormones • Pancreatic hormones • Parathyroid, calcitonin, Vit D. • Control of secretion, actions and alterations in diseases • Applications and implications in Sleep technology (Applied physiology)

Unit No.	Learning Objectives	Content
10	• Describe the physiology of male & female reproductive system.	**Reproductive System** • cellular division mitosis and meiosis • Sex determination and differentiation • Pubertal changes in males and females • Reproductive hormones- secretion, control, actions • Male reproductive system- Testes and function, spermatogenesis, semen • Female reproductive system- oogenesis, ovarian cycle, menstrual cycle, Pregnancy and lactation
11	• Describe the physiology of Digestive system. • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	**Digestive system** • Movements of food in alimentary tract- swallowing, stomach, small and large intestinal movements • Composition, regulation and function of secretions of GIT- Saliva, gastric juice, Pancreatic juice, Bile etc. • Digestion and Absorption in GIT. • Alterations in diseases • Applications and implications in Sleep technology (Applied physiology)
12	• Describe the physiology of nerve stimulus, reflexes, brain, cranial & spinal nerves. • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	**Nervous System** • Functions of Neuron and Neuroglia • Cerebrospinal fluid- composition, formation, absorption circulation and function • Reflex arc, Reflex action and reflexes • Functions of brain- Cerebral lobes, cerebellum, Hypothalamus, Thalamus, brainstem, Spinal cord • Blood brain barrier • Sensory pathways- Touch, Pain • Motor Pathways • Autonomic Nervous system
13	• Describe the physiology of sensory organs.	**The Special senses** • Vision, , visual pathway, refractive errors • Hearing organs and pathway • Taste- Receptors and pathway • Smell- Receptors and pathway, • Alterations in disease • Applications and implications in Sleep technology (Applied physiology)

Unit No.	Learning Objectives	Content
14	• Describe physiology of sleep and wakefulness • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	• Two process model of sleep induction • Chronobiology of sleep
15	• Describe physiological changes during sleep • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	• Normal sleep • Respiratory changes during sleep • Cardiovascular changes during sleep • Neuronal changes during sleep • Endocrinal changes during sleep • Gastrointestinal changes during sleep • Genito-urinary changes during sleep

4.1.3 Subject : Biochemistry

Course Description: The course is designed to assist the students to acquire knowledge of the normal biochemical composition & functioning of human body & understand the alterations in biochemistry in diseases and application of biochemistry in practice of respiratory therapy.

Unit No.	Learning Objectives	Content
1	• Describe the structure composition & function of cell. • Differentiate between prokaryote & Eukaryote cell.	**Introduction** • Definition and significance in Sleep technology • As Basic science for the study of medicine • Review of structure, composition and functions of cell • Functions of chief intracellular components • Prokaryote and Eukaryote cell organization
2	• Describe the structure & functions of cell membrane.	**Structure and functions of Cell membrane** • Fluid mosaic model tight junction, Cytoskeleton • Transport mechanism: diffusion, osmosis, filtration, active, channel and sodium pump • Acid base balance- maintenance & diagnostic tests o PH buffers
3	• Explain the metabolism of carbohydrates. • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	**Composition and metabolism of carbohydrates** • Review of Types, structure, composition and biological importance of carbohydrates • Metabolism o Pathways of glucose: - Glycolysis - Gluconeogenesis: Cori's cycle, Tricarboxylic acid (TCA) cycle - Glycogenolysis o Pentose phosphate Pathways o Regulation of blood glucose level o Glycogen synthesis& breakdown o Sources & fate of glucose in body-Phosphorylation, Glycolysis, o Fate of pyruvic acid, Citric acid cycle o Energy Metabolism of other hexoses, o HMP shunt & its biological significance o Blood glucose –Normal level & regulations, Glycosuria o Digestion & Absorption of Carbohydrates o Investigations and their interpretations
4	• Explain the metabolism of lipids. • Describe and show how the knowledge gained can be used in	**Composition and metabolism of Lipids** • Review of Types, structure, composition and biological importance of Lipid and prostaglandins • Metabolism of fatty acid o Breakdown

Unit No.	Learning Objectives	Content
	clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	○ Synthesis • Metabolism of triacylglycerols • Digestion & Absorption of Lipids • Cholesterol metabolism ○ Biosynthesis and its regulation - Bile salts and bilirubin - Vitamin D - Steroid hormones • Lipoproteins and their functions: ○ VLDLs – IDLs, LDLs and HDLs ○ Transport of lipids ○ Atherosclerosis ○ Investigations and their interpretations • Metabolism of Lipids ○ Plasma lipids ○ Outcome of fat after absorption ○ Sources of fat depot, ○ Relation of liver to fat metabolism, ○ Fatty liver-Lipotropic factors ○ Ketone bodies-Formation & utilization, ○ Cholesterol-Sources ,Occurrence & distribution, Blood Level & Metabolism
5	• Explain the metabolism of amino acids and proteins. • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	**Composition and metabolism of Amino acids and proteins** • General Nature • Classification • Biological Importance • Physical Properties –as colloids • Properties due to charge & due to size -Tests for identification, Protein precipitants, Denaturation. • Review of Types, structure, composition and biological importance of Amino acids and proteins • Metabolism of amino acids and proteins ○ Protein synthesis, targeting and glycosylation ○ Chromatography ○ Electrophoresis ○ Sequencing ○ Amino acid Pool, Amino acid hormones, ○ Dynamic equilibrium & balance ○ Essential amino acids, ○ Deamination, Transamination, & glutamine formation. • Metabolism of Nitrogen ○ Fixation and assimilation

Unit No.	Learning Objectives	Content
		○ Urea cycle ○ Hemes and chlorophylls ○ Urea formation • Digestion & Absorption of Proteins • Enzymes and co-enzymes ○ Classification ○ Properties ○ Kinetics and inhibition ○ Control ○ Mechanism of action ○ Enzyme inhibition ○ Coenzymes, Isoenzymes ○ Diagnostic significance • Chemistry of Nucleic acid ▪ Purines & Pyrimidine bases ▪ Nucleotides & Nucleosides ▪ Nucleic Acids-DNA & RNAs ▪ Biological significance Investigations and their interpretations
6	• Describe types, composition & utilization of Vitamins & minerals. • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	**Composition of Vitamins and Minerals** • Review of classification, properties and biological importance of Vitamins and minerals ○ Absorption ○ Storage & transportation ○ Normal concentration • Metabolism of minerals ○ Metabolism of sodium, Potassium, Calcium & Phosphorus, Iron. • Review of Water & Electrolytic balance & Imbalance • Review of Acid-base balance & Imbalance Investigations and their interpretations
7	• Describe immunochemistry. • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	**Immunochemistry** • Immune response • Structure and classification of Immunoglobins • Mechanism of antibody production • Antigens: HLA typing • Free radical and Antioxidants • Specialized protein: Collagen, Elastin, Keratin, Myosin, Lens protein. • Electrophoretic and Quantitative determination of Immunoglobins – ELISA etc. Investigations and their interpretations

4.1.4 Subject : Basics of Sleep Technology

Unit No.	Learning Objectives	Content
1	Electricity and Electronics	• Voltage, current, resistance, direct and alternating current, impedance, capacitance, induction, Ohm's law, circuit analysis, grounding, transistors, piezoelectric effect, and transducers, amplification, input impedance, and differential amplification.
2	Analog Filtering	• Low pass, high pass and notch filters - construction and properties
3	Electrodes	• Electrical properties of electrodes according to materials, shape and size, bias potentials, electrical properties and uses of surface/scalp electrodes, monopolar, concentric, and single fiber needle electrodes, sphenoidal electrodes, depth electrodes, and subdural electrodes, electrical interference and grounding.
4	Electrical Safety	• Electrical power systems, leakage current, macro and micro shock, and electrical safety procedures in the hospital and laboratory
5	Signal Analysis	• Sine and cosine wave analysis, frequency, phase and amplitude, analog to digital conversion, sampling, Nyquist theorem, aliasing, vertical and horizontal resolution, digital filter construction and effects, signal averaging, stimulus artifact, signal to noise ratio, and back averaging, time vs frequency domain analysis, interval analysis, autocorrelation analysis, Fourier analysis, and Fourier analysis and filtering, spectral analysis applied to EEG and EMG, automated signal recognition and seizure detection
6	Properties of bioelectrical generators	• Membranes, channels, transport, membrane potentials, post-synaptic potentials, action potentials, action potential propagation, active and passive currents, current flow in myelinated and unmyelinated nerve, neuromuscular transmission, miniature endplate potentials, volume conduction principles, physiological and structural generators, cellular substrates of cortical rhythms and epileptiform discharges, polarity and field determinations, near and far field recordings, muscle resting membrane and action potentials, muscle excitation contraction coupling, single fiber potentials, compound muscle action potentials, sensory nerve action potentials, fibrillation and positive sharp wave potentials, the effects of temperature on neural transmission

7	Explain electrophysiological signal acquisition process	• Electrophysiological signals • Signal generation • Signal identification

8	• Describe types of sleep study
	• Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders
		• Different types of sleep study
		  ○ Level 1 polysomnography
		  ○ Level 2 polysomnography
		  ○ Level 3 polysomnography
		  ○ Level 4 polysomnography
		• Their components
		• Indications and contraindications of different types of sleep study

9	• Describe the protocols of sleep study
	• Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders
		• Types of sleep study protocols
		  ○ Whole night diagnostic study
		  ○ Whole night titration study
		  ○ Split night study
		  ○ Multiple Sleep Latency Test
		  ○ Maintenance of Wakefulness Test
		  ○ Home Sleep Testing
		  ○ Actigraphy
		  ○ Suggested Immobilization Test
		• Components of each protocols
		• Indications and contraindications of different protocols
		• Recent standard guidelines of different protocols

10	• Describe Patient assessment scheme • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	• History taking in a patient of Sleep Disorders • Physical examination

11	• Describe infection control practices in Sleep center • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	• Definition of Infection control and • Infection control measures in sleep clinic/Outdoor and sleep laboratory

12	• Preparation and performance of Sleep study
	• Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders
		• Technical preparations
		  ○ Equipment and supplies
		  ○ Montages
		  ○ Appropriate anatomical locations
		  ○ Site preparation and application
		  ○ Impedance verification
		  ○ Technical specification and instrumentation
		• Calibrations
		  ○ Recording device
		  ○ Ancillary equipment
		  ○ Physiologic verification
		• Identify, respond and document
		  ○ Equipment malfunction
		  ○ Settings (e.g., filters, sensitivity, gain)

13	Scoring of sleep study data
	• Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders
		• Scoring as per latest version of AASM scoring manual
		  ○ Sleep stages
		  ○ Arousals
		  ○ Respiratory events
		  ○ Desaturations
		  ○ Movements
		  ○ Cardiac events

14	Non Invasive ventilation • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	• Devices • Principles • Choosing the appropriate device • Titration protocols • Adverse effects • Types of interfaces • Choosing the appropriate interface

4.2. Second Year: Following subjects are included in the syllabus of second year:

` 4.2.1 Pharmacology
4.2.2 Diagnostic methods in Sleep Medicine
4.2.3 Respiratory technology
4.2.4 Research Methodology

4.2.1 Subject - Pharmacology

Course Description: This course is designed to enable students to acquire understanding of fundamentals of pharmacology & identification of various drugs, their actions, indications contraindication and sleep technologist's responsibilities.

Unit No.	Learning Objectives	Content
1	• Describe Pharmacodynamics, Pharmacokinetics, Classification, Principles of Administration of Drugs. • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	**Introduction to pharmacology** • Definitions • Branches, Nature & Sources • Terminology Used. • Types: Classification • Abbreviations, Prescription, Drug Calculation, Weights and Measures, Dosage Forms. • Pharmacodynamics: Actions, Drug Antagonism, Synergism, Tolerance, Receptors, Therapeutic, adverse, toxic effects. • Pharmacokinetics: Absorption, Bioavailability, Distribution, Metabolism, Interaction, Excretion • Route and Principles of Administration of Drugs including seven 'Rs'. • Storage and maintenance of drugs and respiratory therapist's responsibility. • Systems of drug measurement • Clinical drug dose calculation & converting

Unit No.	Learning Objectives	Content
		• Indian Pharmacopoeia: Legal Issues, Drug Laws, Schedule Drugs.
2	• Describe drugs used on cardio-vascular system & respiratory therapist's responsibilities • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders •	**Drugs acting on Cardiovascular system** Mechanism of Action, Dose and route, Indications, Contra Indications, Side effects, Adverse effects, Sleep technology Considerations • Cardiac Glycosides • Antianginal Drugs • Peripheral Vasodilators • Antidysrhythmic • Cardiac Stimulants • Anticoagulants • Thrombolytic Drugs • Antilipemic Agents • Antihypertensive Agents
3	• Describe drugs acting on respiratory system & respiratory therapist's responsibilities • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders •	**Drugs acting on respiratory system** Mechanism of Action, Dose and route, Indications, Contra Indications, Side effects, Adverse effects, Sleep technology Considerations • Mucolytics • Decongestants • Expectorants • Antitussives • Bronchodilators • Broncho constrictors • Antihistamines

4	• Describe drugs used on nervous system & respiratory therapist's responsibilities
	• Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and
		Drugs acting on nervous system
		Mechanism of Action, Dose and route, Indications, Contra Indications, Side effects, Adverse effects, Sleep technology Considerations
		• Central Nervous System Drugs
		  ○ Local Anesthetics
		  ○ Non-narcotic Analgesics and Antipyretics
		  ○ Narcotic Analgesics
		  ○ Narcotic Antagonists
		  ○ Sedatives and Hypnotics
		  ○ Anticonvulsants
		  ○ Muscle Relaxants

Unit No.	Learning Objectives	Content
	management of sleep disorders	○ Antipsychotic Agents ○ Antiparkinsonian Agents • Autonomic Nervous System Drugs ○ Adrenergic Drugs ○ Adrenergic Blocking Agents ○ Cholinergic agents ○ Anticholinergics
5	• Describe drugs used in de-addiction, emergency, deficiency of vitamins & minerals, poisoning, for immunization & immune-suppression & respiratory therapist's responsibilities • Demonstrate awareness of common drugs used in alternative system of medicine. • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	**Miscellaneous** Mechanism of Action, Dose and route, Indications, Contra Indications, Side effects, Adverse effects, sleep technologists Considerations • Emergency Drugs • Vitamins and minerals • Immunosuppressant • Antidotes • Drugs used in alternative systems of medicine: Ayurveda, Homeopathy, Unani and Siddha etc.

4.2.2 Subject - Sleep Diagnostics

Unit No.	Learning Objectives	Content

1	Describe different questionnaires for assessment of sleep disorders	• Enumerate questionnaires, their components, psychometric properties, uses and limitations:
		  ○ Epworth sleepiness scale
		  ○ Berlin questionnaire
		  ○ STOP-BANG
		  ○ Pre-post PSG questionnaire

2	Explain the information gathering from sleep-logs, questionnaire	• Sleep diary, components, uses and limitations • Analyzing the data from sleep diary • Methods of administration of questionnaire • Analyzing the data from questionnaires
3	Describe EEG signals during PSG	• Types of EEG signals • Identification of normal and abnormal respiratory signals and their clinical relevance
4	Describe respiratory signals during PSG	• Types of Respiratory signals • Identification of normal and abnormal respiratory signals and their clinical relevance • Basics of respiratory monitoring
5	Describe EOG and EMG signals	• Types of EOG and EMG signals • Identification of normal and abnormal EOG and EMG signals and their clinical relevance
6	Biomechanical and chemical biomonitoring	• Respiratory effort monitoring, ECG monitoring, transducers, blood pressure monitoring
7	Describe artefacts in electrophysiological signals	• Identification of artifacts • Causes of artifacts • Troubleshooting of artifacts
8	Describe oximetry & capnography	• Principle of oximetry • Uses and limitations of oximetry • Principle of capnography • Uses and limitations of capnography • Role of oximetry and capnography in sleep medicine
9	Preparation of report from sleep study data	• Components of PSG report • Uses and limitations of every component of PSG report • Preparation of an informative PSG report
10	Actigraphy	• Principle of actigraphy • Uses and limitations of actigraphy

4.2.3 Subject - Respiratory Technology

Unit No.	Learning Objectives	Content
1	Basics of lung functions	• Define lung volumes & capacities • Various tests in PFT including muscle testing Basic physiology responsible
2	Spirometers and their types	• Basic principles • Types
3	How to perform spirometry	• Methodology
4	Interpretation	• How to interpret spirometry • Relevance to respiratory technology
5	Principles of diffusion	• Principles of diffusion
6	How to perform and interpret diffusion studies	• Methodology • Interpretation • Causes of increased/decreased DLCO • Values
7	Arterial blood Gases	• Basic principle of ABG • Normal values of blood gases • Method of sampling of ABG • Interpretation of ABG
8	Oxygen therapy	• Basics of oxygen therapy • Modes of oxygen therapy and their applications • Oxygen Cylinders • Oxygen concentrators
9	Nebulization therapy	• Basics of inhalation therapy • Application of nebulization therapy
10	Non Invasive Ventilation with Oxygen therapy	• Basic principle of Mechanical ventilation • Invasive and Non-Invasive ventilation • Indication and Contraindications of Non-Invasive ventilation (NIV) • Different modes of NIV and their applications • NIV machine and accessories • How to start NIV therapy • Troubleshooting of NIV therapy

4.2.4 Subject : Research Methodology

Course Description: The course is designed to enable students to develop an understanding of basic concepts of research and research process. It is further structured to conduct/ participate in need based research studies in various settings and to utilize the research findings to provide quality Sleep technology care. The hours for practical will be utilized for conducting individual/ group research project.

Unit No.	Learning Objectives	Content
1	• Describe the concept, research, terms, need & areas of research in respiratory therapy. • Explain the steps of research process	**Research and research process** • Introduction and Definition of Research • Need & significance of research • Steps of scientific method • Characteristic of good research • Steps of research process overview
2	• Identify & research problem and objectives	**Research problem/ question** • Identification of problem area • Criteria for selecting a good research problem • Formulating a problem statement • Writing research objective • Hypothesis and assumptions

3	• Review the related literature	**Review of literature**
		• Definition & Purposes
		• Location, Sources
		• On line search;
		• Cinhal, Cochrane etc.
		  ○ Method of review of literature
		  ○ Developing conceptual or theoretical framework & models

4	• Describe the research approaches & designs	**Research approaches and designs**
		• Introduction and definition of research designs
		• Elements of research design
		• Types of research design
		  ○ Quantitative designs
		  ○ Qualitative designs
		• Mixed method research design

5	• Explain the sampling process	**Population, Sample and Sampling** • Definition of population, sample • Sampling criteria • Factors influencing sampling process • Types of sampling techniques. • Sample size

Unit No.	Learning Objectives	Content
		• Problems of sampling

6	• Describe the methods of data collection	• **Data collection methods and tools:**
		  ○ Methods and tools of data Collection
		  ○ Selection of methods of data collection
		  ○ Criteria for evaluation/assessment of data collection methods
		• Commonly used tools & methods of data collection in Sleep technology research
		• Validity & Reliability of tools
		• Pilot study
		• Data collection procedure

7	• Analyze, Interpret summarize the research data	**Analysis of data:** • Compilation • Tabulation • Classification, • Summarization, • Presentation, • Interpretation of data

8	• Communicate and utilize the research findings	**Communication and utilization of research**
		• Communication of research findings
		  ○ Verbal report
		  ○ Writing Research Report
		  ○ Writing Scientific Article/paper
		  - Critical review of Published research
		  - Utilization of research findings

9	• Explain the use of statistics, scales of measurement & graphical presentation of data • Describe the measures of central tendency & variability & methods of correlation	**Introduction to statistics** • Definition, use of statistics, scales of measurement. • Frequency of distribution and graphical presentation of data • **Measures of central tendency:** Mean, median, mode. • Measures of Variability : Standard deviation • Co-efficient of correlation • Normal probability • **Tests of significance :** 't' test , chi square • Statistical packages and its application - SPSS

4.2.5 Rotatory posting in

1. **Neurology (2 months)** : EEG scoring including long term video EEG
   a. Principles of Clinical Neurophysiology
   b. Procedures:
      i. Nerve action potentials, compound muscle action potentials, electromyography, quantitative electromyography, repetitive stimulation, F wave recording, H reflex recording, blink reflex recording and jaw jerk recording
      ii. Procedures: EEG monitoring (non-invasive and intracranial), video monitoring, EMG and movement monitoring, ECG monitoring, EEG correlation with neuroimaging (including MRI, PET and ictal SPECT), Wada testing, intracranial electrode stimulation and functional mapping
2. **Pulmonary Medicine (2 months)** : Oxygen therapy, Pulmonary Function Testing (Spirometry and diffusion study), ABG procedure and interpretation, Nebulization therapy and drugs, NIV therapy (setting and troubleshooting)

4.3 Third Year: During third year following subjects will be taught:

4.3.1 Sleep disorders primarily managed by behavioral interventions
4.3.2 Sleep Disorders related to CNS and Respiratory System
4.3.3 Advancements in Sleep Technology
4.3.4 Management of a sleep facility

4.3.1 Subject - Sleep disorders primarily managed by behavioral interventions

Unit No.	Learning Objectives	Content
1	• Describe Sleep Disorders according to latest International Classification of Sleep Disorders • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	**Prevalence, Etiology, Pathophysiology, clinical presentation and management of:** **Insomnia** • Chronic Insomnia disorder • Short term Insomnia disorder • Other Insomnia disorder ▪ Isolated Symptoms and Normal Variants • Excessive Time in Bed • Short Sleeper **Circadian Rhythm Sleep Disorders** • Delayed Sleep-Wake Phase Disorder • Advanced Sleep-Wake Phase Disorder • Irregular Sleep-Wake Rhythm Disorder • Non-24-Hour Sleep-Wake Rhythm Disorder • Shift Work Disorder • Jet Lag Disorder • Circadian Sleep-Wake Disorder Not Otherwise Specified (NOS)

Unit No.	Learning Objectives	Content
		Behavioral component of management of other sleep disorders • Hypersomnia • Narcolepsy • Insufficient Sleep Syndrome • Sleep Related Breathing Disorders • Parasomnia • Sleep Related Movement Disorders

4.3.2 Subject - Sleep Disorders related to CNS and Respiratory System

Unit No.	Learning Objectives	Content
1	• Describe Sleep Disorders according to latest International Classification of Sleep Disorders • Describe and show how the knowledge gained can be used in clinical decision making pertaining to etiopathology, clinical symptoms and management of sleep disorders	**Prevalence, Etiology, Pathophysiology, clinical presentation and management of:** **Sleep related breathing disorders** ▪ Obstructive Sleep Apnea Disorders • Obstructive Sleep Apnea, Adult • Obstructive Sleep Apnea, Pediatric ▪ Central Sleep Apnea Syndromes • Central Sleep Apnea with Cheyne-Stokes Breathing • Central Apnea Due to a Medical Disorder without Cheyne-Stokes Breathing • Central Sleep Apnea Due to High Altitude Periodic Breathing • Central Sleep Apnea Due to a Medication or Substance • Primary Central Sleep Apnea • Primary Central Sleep Apnea of Infancy • Primary Central Sleep Apnea of Prematurity • Treatment-Emergent Central Sleep Apnea ▪ Sleep Related Hypoventilation Disorders • Obesity Hypoventilation Syndrome • Congenital Central Alveolar Hypoventilation Syndrome • Late-Onset Central Hypoventilation with Hypothalamic Dysfunction • Idiopathic Central Alveolar Hypoventilation • Sleep Related Hypoventilation Due to a Medication or Substance

Unit No.	Learning Objectives	Content
		• Sleep Related Hypoventilation Due to a Medical Disorder ▪ Sleep Related Hypoxemia Disorder • Sleep Related Hypoxemia ▪ Isolated Symptoms and Normal Variants • Snoring • Catathrenia **Hypersomnia** • Narcolepsy Type 1 • Narcolepsy Type 2 • Idiopathic Hypersomnia • Kleine-Levin Syndrome • Hypersomnia Due to a Medical Disorder • Hypersomnia Due to a Medication or Substance • Hypersomnia Associated with a Psychiatric Disorder • Insufficient Sleep Syndrome • Isolated Symptoms and Normal Variants o Long Sleeper **Sleep related movement disorders** • Restless Legs Syndrome • Periodic Limb Movement Disorder • Sleep Related Leg Cramps • Sleep Related Bruxism • Sleep Related Rhythmic Movement Disorder • Benign Sleep Myoclonus of Infancy • Propriospinal Myoclonus at Sleep Onset • Sleep Related Movement Disorder Due to a Medical Disorder • Sleep Related Movement Disorder Due to a Medication or Substance • Sleep Related Movement Disorder, Unspecified • Isolated Symptoms and Normal Variants o Excessive Fragmentary Myoclonus o Hypnagogic Foot Tremor and Alternating Leg Muscle Activation o Sleep Starts (Hypnic Jerks). **Sleep related seizures** **Parasomnias** • NREM-Related Parasomnias • Disorders of Arousal (From NREM Sleep) • Confusional Arousals • Sleepwalking • Sleep Terrors • Sleep Related Eating Disorder • REM-Related Parasomnias • REM Sleep Behavior Disorder • Recurrent Isolated Sleep Paralysis • Nightmare Disorder

Unit No.	Learning Objectives	Content
		• Other Parasomnias • Exploding Head Syndrome • Sleep Related Hallucinations • Sleep Enuresis • Parasomnia Due to a Medical Disorder • Parasomnia Due to a Medication or Substance • Parasomnia, Unspecified • Isolated Symptoms and Normal Variants ○ Sleep Talking

4.3.3– Advancement in Sleep Technology

Unit No.	Learning Objectives	Content
1	Scoring of sleep study among infants and children	• Scoring rules for Children and Infants sleep study, as per latest standard guidelines

2	Discuss PAP therapy treatment adherence	• Sleep Health Educator and patient self-management
		• Developing and maintaining therapeutic compliance
		• At Home Positive airway pressure follow-up
		  ○ Therapy assessment tools
		  ○ Causes of non-adherence
		  ○ Interventions
		  ○ Equipment maintenance

3	Gathering data from PAP devices in PAP clinic	• Type of data available in PAP devices • Technique of data collection from PAP devices • Interpretation of data from PAP devices • Uses and limitation of data from PAP devices
4	Discuss risk assessment in sleep medicine	• Methods of risk assessment during sleep clinic and sleep laboratory visit

5	Discuss latest various national and international sleep societies practice parameters and guidelines	• Practice parameters and guidelines
		  ○ American Academy of Sleep Medicine
		  ○ World Sleep Society

6	Discuss emergency care to patients during sleep study	• How to predict adverse events during sleep study • Management of adverse events during sleep study • Prevention of adverse events during sleep study
7	Telemedicine in Sleep Practice	• Concept of telemedicine • Methods of telemedicine • Advantages and limitations of telemedicine in sleep medicine practice
8	Advancements in acquisition of sleep related parameters	• PAT based devices • Non-contact devices for acquisition of sleep related parameters • Consumer based technologies diagnosis of sleep disorders
9	Sleep Study in special population	• Acquisition of data among infants and children • Acquisition of data in ICU • Acquisition of data among children with intellectual disability • Acquisition of data from patients with dementia
10	**Imaging related to Sleep Medicine**	• CT scan, MRI scan and other imaging related to sleep medicine

4.3.4 Subject – Sleep Lab Management

Unit No.	Learning Objectives	Content
1	Discuss record management in sleep laboratory	• Record management in sleep laboratory
2	Management of sleep centre	• Sleep Center Facilities and Equipment • The manager's role in a sleep center • Sleep center policies and procedures • Medical Ethics and professionalism • Internal audits of sleep center • Quality assurance and quality improvement • Research in the sleep center • The sleep technologist in the medical office
3	Documentation in sleep clinic and sleep laboratory	• Sleep clinic ○ Patient's clinical details documents ○ Patient's PAP therapy uses documents ○ Total OPD consultation documents ○ Sleep study appointment date document • Sleep laboratory ○ Patient admission and discharge documents ○ Patient's clinical details record ○ Sleep study events documents ○ PSG report documents ○ Sleep laboratory inventory documents ○ Sleep laboratory purchase documents Sleep laboratory consumables documents
4	Referencing	•
5	Emergency management in sleep Medicine	• Types of emergencies pertaining to sleep medicine • Identification and management of emergency conditions related to sleep medicine
6	Business model of sleep laboratory	•

4.3.5 Rotatory Posting: In Neurology, Pulmonary Medicine, ENT and Dentistry department (1 month each) to learn practical work related to Sleep Disorders.

5. ***Examination:***

Formative assessment:

- Students will be assessed by monthly theory and practical internal assessments.
- At the end of every year, students will be subjected to internal examinations of all the subjects of that particular year.

Summative assessment:

- At the end of completion of 3 years of training, the candidate will be subjected to Internal followed by External examination which will include both theory and practical assessment.

*To appear in Final examination, all students are expected to prepare at least 100 polysomnography reports after manual scoring of data during their 3 years of training.

*Examination pattern will be subjected to change as per institute protocol.

6. ***Suggested reading:***

1. American Academy of Sleep Medicine. International Classification of Sleep Disorders. 3rd ed. Darian, IL: American Academy of Sleep Medicine; 2014.
2. Berry RB, Brooks R, Gamaldo CE, Harding SM, Lioyd RM, Marcus CL, Vaughn BV for the AA of SM. The AASM Manual for scoring of sleep and Associated eveents: Rules,terminlogy and technical specifications. Version 2. Darien, IL: American Academy of Sleep Medicine; 2012.
3. Geyer JD, Carney PR, Payne T. Atlas of Polysomnography. Lippincott Williams and Wilkins. 2nd Ed. Philadelphia, PA. 2010
4. Spriggs WH. Essentials of polysomnography. Jones and Barlett Publishers, LLC. Ontario, Canada. 2010
5. Gupta R, Pandi-Perumal SR, BaHammam A. Clinical Atlas of Polysomnography. Apple Academic Press. 1st Ed. 2018
6. Cynthia Mattice, Rita Brooks, Teofilo L. Lee-Chiong. Fundamentals of Sleep Technology. Lippincott Williams & Wilkins. 3rd edition. 2020
7. Singh TD. Basic Polysomnography. Evincepub Publishing. 1st edition. 2019

Dr. H N Mallick | Dr. Abhishek Goyal | Dr. Ravi Gupta

Dr. Niraj Kumar | Dr. Ashi Chugh | Dr. Lokesh Kumar Saini