



**MBBS
Year-I**

**Revised Curriculum
(Version-III)**

**National University of Medical Sciences
Pakistan**

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1. Preamble

Integration has been accepted as an important educational strategy in medical education. NUMS believes in continuous curriculum revision through regular reviews and feedback of stakeholders. This curriculum has been updated with Correlation as a minimum level of integration in MBBS. This curriculum is outcome based, patient centered, community relevant, promotes health and prevents disease. It has been revised by the faculty of basic and clinical sciences from constituent/affiliated colleges in collaboration with NUMS Academic Directorate and NUMS department of Health Professions Education.

2. Curriculum perspective

NUMS curriculum is evolved taking into consideration constructivist and behaviorist with some element of cognitivist approach. It allows students to construct their own knowledge based on what they already know and to use that knowledge in purposeful activities requiring decision making, problem solving, and judgments.

3. Level of integration

NUMS will follow Correlation i.e level 7 of Harden's level of Integration in first four years. The emphasis remains on disciplines or subjects with subject-based courses taking up most of the curriculum time. Within this framework, an integrated teaching session or course is introduced in addition to the subject-based teaching. This session brings together areas of interest common to each of the subjects. Though the teaching is discipline based, topics are correlated and taught with clinical context for better understanding and application of concepts. However clinical teaching increases gradually with advancing years. MBBS Year V is for clerkships

4. Curricular organization and structure

- a. NUMS MBBS curriculum in the first four years shall be delivered in a System Based Modular Format with clinical relevance. However, in year III & IV, students shall get clinical exposure through rotations in the wards and OPDs and in Year V through clerkships
- b. There will be three blocks in year I, each will have modules, duration of which depends upon the number and complexity of the objectives to be achieved in that module
- c. The curriculum will be delivered by modular teams of multidisciplinary basic science faculty and relevant clinical faculty.
- d. The planning and delivery will be coordinated by year coordinators who will guide module coordinators of their respective years for efficient implementation

- e. Modular Coordinator will be responsible for teaching and assessment during each module. S/he will be appointed by HoDs in coordination with HPE team
 - f. Clinical Coordinator will be responsible for placement, teaching and assessment during clinical rotations
 - g. All NUMS colleges will provide study guides of each module to the students
 - h. To attain the integration in MBBS program, teaching shall be done in three spirals followed by Clerkships in final year
 - 1) **Basics of Medicine (Spiral I -Years I & II):** The syllabus will be integrated horizontally around systems of the body in which Anatomy, Physiology and Biochemistry will be taught with clinical relevance. Additional chunks of content will be added in a module that exactly does not fit in the central theme of the module.
 - 2) Longitudinal themes (Behavioral Sciences and Research Methodology & EBM) are an integral part of year I & II
 - 3) Islamiat and Pakistan Studies are compulsory subjects taught throughout the year in first and second year respectively
 - 4) Apart from attending daily scheduled sessions, students should engage in self-directed learning to achieve the desired objectives
 - 5) Professional Exams are discipline based. In first Prof, Anatomy, Physiology and Biochemistry and in second prof, Anatomy, Physiology, Biochemistry and Islamiat/Pakistan Studies will be assessed
- 5. Competencies** The focus of this curriculum is on the roles of a general physician as identified by PMC. These are skillful, knowledgeable, community health promoter, critical thinker, professional and role model, researcher and leader. Competencies focused in year I and II are: -
- a. Medical Knowledge
 - b. Procedural skills
 - c. Problem solving
 - d. Communication skills
 - e. Professionalism
 - f. Research

6. Outcomes

By the end of years, I & II, students should be able to:

- Correlate the developmental and anatomical knowledge of different organ systems of human body to their physiological and biochemical basis.
- Comprehend the significance of behavioural sciences for medical students
- Analyze multiple perspectives of Islamic studies or ethics and Pakistan studies
- Discuss the basic principles of research

7. Academic calendar Year I

Blocks	I (14 weeks)					II (10 weeks)		III (10 weeks)		
(34 wks)	02	02	06	03	01	09	01	04	05	01
Modules	Foundation-I	Cell Structure & Function	MSK - I	Haem & Immunology- I	EOB	Cardiovascular System - I	EOB	Respiratory system - I	MSK – II	EOB
Integration: Anatomy, Physiology, Biochemistry, relevant clinical disciplines										
Across the year : Behavioral Sciences, Research Methodology and Islamiyat										

8. Contact Hours Distribution Year-I

SUBJECTS	CONTACT HOURS
Anatomy	250
Physiology	225
Biochemistry	125
Medicine & Allied	30
Surgery & Allied	30
Research Methodology & EBM	20
Islamiyat	15
Self-Directed Learning	100
Cocurricular activities	40
Total Hours	835

9. Educational Strategies (These are proposed, but institutes can use other evidence-based teaching methodologies that suit their context)

- a. Interactive Lectures
- b. Small group discussion
- c. Lab practical
- d. Skill lab
- e. Problem based learning/ Case based learning
- f. Tutorials
- g. Integrated sessions using any of the above strategies
- h. Self-directed learning (SDL) and directed self-learning (DSL)

10. Resources. To be filled in by the institute

- a. Faculty
- b. Facilities
- c. Administration for Course
- d. Administrative structure
- e. Communication with students

11. Internal Assessment

Formative assessment (low stake) is at faculty discretion like mid module test and other class tests. There will be three end of blocks and one pre-annual examination in year I, which contributes towards the weighting of internal assessment i.e 20% in first professional MBBS Examination.

12. Annual Professional Examination.

The University will take the first professional Examination at the end of the academic year. Annual Theory & Practical Examination will be of 200 marks for Anatomy, Physiology and Biochemistry. The passing score is 50% in theory and practical separately

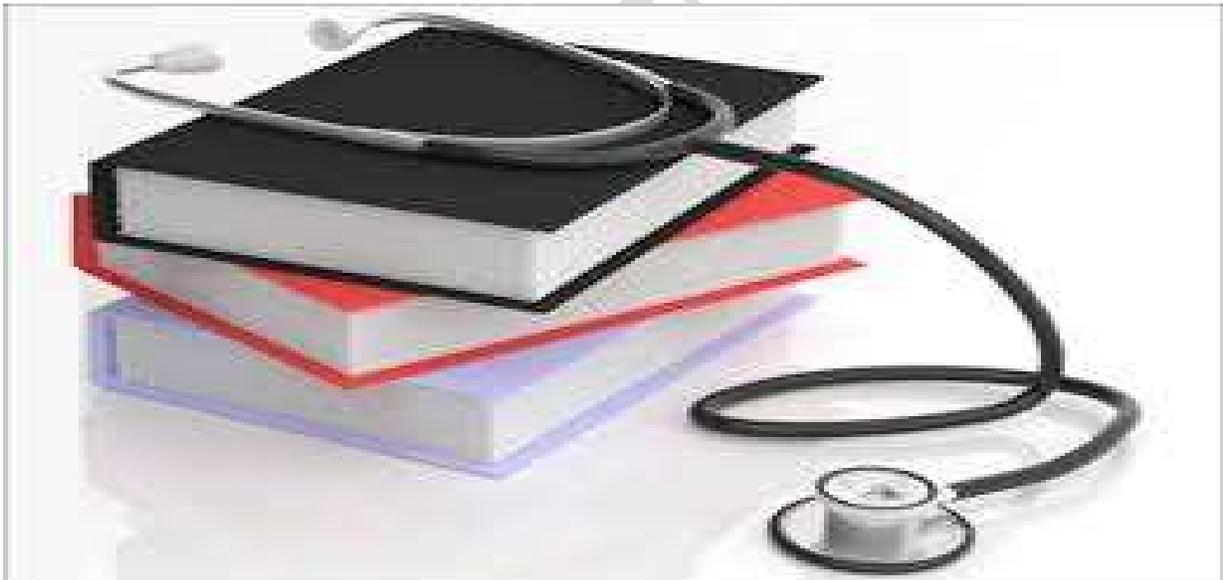
13. Evaluation of the Course. To be filled in by the institute.

- a. The major goals of the evaluation are to monitor quality of and improve curriculum
- b. Student portfolio shall be maintained in the departments in which students will give their feedback either by name or anonymously. Feedback may be taken at the end of module, online and informal student feedback during the running module
- c. Faculty suggestions if any, for improvement of curriculum and teaching may be incorporated in the next session

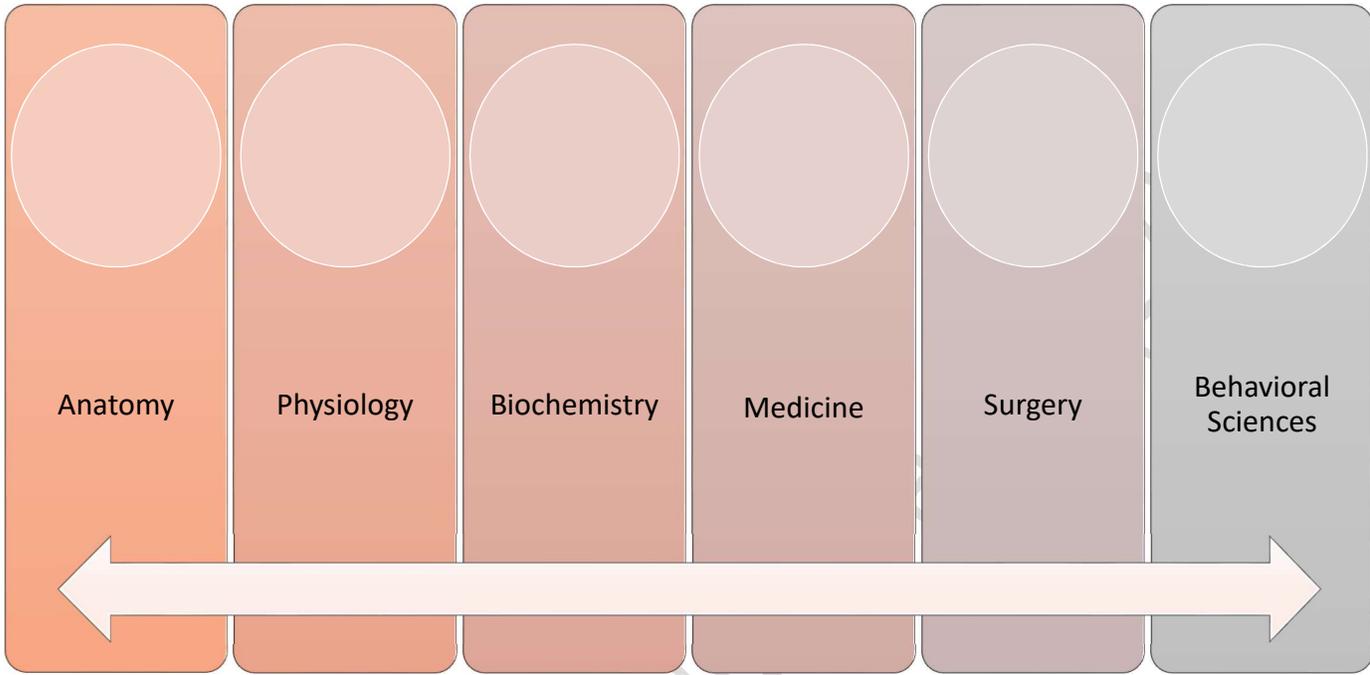
14. Implementation of curriculum

- a. The university will give details of all content including learning outcomes, assessment blueprints, and table of specifications, distribution of which across the whole years and rotations is upon the discretion of the medical college/institute
- b. Early clinical exposure may be achieved by allocating hours to skill labs, Medicine & Surgery ward visits in each module or patient may be brought before the students as per the decision of institute

MBBS YEAR I
BLOCK I
MODULE I
FOUNDATION- I
Duration: 02 weeks



Integration of Disciplines in Foundation Module



MODULE PLANNING COMMITTEE

Module Coordinator	<i>To be filled by the institutes</i>
Members	

Preamble

This module focuses on orientation of students to different disciplines to be taught in years I & II along with their grooming through basic themes of Behavioral Sciences. It includes basic anatomical, physiological and biochemical concepts about the human body and its development. Students will also be introduced to clinical subjects. Apart from attending daily scheduled sessions, students should engage in self-directed learning to achieve the desired objectives

Aim

This module enables the student to recognize the role of different disciplines in studying human body and its diseases.

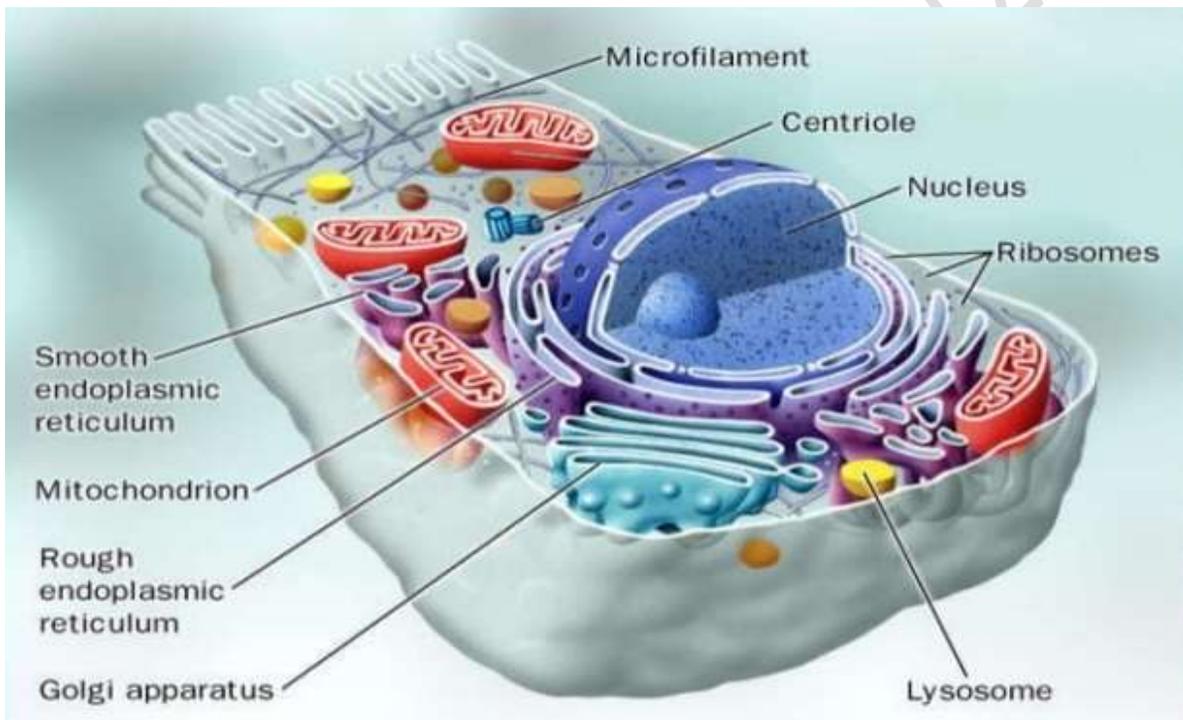
Learning outcomes

By the end of this module the students will be able to

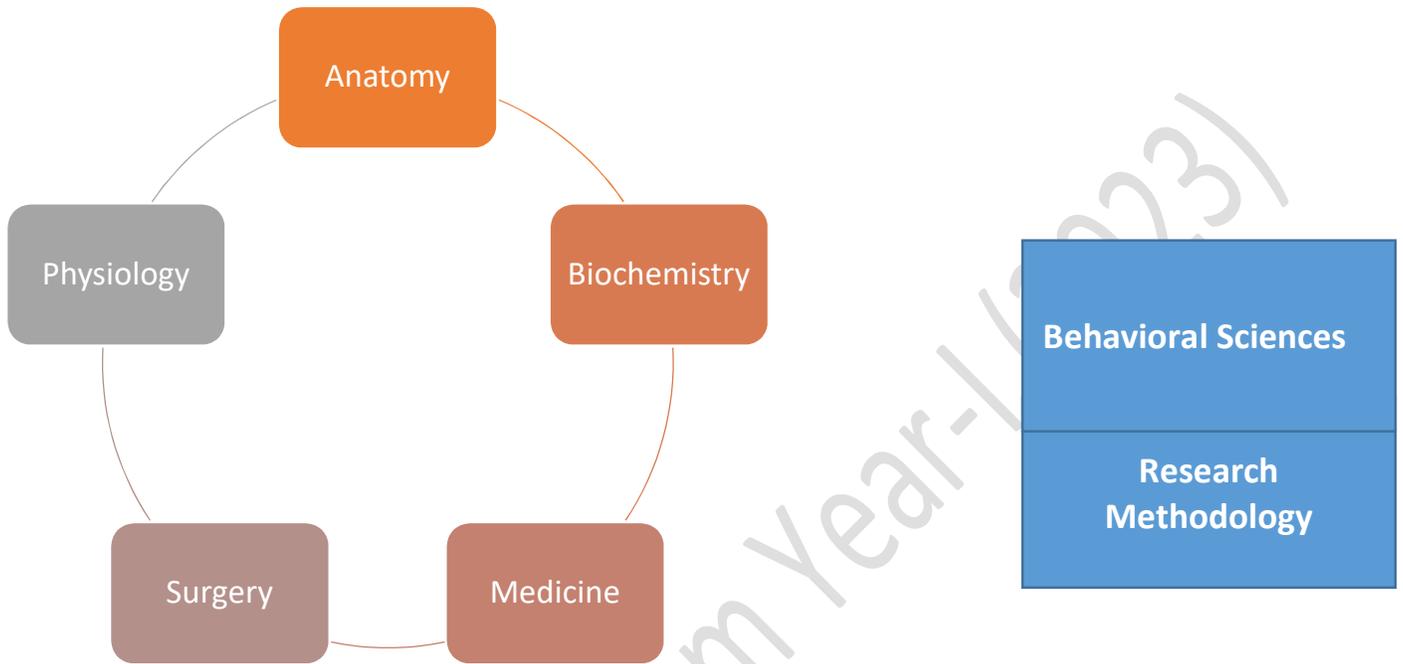
- Grasp the basic concepts of sub-disciplines of Anatomy
- Operate a microscope correctly according to standard operating procedures
- Comprehend the basic concepts of Physiology
- Comprehend the basic concepts of biochemistry
- Outline the basics of Medicine
- Outline the basics of Surgery
- Comprehend the basic concepts of Behavioral Sciences

ANATOMY				
Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
Introduction	Grasp the basic concepts of sub-disciplines of Anatomy	<ul style="list-style-type: none"> Define Anatomy and its various disciplines Follow the plan of instruction and assessment of Anatomy as per criteria laid by NUMS 	Lecture	Formative-classroom assessment-Oral questioning
Handling of microscope	Operate a microscope correctly according to standard operating procedures	<ul style="list-style-type: none"> Identify the parts of microscope Demonstrate working of microscope with focusing of slides at different magnifications 	Practical	Formative-classroom assessment-Oral questioning
PHYSIOLOGY				
Introduction	<i>Comprehend the basic concepts of Physiology</i>		<i>Lecture</i>	<i>Formative</i>
BIOCHEMISTRY				
Introduction	Comprehend the basic concepts of biochemistry		Lecture	Formative
MEDICINE				
Introduction	Recognize the importance of Medicine in human life	Introduction to medicine	Lecture	Formative
	Understand the evolution of modern medicine	History of Medicine		
SURGERY				
Introduction	Recognize the importance of principles of surgery in general	<ul style="list-style-type: none"> Recognize different specialties of surgery Discuss principles of management of surgical problems Recognize the role of Radiology and anaesthesia in surgical practice 	Lecture	Formative

MBBS YEAR I
BLOCK I
MODULE II
CELL STRUCTURE & FUNCTION
Duration : 02 weeks



Integration of Disciplines in Module II



MODULE PLANNING COMMITTEE

Module Coordinator	<i>To be filled by the institutes</i>
Members	

Preamble

This module introduces the student to the basic structure and functioning of the cell and molecules and how dysfunctions in cell can lead to disease. The research methodology, Behavioral Sciences and Islamiat will be taught as a part of the longitudinal theme. Apart from attending daily scheduled sessions, students should engage in self-directed learning to achieve the desired objectives

Learning outcomes

- At the end of this module, student will be able to relate the embryological, histomorphological knowledge of cell to its physiological and biochemical basis and appraise the clinical aspect related to dysfunctions in the cell

List of Proposed Themes for integrated sessions (at least one/week)

Theme
Cell
Development of human body

General Histology				
Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
	By the end of this module, students will be able to:			
Cell	<ul style="list-style-type: none"> Correlate microscopic structure of cytoskeleton with variation in cellular modifications 	Knowledge: <ul style="list-style-type: none"> List various cell organelles along with their functions Explain the structure and functions of various components of cytoskeleton. 	LGIS	MCQs/ SEQs/ SAQs/ OSPE/ VIVA
Epithelial tissue	<ul style="list-style-type: none"> Correlate the microstructure of various types of epithelia with their functions and dysfunctions 	Knowledge: <ul style="list-style-type: none"> Define epithelium Classify epithelium with examples of each type Classify Glands with examples. Define polarity Differentiate among various epithelial cells List the structural modifications of apical, lateral and basal domains of the cell. Classify the apical modifications according to motility Name the component of cytoskeleton contributing in each apical modification Define metaplasia and correlate it with its clinical importance. Classify various types of cell junctions according to functions, providing examples of each. Skill: <ul style="list-style-type: none"> Identify the histological features of different types of epithelia under light microscope Illustrate different types of epithelia and write two points of identification of each 	LGIS/ Practical	MCQs/ SEQs/ SAQs/ OSPE/ VIVA

		<ul style="list-style-type: none"> • Compare the histological features of serous and mucus acini under light microscope. 		
General Embryology				
Gametogenesis	Describe gametogenesis and numerical and structural chromosomal abnormalities that result from aberrations in this process.	<ul style="list-style-type: none"> • Explain the sequence of events of mitosis and meiosis with the help of illustrations and models. • Elucidate the morphological changes in male and female gametes during their maturation • Define the following terms in relation to spermatogenesis and oogenesis: <ul style="list-style-type: none"> ○ Haploid ○ Diploid ○ Euploid ○ Aneuploid ○ Triploid ○ Polyploid ○ Nondisjunction ○ Monosomy ○ Trisomy ○ Mosaicism ○ Translocation 	LGIS	MCQs/ SEQs/ SAQs/ OSPE/ VIVA
Chromosomal aberrations	Explain the embryological basis of common numerical and structural chromosomal aberrations	<ul style="list-style-type: none"> • List numerical and structural chromosomal disorders • Explain the embryological basis and clinical presentation of following syndromes: <ul style="list-style-type: none"> • Down's • Klinefelter • Turner • Angelman • Prader Willi • Cri du chat 		
Gross Anatomy				
Introduction	Use the general anatomical terms in describing the structure of different parts of body	<ul style="list-style-type: none"> • Demonstrate the anatomical position. • Name various planes of the body. 	LGIS	Formative-classroom assessment- Oral questioning

		<ul style="list-style-type: none">• Define the terms of position, movement, and laterality.		
Practicals: <ul style="list-style-type: none">• All types of simple epithelia• All types of stratified epithelia• Glands				

MBBS Curriculum Year-I (2023)

PHYSIOLOGY

TOPIC/THEME	LEARNING OUTCOMES	LEARNING OBJECTIVES	INSTRUCTIONAL STRATEGIES	ASSESSMENT TOOLS
	By the end of the session, student should be able to;			
CELL & GENETICS				
Homeostasis-I	Appreciate the role of homeostatic feedback mechanisms in maintaining the functional organization of the Human Body and Control of the "Internal Environment"	<p><u>KNOWLEDGE</u></p> <ul style="list-style-type: none"> Discuss the functional organization of human body. Describe the parameters needed for the control of the 'internal environment'. Differentiate between the intracellular and extracellular fluid compartments. List the typical value and normal range for plasma Na⁺, K⁺, H⁺(pH), HCO₃⁻, Cl⁻, Ca²⁺, and glucose, and the typical intracellular pH and concentrations of Na⁺, K⁺, Cl⁻, Ca²⁺, and HCO₃⁻. 	<ul style="list-style-type: none"> Lectures 	<ul style="list-style-type: none"> MCQ SAQ/SEQ Structured viva
Homeostasis-II		<p><u>KNOWLEDGE</u></p> <ul style="list-style-type: none"> Explain Homeostasis and the factors which are regulated through homeostasis Recognize the interplay of various organ systems in maintaining homeostasis Compare and contrast positive, negative and feed forward feedback mechanisms as the control systems of the body. Narrate examples of each feedback control system. Discuss the outcomes of failure fo the feedback 		

		control system of homeostasis		
Cell membrane	Relate the structure of cell and its various components to metabolic processes and locomotion	<p><u>KNOWLEDGE</u></p> <ul style="list-style-type: none"> Describe the composition of a human cell membrane. Diagram its cross section, and explain how the distribution of phospholipids and proteins influences the membrane permeability of ions, hydrophilic and hydrophobic compounds. Enlist the various functions of integral and peripheral proteins in the cell membrane. 	<ul style="list-style-type: none"> Lectures Tutorial 	<ul style="list-style-type: none"> MCQ SAQ/SEQ Structured viva
Cell Organelle – I		<p><u>KNOWLEDGE</u></p> <ul style="list-style-type: none"> Differentiate membranous organelles from non-membranous organelles. Restate the structure & function of nucleus, nuclear membrane, Chromatin & Chromosomes, Nucleoplasm & Nucleolus. Compare the structure & function of smooth endoplasmic reticulum & RER. Appreciate the importance of Golgi apparatus in packaging and storage of newly formed proteins. Discuss the structure & functions of vaults. Discuss the synthesis, types & functions of ribosomes. 		
Cell Organelle – II		<p><u>KNOWLEDGE</u></p> <ul style="list-style-type: none"> Summarize the structure & functions of secretory vesicles. Discuss the physiological anatomy of mitochondria & 		

		<p>discuss its functions in special relation to energy synthesis.</p> <ul style="list-style-type: none"> • Compare and contrast the functions of lysosomes & peroxisomes. 		
Cytoskeleton & Locomotion of cells		<p>KNOWLEDGE</p> <ul style="list-style-type: none"> • Discuss the structure & function of cell cytoskeleton (microtubules, microfilaments & intermediate filaments). • Recall movements of cells (amoeboid, ciliary & flagellar movements). 		
Transport of Micro molecules	Differentiate the different type of transport mechanism across the cell membrane for the movement of micro & macromolecules.	<p>KNOWLEDGE</p> <ul style="list-style-type: none"> • Classify various modes of transport of substances across the cell-membrane. • Compare and contrast amongst the processes of osmosis, diffusion & facilitated diffusion (transport of micro molecules). 	<ul style="list-style-type: none"> • Lectures • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva
Transport of Macromolecules		<p>KNOWLEDGE</p> <ul style="list-style-type: none"> • Compare and contrast the process of exocytosis & endocytosis (transport of macromolecules) 		
Primary active transport	Differentiate the different type of transport mechanism across the cell membrane for the movement of micro & macromolecules	<p>KNOWLEDGE</p> <ul style="list-style-type: none"> • Explain the process of primary active transport with examples. • Give an account on the structure, working and important functions of Na⁺ / K⁺ pump. • Enlist other active transport pumps present in human body e.g. sarcoplasmic reticulum Ca²⁺ pump, and gastric H⁺ pump 	<ul style="list-style-type: none"> • Lectures • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva
Secondary active transport		<p>KNOWLEDGE</p> <ul style="list-style-type: none"> • Grasp concept of Secondary active transport. 		

		<ul style="list-style-type: none"> • Differentiate co-transport & counter-transport with examples. • Describe how energy from ATP hydrolysis is used to transport ions such as Na⁺, K⁺, Ca²⁺, and H⁺ against their electrochemical differences (e.g., via the Na⁺ / K⁺ pump,). 		
Genetic control of cell function		<p><u>KNOWLEDGE</u></p> <ul style="list-style-type: none"> • Comprehend Genetic control of cell functions and cell division • Compare & contrast apoptosis & necrosis. • Explain the pathophysiology of cancer and aging 		
Practicals	Study Neubauer's chamber in detail using compound Microscope judiciously	<p><u>SKILLS</u></p> <ul style="list-style-type: none"> • Identify different parts of the compound/binocular microscope. • Carefully handle the microscope, and set its coarse and fine adjustments and magnifications using different lenses. • Identify the counting chambers and dimensions of different squares on the counting grid and recall the principle of hemocytometry. • Focus the counting grid for RBC and WBC counting under low and high magnification • Analyze the role of diluting fluids and their composition in hemocytometry. • Count the cells on the slide using Thomas rule in RBCs counting squares of Neubauer's chamber. <p><u>ATTITUDE:</u></p> <ul style="list-style-type: none"> • Practice the art of handling equipment carefully and 	Practical Demonstration	OSPE Structured viva

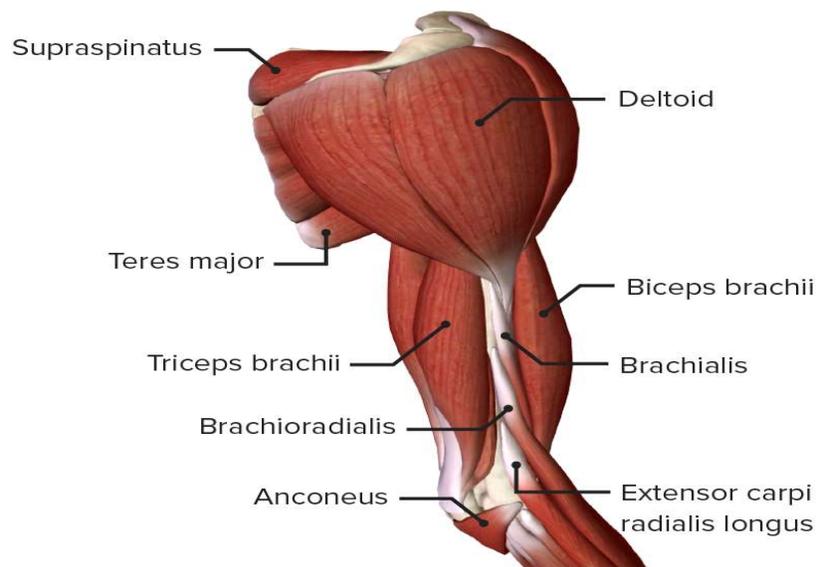
		experimenting with taking relevant precautions		
	Determine RBC count by using Neubauer's chamber	<p><u>SKILLS</u></p> <ul style="list-style-type: none"> ● Estimate the red blood cell count by taking blood in RBC pipette and diluting it with Hayem's fluid ● Apply the method of charging Neubauer's chamber. ● Count the cells on the slide using Thomas's rule, in the WBCs counting squares of Neubauer's chamber. <p><u>ATTITUDE:</u></p> <ul style="list-style-type: none"> ● Practice the art of taking consent from the subject before performance. ● Demonstrate the art of explaining the procedure effectively to the patient. ● Use aseptic technique to prick and draw blood for the procedure. 	Practical	OSPE Structured viva

BIOCHEMISTRY				
Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
Cell	Explain Cell Biochemistry	Cell Biochemistry	<ul style="list-style-type: none"> • Lectures • SGD 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva
	List various Biomolecules	Biomolecules		
	Differentiate between Cell Organelles, their structure, biochemical functions and associated disorders	<ul style="list-style-type: none"> • Enumerate and describe various Cell Organelles in detail (Nucleus, Mitochondria, Ribosomes, Golgi Apparatus, Endoplasmic Reticulum, Lysosomes and Peroxisomes) • Elaborate genetic control of cellular functions with help of a diagram • Outline the role of various cell Organelles in various cellular metabolisms 		
	List various Cytology techniques for study of a cell	Cytology techniques for study of a cell		
	Discuss the chemical composition of a cell membrane and its significance regarding a particular cellular environment	<ul style="list-style-type: none"> • Draw and explain the chemical composition of a cell membrane • Describe its significance regarding a particular cellular environment 		
	Relate the concept of chemistry and role of signal transduction in health and disease	<ul style="list-style-type: none"> • Describe the chemistry of cell signaling mechanism and enlist the various receptors involved in it accordingly • Elaborate the role of signal transduction in health and disease • Describe various membrane transport mechanisms • Tabulate various types of transports across the cell 		

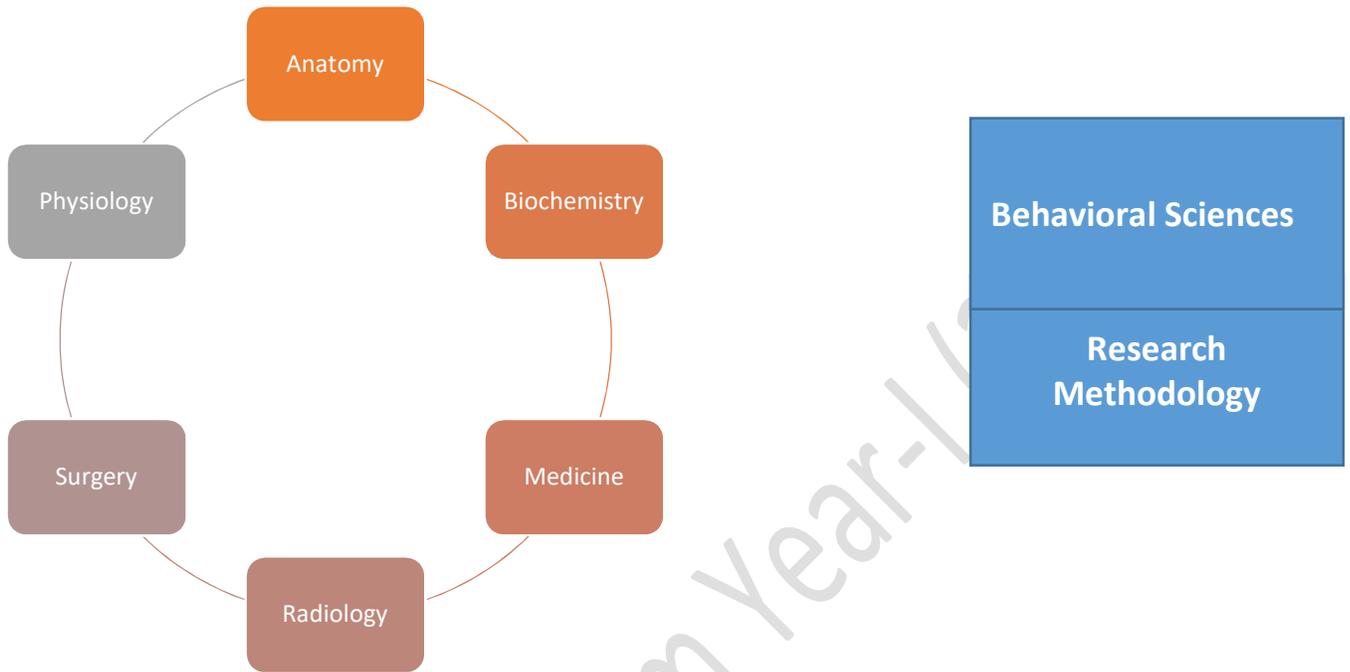
		membrane i.e. active transport, passive transport, simple diffusion and facilitated diffusion with one example		
Practicals		<ul style="list-style-type: none"> • Introduction to use of laboratory glassware • Introduction to use of laboratory equipment <ul style="list-style-type: none"> ➤ Spectronic 20, microlab, incubator, water bath, hot oven, centrifuge, electronic balance ➤ Preservation and collection of clinical specimen 	Practical	OSPE

SURGERY				
Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
Surgical Setup	Develop an understanding about how to approach patients in clinics	Comprehend the structure and functioning of different departments of clinics like ER, OPD, Wards and operation theaters	Lectures/SGD	Formative assessment
MEDICINE				
Medicine & Allied subjects	Recognize various disciplines in medicine & allied	Comprehend the structure and functioning of various disciplines in medicine & allied	Lectures/SGD	Formative assessment
Chromosomal aberrations	Recognize the clinical presentation of common chromosomal aberrations	Clinical presentation of following syndromes preferably via video clips: <ul style="list-style-type: none"> • Down's • Klinefelter • Turner • Prader Willi 	Video clips	Formative assessment

MBBS YEAR I
BLOCK I
MODULE III
Musculoskeletal System- I (MSK - I)
Duration: 06 weeks



Integration of Disciplines in Module III



MODULE PLANNING COMMITTEE

Module Coordinator	<i>To be filled by the institutes</i>
Members	

Preamble

The Musculoskeletal system is responsible for locomotion, support and protection to the human body. This system consists of osteology (the study of bones), arthrology (the study of joints), and myology (the study of muscles) of upper limb. It also includes basic structure and functioning of the nerve and muscles and how their dysfunctions can lead to disease. Along with this, biochemical aspect of mineral and trace elements is also a part of this module. The research methodology, Behavioral Sciences and Islamiat will be taught as a part of the longitudinal theme

Apart from attending daily scheduled sessions, students should engage in self-directed learning to achieve the desired objectives

OUTCOMES

By the end of this module, student should be able to integrate the basic and clinical knowledge for better understanding of the upper limb which will help them in the subsequent years of clinical practice

List of Proposed Themes for integrated sessions (at least one/week)

Theme
Pain/ limited movement of shoulder
Frozen Shoulder
Pain/ limited movement of elbow
Tennis Elbow
Numbness of hand
Carpal Tunnel Syndrome

ANATOMY				
Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
	By the end of this module, students will be able to:			
General Histology				
Connective tissue	Correlate microscopic structure of various types of connective tissues with their function and dysfunction	Knowledge: <ul style="list-style-type: none"> List the components of connective tissue. List various CT cells and fibers Classify connective tissue Describe the characteristic features of each type Explain the role of fibroblasts in wound contraction Elucidate the role of macrophages in defense Skill: <ul style="list-style-type: none"> Identify different types of connective tissue under the microscope Illustrate the types of connective tissue with two identification points of each. 	LGIS Practical	MCQs SEQs/SAQsOS PE Viva Voce
Bone		Knowledge: <ul style="list-style-type: none"> Describe the origin, histological structure, and functions of the following: <ul style="list-style-type: none"> Osteoprogenitor cells Osteoblasts Osteocytes Osteoclasts Describe the characteristic histological features of osteon Define periosteum and endosteum Differentiate between primary and secondary bone. Apply knowledge of histology to explain clinical conditions like osteomalacia, osteopetrosis and osteitis fibrosa cystica. 	LGIS Practical	MCQs SEQs/SAQsOS PE Viva Voce

		Skill: <ul style="list-style-type: none"> Identify the structure of compact and spongy bone under the light microscope Illustrate the microscopic structure of compact and spongy bone with two identification points of each. 		
Cartilage		Knowledge: <ul style="list-style-type: none"> Differentiate in tabulated form the types of cartilage with reference to composition, arrangement of chondrocyte, interstitial matrix, and distribution. Skill: <ul style="list-style-type: none"> Identify different types of cartilage under the microscope Illustrate the types of cartilage with two identification points of each 	Practical	MCQs SEQs/SAQsOS PE Viva Voce
Muscular tissue	Correlate microstructure of various types of muscles with their functions	Knowledge <ul style="list-style-type: none"> Describe the light microscopic characteristics of skeletal, cardiac, and smooth muscles Tabulate the microscopic differences between three types of muscles Skill <ul style="list-style-type: none"> Identify the histological structure of three types of muscles under the light microscope Illustrate the light microscopic structure of three types of muscles with two identification points of each. 	LGIS/ Practical	MCQs/ SEQs/ SAQs/ OSPE/ VIVA
General Embryology				
Ovulation, Fertilization, First & second weeks of Development	<ul style="list-style-type: none"> Elucidate the embryological phenomena related to normal and abnormal 	Knowledge <ul style="list-style-type: none"> Correlate the menstrual and ovarian cycles with each other 	LGIS	MCQs/ SEQs/ SAQs/ OSPE/ VIVA

	<p>processes of ovulation, fertilization, and implantation</p> <ul style="list-style-type: none"> Describe the sequential phases of human development during second week 	<ul style="list-style-type: none"> Describe the process of ovulation Define corpus luteum and corpus albicans Define fertilization. Describe and illustrate the steps, and outcomes of fertilization Describe the basic principles behind various techniques of in vitro fertilization Describe the process of implantation. List the sites of abnormal implantation and describe their clinical significance. Define cleavage, morula, blastula Explain the events of second week of development in a sequence Justify the statement that the second week is known as “week of two’s” Identify the various phases of development on the given model. 		
General Anatomy				
Neurology-I	<p>Apply the knowledge of introduction to neurology in appreciating the specific concepts of Neuroanatomy</p>	<ul style="list-style-type: none"> Describe the organization of nervous system. Enumerate components of central and peripheral nervous system & describe their general features Describe the origin, course, and distribution of a typical spinal nerve with the help of a diagram. Define: Dermatomes, Receptors, and effectors 	LGIS/ SGD	MCQs
GROSS ANATOMY				

Bones of shoulder girdle and upper limb	Correlate the bony features of long bones of upper limb (clavicle, scapula, humerus, radius and ulna) with their articulations, attachments, and anatomical basis of relevant clinical presentations in case of injury and fractures	<ul style="list-style-type: none"> • Determine the side of clavicle, scapula, humerus, radius ulna • Identify important bony landmarks on these bones • Locate attachments of major muscles and ligaments attached on these bones • Discuss the clinical implications in fractures of these bones at different sites 	SGD	<ul style="list-style-type: none"> • MCQs • SEQ / SAQ • OSPE • Viva Voce
Pectoral region and breast	Correlate the knowledge of gross anatomy of pectoral region with relevant clinical presentations.	<ul style="list-style-type: none"> • Comprehend the structure of breast tissue • Justify the importance of fibrous septa in breast in relation to its carcinoma • Describe the blood supply and lymphatic drainage of breast • Justify the clinical importance of sentinel lymph node • Trace the possible routes of metastasis of breast cancer • Tabulate the attachments, nerve supply and actions of muscles attaching upper limb to thoracic wall. • Describe attachments of pectoral fascia 	SGD/CBL	<ul style="list-style-type: none"> • MCQs/SEQs/SAQs/ • VIVA
Scapular region	Correlate the knowledge of Anatomy of scapular region with relevant clinical presentations	<ul style="list-style-type: none"> • Tabulate the attachments, nerve supply and actions of muscles attaching upper limb to vertebral column • Tabulate the attachments, nerve supply and actions of muscles attaching scapula to the humerus • Identify the boundaries and contents of quadrangular and triangular spaces • Trace the route and anatomical relationships of 	SGD	<ul style="list-style-type: none"> • MCQs • SEQs/SAQs • Viva Voce

		<p>arteries and nerves present in this region</p> <ul style="list-style-type: none"> • Describe the structure of acromioclavicular and sternoclavicular joints • Justify the stability of clavicular joints in case of direct blow to clavicle and resultant fracture • Describe type, ligaments, articular surfaces, blood supply and nerve supply of shoulder joint • Elucidate the movements at shoulder joint with reference to axis and muscles producing them • Justify the clinical presentation of shoulder joint dislocation on anatomical basis • Justify the stability of the shoulder joint in spite of wide range of movements it offers by describing the factors responsible • Define rotators cuff and list its components • Justify the clinical presentation of rotator cuff injuries, frozen shoulder and calcific supraspinatus tendinitis based on the anatomical knowledge • Illustrate the anastomosis around shoulder joint/scapula 		
Axilla	Correlate the topographic arrangement of axillary walls and its contents with anatomical basis of various relevant clinical presentations	<ul style="list-style-type: none"> • Appraise the shape and extent of axilla • Enumerate different structures forming various walls of axilla and identify their inter-relationship • Enumerate different contents of axilla 	SGD	MCQs SAQ/ SEQ/ OSPE Viva Voce

		<ul style="list-style-type: none"> • Describe the relations and distribution of vessels of axilla • Describe the formation and name the branches of brachial plexus • Illustrate the brachial plexus • Elucidate the drainage area of each group of axillary lymph nodes • Analyze the anatomical basis of clinical presentation in case of injury to long thoracic nerve 		
Arm & Forearm	Correlate the knowledge of gross anatomy of arm and forearm with common clinical presentations.	<ul style="list-style-type: none"> • Tabulate the attachments, nerve supply and actions of muscles of arm and forearm • Trace the route and relations of the neurovascular structures of arm and forearm • Analyze the anatomical basis of clinical presentation in case of injury to various nerves of arm and forearm • Describe the type, capsule and ligaments of elbow, superior and inferior radio-ulnar joints • Explain the movements of these joints with reference to axis and muscles performing these movements • Describe the blood supply and nerve supply of elbow joint • Justify the anatomical basis of carrying angle • Correlate the anatomy of these joints with clinical presentations of their dislocation • Outline the boundaries and contents of cubital fossa in a sequential order 	SGD	MCQs/ SEQs/ SAQs/ VIVA

		<ul style="list-style-type: none"> • Justify the clinical importance of blood vessels present in cubital fossa • Recognize the boundaries of anatomical snuff box and bony landmarks in its floor • Describe the attachments of, and structures passing deep to flexor and extensor retinacula in a sequential order • Elucidate the anatomical basis of clinical presentation of compartment syndrome of forearm, Volkmann's ischemic contracture, rupture of various tendons and tennis elbow. • Highlight the clinical significance of radial artery with reference to pulse and BP monitoring and coronary angiography 		
Hand	Correlate the knowledge of gross anatomy of hand with common clinical presentations.	<ul style="list-style-type: none"> • Identify bones of an articulated hand • Explain the clinical significance of injury to scaphoid and hamate • Elucidate the salient features of skin of palm and dorsum of hand and discuss its cutaneous innervation • Describe palmar aponeurosis • Enumerate the small muscles of hand with their actions and nerve supply • Describe the fibrous and synovial flexor sheaths of the hand • Explain the carpal tunnel with reference to its formation and contents • Analyze the anatomical basis of Dupuytren's contracture, carpal tunnel syndrome, 	SDG	MCQs SAQ/SEQ Viva Voce

		<p>trigger finger and tenosynovitis of synovial sheaths of flexor tendons</p> <ul style="list-style-type: none"> • Describe boundaries & contents of spaces of palm • Analyze the anatomical basis of palmar, Parona and pulp spaces in case of wound, resultant infections, and route of surgical drainage. • Revisit the insertion of long flexor and extensor tendons • Describe the blood supply of hand • Trace the pathway and distribution of radial, median, and ulnar nerves in hand and correlate with clinical presentation of their injuries 		
Wrist Joint	Correlate the knowledge of gross anatomy of wrist joint with common clinical presentations.	<ul style="list-style-type: none"> • Describe the type, capsule, and ligaments of wrist joint • Explain the movements of wrist joint with reference to axis and muscles responsible • Describe the blood supply and nerve supply of wrist joint • Correlate the anatomical knowledge with clinical presentation of wrist joint dislocation • Enumerate the structures endangered in case of fall on outstretched hand 	SDG	MCQs SAQ/SEQ Viva Voce
Cutaneous innervation of upper limb	Predict the area of sensory loss in case of injuries of different nerves of upper limb based on anatomical knowledge of cutaneous innervation.	<ul style="list-style-type: none"> • Correlate the dermatomes with the cutaneous innervation of specific nerves in Arm & forearm • Illustrate cutaneous innervation and dermatomes of upper limb • Identify the area of sensory loss in case of injury to different nerves 	SGD	MCQs SAQs/SEQs Viva Voce

Injuries to brachial plexus and its branches	Analyze the areas of motor and sensory loss in case of injuries to brachial plexus and its branches at various anatomical sites	<ul style="list-style-type: none"> • Revisit the formation and branches of brachial plexus • Identify the points of injury and justify peculiar positions of upper limb in cases of Klumpke paralysis & Erb-Duchenne palsy with anatomical reasoning • Identify the anatomical sites where different branches of brachial plexus are vulnerable to injury / compression • Correlate the lesion of following nerves with respective areas of sensory and motor loss and peculiar positions of different parts of upper limb: <ul style="list-style-type: none"> ▪ Axillary ▪ Long thoracic ▪ Musculocutaneous ▪ Ulnar ▪ Median ▪ Radial 	SGD	MCQs SAQs/SEQs Viva Voce
Venous and lymphatic drainage of upper limb	Summarize the lymphatic and venous drainage of upper limb in totality	<ul style="list-style-type: none"> • Recap the veins in various parts to describe the venous drainage of upper limb as a whole • Identify the veins commonly used for cannulation • Discuss the lymphatic drainage of upper limb in detail in correlation with infection and malignant spread. 	SGD	MCQs SAQs/SEQs Viva Voce
Surface Marking	Recognize the muscular, tendinous, and bony landmarks of upper limb to Utilize the knowledge of topography of important neurovascular structures of upper	<ul style="list-style-type: none"> • Take consent from the subject • Expose the relevant part properly • Mark the following structures on surface of a subject or mannequin correctly: <ul style="list-style-type: none"> ○ Axillary nerve ○ Brachial nerve ○ Ulnar artery 	SGD	MCQs SAQs/SEQs OSPE Viva Voce

	limb in plotting the same on body surface and inferring relevant clinical presentations while exercising the standard protocol.	<ul style="list-style-type: none"> ○ Radial artery ○ Superficial palmar arch ○ Deep palmar arch ○ Cephalic vein ○ Basilic vein ○ Median cubital vein ○ Axillary nerve ○ Musculocutaneous nerve ○ Median nerve ○ Radial nerve ○ Ulnar nerve <ul style="list-style-type: none"> ● Cover the exposed part and thank the subject 		
Skills	Correlate various parts of upper limb with topographic arrangement	<ul style="list-style-type: none"> ● Identify various muscular, neurovascular, and ligamentous structures of upper limb on models and prosected specimens 	SGD	OSPE
List of Practicals: <ul style="list-style-type: none"> ○ Loose Connective tissue ○ Dense Connective tissue ○ Reticular connective tissue ○ Adipose tissue ○ Bone ○ Cartilage ○ Muscle 				

PHYSIOLOGY

TOPIC/THEME	Learning Outcomes	Learning Objectives	Instructional Strategies	Assessment Tools
	By the end of the session, student should be able to;			
NERVE AND MUSCLE				
Neuron/ Synapse	Review the physiological structure and working of neuron and synapse	<p><u>KNOWLEDGE</u></p> <ul style="list-style-type: none"> Define, and identify the following regions on a diagram of a motor neuron: dendrites, axon, axon hillock, soma, and an axodendritic synapse. Classify synapses on anatomical & functional basis. Elucidate structural and functional changes taking place in nerve fibers after injury. 	<ul style="list-style-type: none"> Lectures CBL 	<ul style="list-style-type: none"> MCQ SAQ/SEQ Structured viva
RMP- Resting Membrane Potential	Explain the ionic and mechanical mechanisms of generation of resting membrane potential & action potential in excitable tissue (nerves & muscle).	<p><u>KNOWLEDGE</u></p> <ul style="list-style-type: none"> Grasp concept of Nernst potential and its importance in generation of resting membrane potential. Comprehend different mechanisms responsible for the genesis of membrane potential (role of channels, carrier proteins). Describe the normal distribution of Na⁺, K⁺, and Cl⁻ across the cell membrane, and using the Goldman equation, explain how the relative permeability of these ions create a resting membrane potential Explain how the abnormal function of ion channels (channelopathies) can alter the resting membrane potential 	<ul style="list-style-type: none"> Lectures 	<ul style="list-style-type: none"> MCQ SAQ/SEQ Structured viva Assignment
Generation and propagation of Action Potential		<p><u>KNOWLEDGE</u></p> <ul style="list-style-type: none"> Define action potential. Draw different phases of action potential and explain ionic & electrical changes occurring during each phase of action potential Differentiate between absolute and relative refractory periods Discuss the role of positive feedback mechanisms in initiation of an action potential 	<ul style="list-style-type: none"> Lectures 	<ul style="list-style-type: none"> MCQ SAQ/SEQ Structured viva Assignment

		<ul style="list-style-type: none"> • Distinguish the effects of hyperkalemia, hypercalcemia, and hypoxia on the resting membrane potential & action potential • Discuss the process of generation of nerve impulse and its transmission in different types of nerve fibers (myelinated and non-myelinated nerve fibers) with their characteristics. • Understand the concept of all or nothing principle in propagation of an action potential • Explain the concept of saltatory conduction • Discuss the properties of contiguous conduction • Differentiate between myelinated and non-myelinated nerve fibers based on their structure and characteristics 		
NMJ& Myasthenia Gravis	Correlate the physiological mechanism of Neuromuscular, Transmission and Excitation- Contraction	<p><u>KNOWLEDGE</u></p> <ul style="list-style-type: none"> • Illustrate neuromuscular junction, sequence of events taking place during neuromuscular transmission and factors affecting this process • Explain the pathophysiology of Myasthenia Gravis. 	<ul style="list-style-type: none"> • Lectures • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva
Skeletal muscle morphology	Coupling with various neuromuscular diseases. Discuss the morphology and physiological processes of the skeletal muscle contraction.	<p><u>KNOWLEDGE</u></p> <ul style="list-style-type: none"> • Illustrate the physiologic anatomy of skeletal muscle • Explain the structure of myosin molecule& its subunits and describe the function of the subunits • Identify the structure of the thick and thin myofilaments and label the constituent proteins • Tabulate macroscopic, microscopic, functional differences of various types of muscles 	<ul style="list-style-type: none"> • Lectures 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva
Skeletal muscle contraction and relaxation	Differentiate the characteristics of skeletal and smooth muscles	<p><u>KNOWLEDGE</u></p> <ul style="list-style-type: none"> • Appreciate the ionic and chemical basis of muscle contraction and relaxation. • Explain how the cross-bridge cycle results in shortening of the muscle. 		

		<ul style="list-style-type: none"> List the steps in excitation-contraction coupling in skeletal muscle, and describe the roles of the sarcolemma, transverse tubules, sarcoplasmic reticulum, thin filaments, and Ca⁺⁺ Describe the roles of ATP in skeletal muscle contraction and relaxation. 		
Types of muscle fibers & contraction		<p><u>KNOWLEDGE</u></p> <ul style="list-style-type: none"> Explain the energy expenditure during muscle contraction Appreciate the characteristics and differences between isometric and isotonic contraction with the help of examples. Compare and contrast slow and fast muscle fibers Explain the relationship of preload, afterload and total load in the time course of an isotonic contraction. 	<ul style="list-style-type: none"> Lectures CBL 	<ul style="list-style-type: none"> MCQ SAQ/SEQ Structured viva
Properties of muscle contraction-I		<p><u>KNOWLEDGE</u></p> <p>Explain the motor unit and its physiological importance.</p> <p>Explain the concept of:</p> <ul style="list-style-type: none"> Summation Treppe Skeletal muscle tone Muscle fatigue Tetanization Contracture remainder Muscle dystrophy 		
Properties of muscle contraction-II				
Muscle remodeling + Rigor mortis		<ul style="list-style-type: none"> Enlist types of muscle remodeling Summarize the effects of hypertrophy, hyperplasia & atrophy on the skeletal muscle structure and function Explain the physiological basis of rigor mortis 		
Smooth muscle morphology & characteristics	Correlate characteristics of smooth muscle contraction with their physiological functions	<p><u>KNOWLEDGE</u></p> <ul style="list-style-type: none"> Comprehend the types of smooth muscles. Differentiate between types of action potentials produced in different smooth muscles and appreciate the role of 	<ul style="list-style-type: none"> Lectures 	<ul style="list-style-type: none"> MCQ SAQ/SEQ Structured viva

		<p>autonomic innervation, mechanical and humoral factors in their generation</p> <ul style="list-style-type: none"> • Appreciate characteristics of smooth muscles (slow cycling of myosin cross-bridge, low energy requirement to sustain contraction, latch mechanism & stress relaxation). 		
Smooth muscle contraction and relaxation		<p>KNOWLEDGE</p> <ul style="list-style-type: none"> • Illustrate the sequence of events leading to smooth muscle contraction and relaxation. • Give an account on the physiological anatomy of smooth muscle NMJ. 		
ERYTHROPOI- SIS IN BONE MARROW		<ul style="list-style-type: none"> • Enlist sites of hemopoiesis in the body during different stages of life. • Make a flow sheet diagram of various stages of erythropoiesis with explanation of their relevant features and sizes during different stages of differentiation of RBC's. • Enlist different growth & differentiation inducers involved in erythropoiesis 		
REGULATION OF ERYTHROPOI- SIS		<ul style="list-style-type: none"> • Identify the factors in regulation of erythropoiesis and maturation of RBC with relative importance of hypoxia in inducing erythropoiesis. • Appreciate the role of erythropoietin in regulating RBC production. • Discuss the role of vitamin B12 & folic acid in maturation of RBC 		
	Determine the Total leukocyte Count	<p>SKILLS</p> <ul style="list-style-type: none"> • Estimate total leukocyte count (TLC) by Hemocytometer using Turk's fluid for dilution • Apply the method of charging Neubauer's chamber. <p>ATTITUDE:</p> <ul style="list-style-type: none"> • Practice the art of taking consent from the subject prior to performance of the procedure. • Communicate the procedure effectively to the patient. • Use aseptic technique to prick and draw blood for the procedure 	Practical Demonstrations	OSPE

Practicals	Platelet count. (Demonstration only)	<p><u>SKILLS</u></p> <ul style="list-style-type: none"> Apply manual method for platelet counting in a blood sample Count platelets on the counting chamber Identify pipette for platelet count and recall its diluting fluid composition <p><u>ATTITUDE:</u></p> <ul style="list-style-type: none"> Practice the art of taking consent from the subject prior to performance of the procedure. Communicate the procedure effectively to the patient. Use aseptic technique to prick and draw blood for the procedure 	Practical Demonstrations	Structured viva
	Determination of Hemoglobin in the blood. (Sahli's method)	<p><u>SKILLS</u></p> <ul style="list-style-type: none"> Apply correct technique for pricking blood Identify Sahli's pipette and apparatus with its parts Correctly use the stirrer <p>Avoid errors during estimation of hemoglobin by taking proper precautions</p>	Practical Demonstrations	Structured viva
	Determine Red cell indices		Practical Demonstrations	Structured viva
	Estimate haematocrit (PCV) levels	<p><u>SKILLS</u></p> <ul style="list-style-type: none"> Measure the Hematocrit by properly centrifuging the blood and using Huxley's Hematocrit reader Avoid errors in PCV estimation Identify buffy coat <p><u>ATTITUDE:</u></p> <ul style="list-style-type: none"> Practice the art of taking consent from the subject prior to performance of the procedure. Communicate the procedure effectively to the patient. Use aseptic technique to prick and draw blood for the procedure. 	Practical Demonstrations	Structured viva

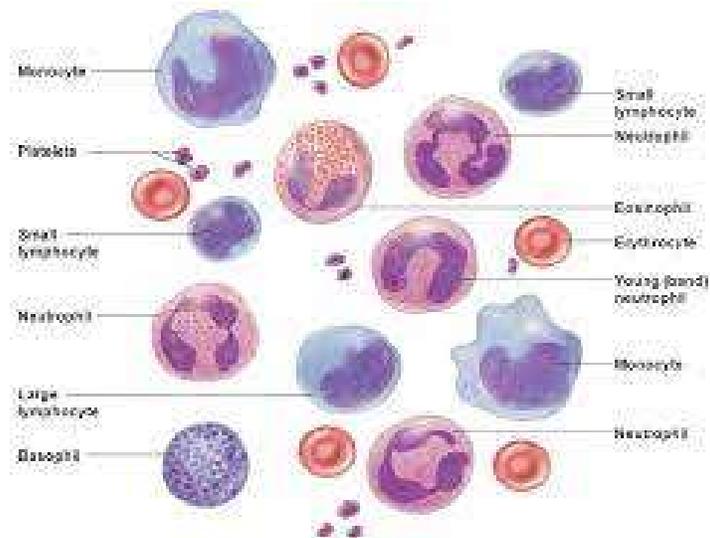
BIOCHEMISTRY				
Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
Carbohydrate Chemistry	Analyze the significance of different carbohydrates in medicine	<ul style="list-style-type: none"> • Classify Carbohydrates and explain their Biochemical functions • Discuss the structure and functions of Monosaccharides and enumerate their various derivatives • Explain the structure and functions of Disaccharides with examples • Describe Oligosaccharides and their combination with other macromolecules <ul style="list-style-type: none"> ➤ Enumerate important examples of Polysaccharides and give their biochemical role 	Lectures/ SGD	MCQ SAQ/SEQ
Digestion and absorption of Carbohydrates	Discuss the digestion and absorption of Carbohydrates	Overview of digestion and absorption of Carbohydrates	Lectures/ SGD	MCQ SAQ/SEQ
Metabolism of Carbohydrates	Apply the knowledge of carbohydrate metabolism for understanding relevant metabolic disorders	<ul style="list-style-type: none"> • Outline the Phases reactions of Glycolysis and regulation of Glycolysis • Describe the bioenergetics of Aerobic and Anaerobic glycolysis and their biochemical importance • Discuss fate of Lactic acid & Pyruvate • Draw Cori's cycle • Outline the Citric Acid Cycle- Reactions • Describe the energetics, regulation, importance and amphibolic nature of citric acid cycle. 	Lectures/ SGD	MCQ SAQ/SEQ

		<ul style="list-style-type: none"> • Discuss Gluconeogenesis & state the three important bypass reactions & significance of gluconeogenesis • Compare and contrast Glycolysis & gluconeogenesis • Discuss the Glycogen Metabolism & Write down the reactions of Glycogenesis and glycogenolysis. • Outline the importance of UDP-Glucose & regulation of Glycogen metabolism • Describe the disorders of Glycogen metabolism (Glycogen Storage Diseases) • Compare and contrast Glycogenesis and glycogenolysis • Describe Hexose Mono Phosphate Shunt, its reactions and importance • Explain Glucuronic acid pathway, its reactions and importance • Describe the metabolism of Fructose, Galactose and Lactose 		
Practicals	Perform and interpret the results	<ul style="list-style-type: none"> • Estimation and clinical interpretation of Glucose in blood • Estimation and clinical interpretation of plasma enzyme Amylase • Experiments on Carbohydrates qualitative analysis-I • Molisch test • Experiments on Carbohydrates qualitative analysis-II • Benedicts test • Fehlings test • Experiments on Carbohydrates qualitative analysis-III 	Practical	

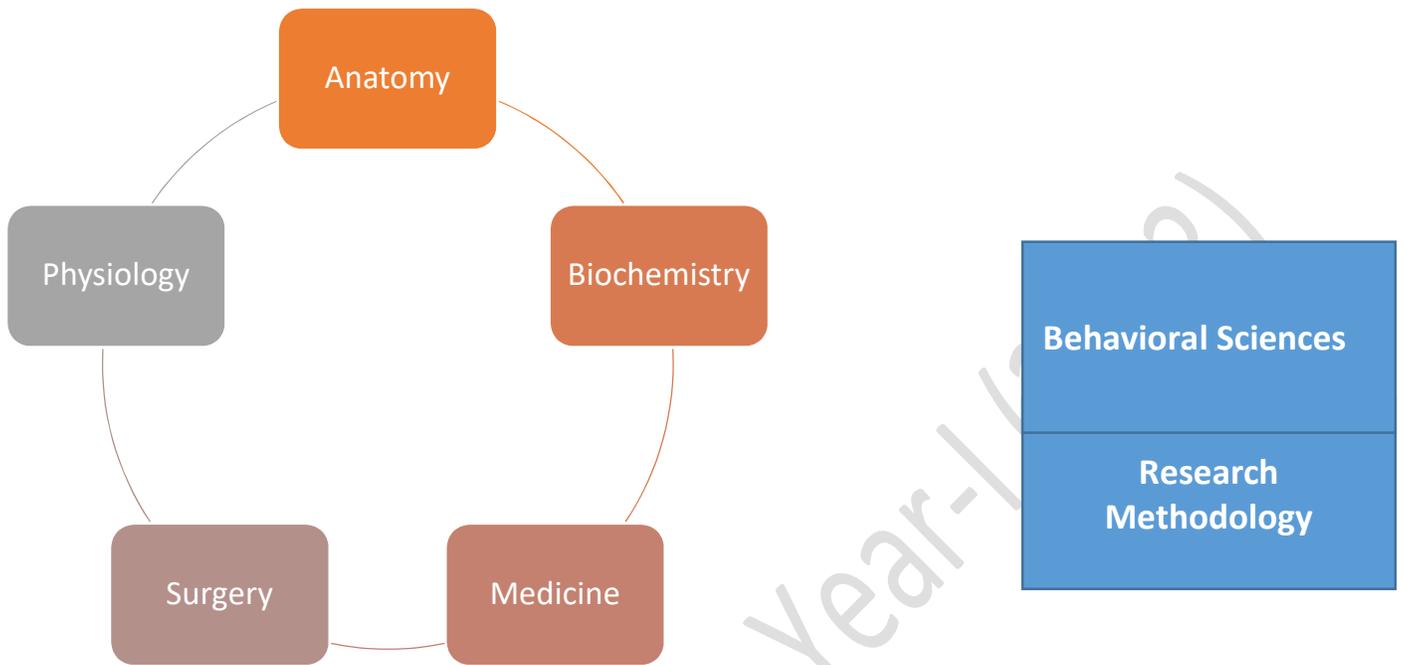
		<ul style="list-style-type: none"> • Iodine test • Seliwanoff test • HbA1c Interpretation 		
SURGERY				
Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
Fractures/dislocations of upper limb	Identify & relate clinical presentation of different fractures/dislocations of upper limb with anatomical knowledge	<ul style="list-style-type: none"> • Define fractures, dislocation and sprain • Identify various causes of fractures, dislocations and sprains • List different types of fractures, dislocations in upper limb • Identify effects of fractures, dislocations and sprains • List complications of fractures, dislocations in general • Correlate different fractures of upper limb with nerve & vascular injuries • Identify common sites of dislocations/ sprains in upper limb • State first-aid principles of fracture / dislocations management 	Video clips / Lectures/ SGD/ CBL/INTEGRATED SESSION	OSPE/ Formative assessment
RADIOLOGY				
Radiological appearance of upper limb	Correlate skeletal framework of upper limb with its radiological appearance	<ul style="list-style-type: none"> • Enumerate the commonly used imaging techniques used in clinical practice to study normal structure, and diagnose fractures, dislocations & sprains in upper limb • Explain the basic principles of different densities on X-rays 	Video clips /Lectures/ SGD/ CBL/INTEGRATED SESSION	OSPE/ Formative assessment

		<ul style="list-style-type: none"> • Identify appearance of bone, cartilage, air, fluid and fat on x-rays • Identify different bones of upper limb on Ap and Lateral view of X-rays • Identify fractures and dislocations in upper limb injuries and correlate with likely important nerve and vessels damage 		
MEDICINE				
Myasthenia gravis	Correlate the lack of transmission at NMJ with its clinical presentation	Introduction to Myasthenia gravis	Video clips / Lectures/ SGD/ CBL/INTEGRATED SESSION	Formative assessment

MBBS YEAR I
BLOCK I
MODULE IV
HEMATOLOGY AND IMMUNOLOGY
Duration: 03 weeks



Integration of Disciplines in Module III



MODULE PLANNING COMMITTEE

Module Coordinator	<i>To be filled by the institutes</i>
Members	

Preamble

This module introduces the student to different lymphoid organs along with physiological imbalances occurring due to deficiencies in contents, functions & features of blood and different lymphoid organs. Biochemical importance of plasma proteins and haemoglobin for understanding its related disorders is also taught in this module. The research methodology, Behavioral Sciences & Professionalism will be taught as a part of the longitudinal theme.

Apart from attending daily scheduled sessions, students should engage in self-directed learning to achieve the desired objectives

OUTCOMES

By the end of this module, student should be able to relate the anatomy of different lymphoid organs with their function and to comprehend the outcomes that result from altered structure.

List of Proposed Themes for INTEGRATED SESSION sessions (at least one/week)

Theme
Pallor
Enlarged lymph nodes
Splenomegaly
Transfusion reactions

GENERAL HISTOLOGY				
Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
	By the end of this module, students will be able to:			
Lymphoid organs	Differentiate the light microscopic structure of lymph node, thymus, spleen, and palatine tonsils from each other	Knowledge: <ul style="list-style-type: none"> Describe the light microscopic features of lymph node, thymus, spleen, palatine tonsil on slides Skill: Identify and illustrate light microscopic features of lymph node, thymus, spleen, palatine tonsil on slides and write two points of identification of each	LGIS	MCQs/ SEQs/ SAQs VIVA VOCE
			Practical	OSPE/ Viva voce
EMBRYOLOGY				
Third Week of development	Elucidate the embryological phenomenon of gastrulation occurring during third week of development	Knowledge: <ul style="list-style-type: none"> Enumerate the sequential phases of human development during third week Define Gastrulation Describe the formation of notochord and the establishment of body axes. Recognize the embryological basis of sacrococcygeal teratoma, Holoprosencephaly, caudal dysgenesis, Situs inversus Skill: Identify the various phenomenon during third week of development on the given model and diagrams	LGIS	MCQs SEQs/SAQs SPE Viva Voce

PHYSIOLOGY				
TOPIC/THEME	LEARNING OUTCOMES	LEARNING OBJECTIVES	INSTRUCTIONAL STRATEGIES	ASSESSMENT TOOLS
	By the end of the session, student should be able to;			
HEMATOLOGY AND IMMUNOLOGY				
Composition & Functions of blood	Describe the Morphology and Genesis of blood cells Discuss the composition and functions of blood	<ul style="list-style-type: none"> • Make a flow sheet diagram of cellular and fluid composition and general functions of blood. • Classify plasma proteins & compare their functions & importance for human body. • Define & explain hematocrit or packed cell volume (PCV). 	<ul style="list-style-type: none"> • Lectures • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva
Anemia-I & Polycythemia		<ul style="list-style-type: none"> • Classify anemia based on their morphological findings, RBC indices & etiology. • Compare and contrast different types of anemia on the basis of etiology, pathophysiology, clinical presentations and blood picture. • Explain the effect of anemia on circulatory system. • Classify polycythemia into primary and secondary polycythemia and discuss its effects on circulatory system. • Describe etiology, pathophysiology and clinical presentation of polycythemia • Derive the values of RBC Indices with the help of hemoglobin, PCV & RBC count 		
Anemia-II & RBC indices				
WBC-Morphology	Classify different types of immunity on the basis of cell types involved and their role in defense mechanism.	<ul style="list-style-type: none"> • Enlist different types of white blood cells and discuss their physiological characteristics. • Define the terms: leukopenia, leukocytosis 	<ul style="list-style-type: none"> • Lectures • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva

		<ul style="list-style-type: none"> • Neutrophilia, neutropenia, eosinophilia, eosionpenia, Basophilia & basopenia. • Make a flow sheet diagram showing steps involved in leukopoiesis. • Enlist the factors necessary for leukopoiesis. • Describe the role and functions of white blood cells in providing protection to the body against invading organism. 		
Innate immunity + complement system		<ul style="list-style-type: none"> • Define innate immunity. Discuss the mechanisms involved in innate immunity. • Comprehend basis of innate immune system of the body and tissues related with innate immunity. • Discuss the role of natural killer cells & interferons in innate immunity. • Identify the specific role of interferons against virus infected cells and discuss their mechanism of action 		
Monocyte-macrophage system		Appraise the composition and functions of reticulo- endothelial system.		
Line of defense against infection & phagocytosis		<ul style="list-style-type: none"> • Explain the lines of defense against infection: role of neutrophils & macrophages. • Discuss the role of eosinophils & basophils. 		
Inflammation		<ul style="list-style-type: none"> • Define inflammation. • Discuss causes, cellular features and five cardinal signs of inflammation. 		

		<ul style="list-style-type: none"> • Explain the process of inflammation. • Give an account on process of “walling-off” involved in inflammation. • Describe pathophysiology of necrosis 		
General concept of T & B lymphocytes Active & passive immunity		<ul style="list-style-type: none"> • Enlist the types of immunity. • Discuss the mechanism involved in development of immunity. Discuss the processing of T & B lymphocytes in human body. • Give a brief account on lymphocyte cloning. • Define immunization & enlist its types. • Discuss the role of memory cells involved in the process of immunization. • Compare & contrast active and passive immunity. • Describe the physiological basis of vaccination. 		
B-cell immunity		<ul style="list-style-type: none"> • Comprehend the concept of humoral immunity. • Discuss the structure of antibodies. • Classify antibodies. Discuss their functions. • Explain the role of antibodies in B-cell immunity 		
Mechanisms of action of antibodies		<ul style="list-style-type: none"> • Discuss the mechanisms through which antibodies directly attack an invading agent. • Give an account on the indirect action of antibodies 		

		<p>on invading agent through complement system.</p> <ul style="list-style-type: none"> • Enlist the various complement proteins and their functions. 		
Allergy /Hypersensitivity		<ul style="list-style-type: none"> • Explain different types of allergy. • Discuss the mechanism involved in development of an allergy & hypersensitivity. • Explain the role of basophils and mast cells in the release of inflammatory mediators in response to allergens reagen binding. • Discuss the anti-allergic role of eosinophil. 		
T-cell immunity		<ul style="list-style-type: none"> • Discuss the role of antigen presenting cells in cell-mediated immunity. • Explain role of helper T cells, cytotoxic T cells and suppressor T cells in T cells immunity. • Discuss the role of interleukins released by helper T cells in facilitating both B & T cell immunity. • Comprehend the role of CD4 & CD8 markers in identification of an invading agent. 		
Autoimmunity & Transplant rejection		<ul style="list-style-type: none"> • Define autoimmunity. Discuss the pathophysiological process involved in development of autoimmunity • Discuss the pathophysiological process 		

		<p>involved in transplant rejection of tissues by human body.</p> <ul style="list-style-type: none"> • Discuss the mechanisms involved in immune tolerance. 		
Blood groups	Differentiate the different types of blood groups	<ul style="list-style-type: none"> • Describe the principles of blood grouping and cross matching. • Tabulate the various blood groups. • Tabulate the genotype & phenotypes of ABO blood group system. 	<ul style="list-style-type: none"> • Lectures • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva
Rh blood group system & Erythroblastosis Fetalis		<ul style="list-style-type: none"> • What are different Rh blood group systems and their significance? • Tabulate the genotype & phenotypes of Rh blood group system. • Discuss the pathophysiology of Erythroblastosis Fetalis, its treatment and precautions. 		
Hemostasis	<p>Compare and contrast various bleeding disorders.</p> <p>Correlate the physiological mechanism for hemostasis & role of pro-coagulants and anti-coagulants in it.</p>	<ul style="list-style-type: none"> • Discuss the four steps involved in blood coagulation. • Discuss the morphology, development & functions of platelets in all the four steps of blood coagulation. • Discuss the role of alpha & dense granules in platelet plug formation. 	<ul style="list-style-type: none"> • Lectures • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva
Coagulation pathway		<ul style="list-style-type: none"> • Comprehend the physiology of clotting factors and mechanism of blood clotting. 	<ul style="list-style-type: none"> • Lectures • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ

		<ul style="list-style-type: none"> • Compare & contrast intrinsic and extrinsic pathway of clotting. 		<ul style="list-style-type: none"> • Structured viva
Bleeding disorder		<ul style="list-style-type: none"> • Discuss the effect of deficiency of platelets and clotting factors in hemostasis. • Discuss the pathophysiology of blood dyscrasias like Vitamin K deficiency, Hemophilia and Thrombocytopenia • Compare & contrast Hemophilia with Thrombocytopenia. • Recall the functioning/changes in the coagulation pathway in case of deficiency of clotting factors 		
Practicals	Estimate ESR	<p><u>SKILLS</u></p> <ul style="list-style-type: none"> • Estimate ESR with Westergren and Wintrobe tubes <p><u>ATTITUDE:</u></p> <ul style="list-style-type: none"> • Practice the art of taking consent from the subject prior to performance of the procedure. • Communicate the procedure effectively to the patient. • Use aseptic technique to prick and draw blood for the procedure 	Practical Demonstrations	OSPE Structured viva
	Determine ABO & Rh blood groups	<p><u>SKILLS</u></p> <ul style="list-style-type: none"> • Use correct technique for prick 	Practical Demonstrations	OSPE Structured viva

	<ul style="list-style-type: none"> • Deingtermine blood groups by using anti-sera and precautions to be observed. • Identify hemolysis after adding antisera to the sample • Mix the blood drops with anti-sera with separate stirrers for each drop/sample (A,B,D) <p><u>ATTITUDE</u> Practice the art of taking consent of patient prior to performance of procedure and communicate the procedure effectively to the patient.</p>		
Estimate bleeding & clotting time	<p><u>SKILLS</u></p> <ul style="list-style-type: none"> • Identify the methods for measurement of bleeding time and clotting time • Skillfully apply blood drop on filter paper • Note the time duration honestly with stop watch • Identify heparinized and non-heparinized capillary tubes • Break the capillary tube carefully without tearing the fibrin thread <p><u>ATTITUDE</u></p> <ul style="list-style-type: none"> • Practice the art of taking consent from the subject prior to performance of the procedure. • Communicate the procedure effectively to the patient. • Use aseptic technique to prick and draw blood for the procedure 	Practical Demonstrations	OSPE Structured viva

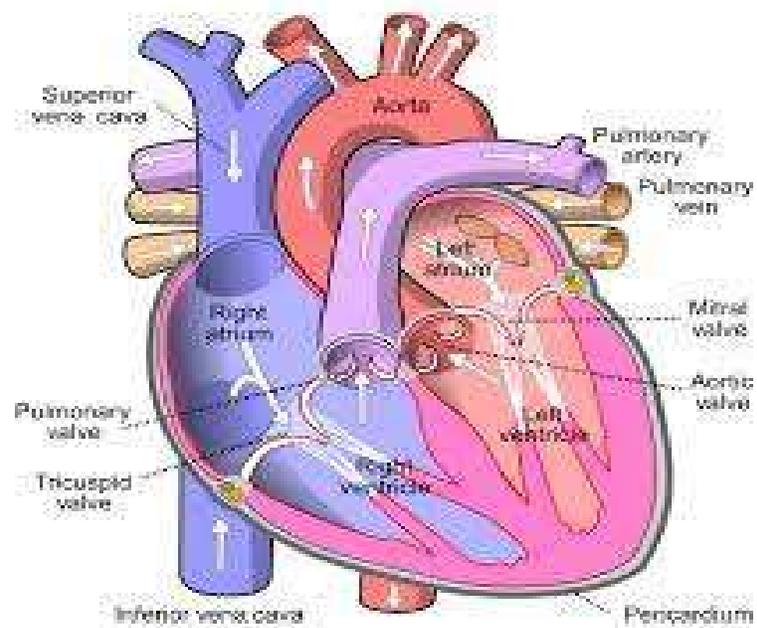
DLC	<p><u>SKILLS</u></p> <ul style="list-style-type: none"> • Prepare Blood film and stain effectively • Identify morphological features of various types of WBCs for identification. <p><u>ATTITUDE:</u></p> <ul style="list-style-type: none"> • Practice the art of taking consent from the subject prior to performance of the procedure. • Communicate the procedure effectively to the patient. <p>Use aseptic technique to prick and draw blood for the procedure.</p>	Practical Demonstrations	OSPE Structured viva
Osmotic fragility of RBC	<ul style="list-style-type: none"> • Observe the response of RBCs to hypotonic & hypertonic environment <p>Learn the conditions in which fragility of RBCs is increased</p>	Practical Demonstrations	OSPE Structured viva

BIOCHEMISTRY				
TOPIC/THEME	Learning Outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
Porphyrin and Hemoglobin	Correlate the biochemical basis of Porphyrin and Hemoglobin with clinical conditions	<ul style="list-style-type: none"> • Enumerate various types of Hemoglobin and explain its functions in detail • Discuss the Oxygen binding capacity of hemoglobin with reference to the O₂-Hb dissociation curve • Enlist various Factors affecting and regulating the oxygen binding capacity of haemoglobin • Give a brief account of Chemistry and biosynthesis of Porphyrins and its disorders (Porphyrias) • Explain Degradation of heme, formation of bile pigments, their types, transport and excretion • Discuss Hyperbilirubinemia and jaundice • Explain various Hemoglobinopathies (Hb-S, Hb-C, Hb-SC, Methemoglobinopathies and thalassemia) and elaborate their biochemical causes 	<ul style="list-style-type: none"> • Lectures • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva
Plasma proteins and Immunoglobulins	Relate the basic knowledge of Plasma proteins to its clinical significance	<ul style="list-style-type: none"> ➤ Describe Plasma proteins & give their clinical significance ➤ Draw and label the Structure of Immunoglobulins ➤ Enumerate major types, functions & Properties of Immunoglobulin 	<ul style="list-style-type: none"> • Lectures • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva

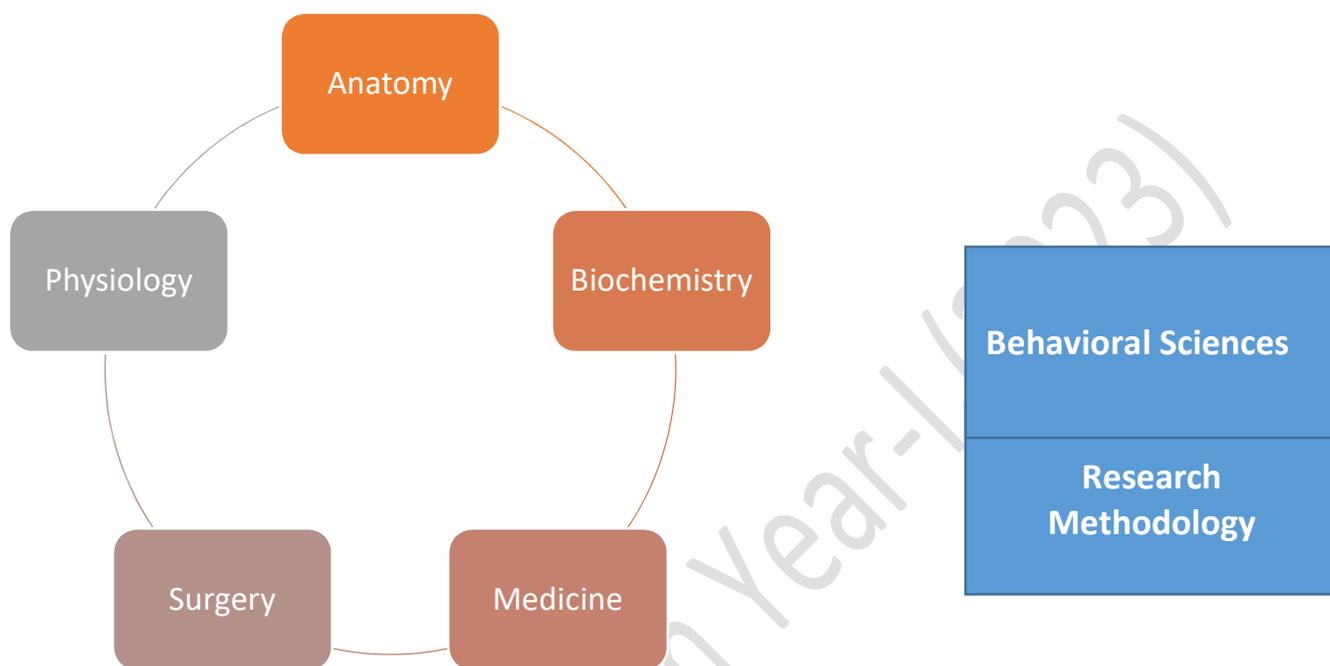
Practicals	Interpret the results	<ul style="list-style-type: none"> ➤ Estimation & clinical interpretation of plasma proteins ➤ Estimation & clinical interpretation of Bilirubin 	Practical	OSPE
SURGERY				
Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
Management of wounds- including Assessment; Cleaning/ Dressings of Head, forearm, hand, leg etc	Develop an understanding about general management of wounds	Skill Lab <ul style="list-style-type: none"> • Describe different types of wounds • Comprehend how to clean/ debride the wounds of different types • Understand the principles of closure of wounds and application of various dressings on different parts of the body • Appreciate the principles of prevention of development of infections of wounds 	CBL/INTEGRATED SESSION/ SP/ Real Patient/ Video clips	Formative assessment
First -aid Skills (Bleeding)	<ul style="list-style-type: none"> • Describe the principles of first-aid in management of patients with external bleeding • Demonstrate appropriate methods of managing external bleeding/vascular lesions and hemorrhage 	Skill Lab Demonstration- <ul style="list-style-type: none"> • Comprehend different types/causes of external bleeding • Describe different lesions leading to bleeding and effects of severity of bleeding • Describe the principles of first-aid in management of patients with external bleeding 	CBL/INTEGRATED SESSION/ SP/ Real Patient/ Video clips	Formative assessment

Transfusion Reaction	<ul style="list-style-type: none"> Identify the need of cross matching to avoid blood group incompatibility. 	<ul style="list-style-type: none"> List the practical steps for cross matching of blood in blood bank List various types of transfusion reaction 	CBL/INTEGRATED SESSION/ SP/ Real Patient/ Video clips	<ul style="list-style-type: none"> Formative assessment
MEDICINE				
Anemia	<ul style="list-style-type: none"> Identify the causes of decrease in hemoglobin level Correlate decrease in hemoglobin level with clinical presentation 	Introduction to anaemia <ul style="list-style-type: none"> Normocytic/ Microcytic anaemia Macrocytic anaemia Hemolytic & Aplastic anaemia 	CBL/INTEGRATED SESSION/ SP/ Real Patient/ Video clips	Formative assessment
Leucocytosis/ Leucopenia	Interpret the significance of altered level of leucocytes	Significance of Leucocytosis / Leucopenia	CBL/INTEGRATED SESSION/ SP/ Real Patient/ Video clips	Formative assessment
Bleeding & Coagulation disorders	<ul style="list-style-type: none"> Correlate decreases in platelet count/ functional defects of platelets and bleeding diathesis (ITP) Correlate deficiencies of clotting factors VIII & IX with its varied clinical manifestations (Hemophilia) 	<ul style="list-style-type: none"> Identify the causes of decreases in platelet count/ functional defects of platelets with bleeding diathesis (ITP) Comprehend the clinical manifestations (Hemophilia) due to deficiencies of clotting factors VIII & IX 	CBL/INTEGRATED SESSION/ SP/ Real Patient/ Video clips	Formative assessment
Abnormalities of Hb	Relate the denovo synthesis of hemoglobin and its manifestations in the patients of thalassemia and sickle cell anemia.	Abnormalities of Hb- thalassemia and sickle cell anemia	CBL/INTEGRATED SESSION/ SP/ Real Patient/ Video clips	Formative assessment

MBBS YEAR I
BLOCK II
MODULE V
Cardiovascular System
Duration: 09 weeks



Integration of Disciplines in Module V



MODULE PLANNING COMMITTEE

Module Coordinator	<i>To be filled by the institutes</i>
Members	

Preamble

This block focuses on cardiovascular system with basic understanding of structure of thorax. At the very outset medical student should understand that cardiovascular system has fundamental importance in all the fields of Medicine. Coronary artery diseases alone are one of the leading causes of morbidity and mortality worldwide. The course of this block is designed for first year MBBS students in an integrated manner.

Apart from attending daily scheduled sessions, students should engage in self-directed learning to achieve the desired objectives

Learning Outcomes:

At the end of this module, student will be able to relate their theoretical learning about cardiovascular system through case-based learning, interactive Lectures, integrated sessions and apply this knowledge in relevant clinical scenarios encountered in subsequent years of training and practice.

List of Proposed Themes for integrated sessions (at least one/week)

Theme
Chest pain
Dyspnoea
Changes in ECG
High blood pressure
Dyslipidaemia
Palpitations
Decreased heart rate

CARDIOVASCULAR SYSTEM				
HISTOLOGY				
Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
Histology of Circulatory System	Correlate the light microscopic structure of different components of cardiovascular System (elastic and muscular arteries, small and large veins, capillaries, heart) with their function and dysfunction.	<ul style="list-style-type: none"> Define capillaries & classify them based on their structure and describe each class by giving examples Classify arteries and veins depending on their size and describe structure and relative thickness of each component by giving examples. Describe histological changes in intima in atherosclerosis or arteriosclerosis. 	LGIS	MCQs/ SEQs/ SAQs VIVA VOCE
		<ul style="list-style-type: none"> Identify various vessels under light microscope and enlist at least two identification points for each. Illustrate elastic and muscular arteries, small and large veins, capillaries, emphasizing the differences amongst them with the help of eosin and hematoxylin pencils. 	Practical	OSPE/ Viva voce
EMBRYOLOGY				
The Embryonic Period (Third to Eight Weeks)	Correlate the developmental events during the embryonic period with relevant congenital anomalies	<ul style="list-style-type: none"> Define neurulation and describe process of formation of neural plate, neural tube and neural crest cells. 	LGIS	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE
		<ul style="list-style-type: none"> Enlist derivatives of: Surface ectoderm Neuroectoderm 		

		<ul style="list-style-type: none"> • Neural crest • Intraembryonic mesoderm (paraxial, intermediate, lateral plate) • Endoderm • Explain somitogenesis and differentiation of somites 		
		<ul style="list-style-type: none"> • Explain the development of Intraembryonic coelom. 		
		<ul style="list-style-type: none"> • Correlate the folding of the embryo in the horizontal and longitudinal planes with its consequences. 		
		<ul style="list-style-type: none"> • Explain the processes of formation of blood vessels • Define hemangioma and explain its embryological basis. 		
Fetal Period	Correlate the developmental events of fetal period with relevant congenital anomalies	<ul style="list-style-type: none"> • Define fetal period • List the external body landmarks from third month till birth. • Enumerate various methods to estimate fetal age • List factors affecting fetal growth. • Define intrauterine growth retardation. 	LGIS	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE
Placenta and fetal membranes	Correlate the developmental events of placenta & fetal membranes with relevant congenital anomalies	<ul style="list-style-type: none"> • Enlist fetal membranes. Describe their important functions & fate in humans • Enlist types of chorion and & give fate of each. • Define decidua. Enlist its types and give fate of each. 	LGIS	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

		<ul style="list-style-type: none"> • Differentiate between stem, anchoring and terminal villi • Describe the structure of placenta and enumerate its functions • Correlate the following anomalies with development of placenta <ul style="list-style-type: none"> ○ Placenta Previa ○ Placenta Accreta ○ Placenta Percreta ○ Placenta Succenturiata ○ Placenta Battledore ○ Placenta Velamentosa • Differentiate between features of maternal and fetal surfaces of placenta. • Enumerate the layers forming placental barrier • Describe placental circulation (maternal and fetal) • Describe development of umbilical cord • Describe production, circulation, and significance of amniotic fluid • Identify causes, complications and diagnostic features of poly & oligohydramnios. • Describe embryological basis of amniotic bands and umbilical cord defects 		
Multiple pregnancies	Distinguish various types of multiple pregnancies based on fertilization, fetal	<ul style="list-style-type: none"> • Elucidate the mechanism behind the occurrence of various types of multiple pregnancies. 	LGIS	MCQs/ SEQs/ SAQs/ VIVA VOCE

	membranes, and placental circulation	<ul style="list-style-type: none"> • Explain the arrangement of fetal membranes in various types of multiple pregnancies • Explain the embryological basis of fetus papyraceus, twin transfusion syndrome and conjoined twins. 		
Screening for fetal well being	Appraise Invasive and noninvasive approaches for antenatal screening for fetal well being	Explain invasive and noninvasive approaches for antenatal screening for fetal well being	LGIS	MCQs/SAQs /SEQs/Viva voce/ OSPE
Development of body cavities	Correlate the development of body cavities with their congenital anomalies	<ul style="list-style-type: none"> • Describe the formation of intraembryonic coelom and its divisions • Correlate the effects of folding with relocation of different parts of intraembryonic coelom • Elucidate the processes involved in partitioning of intraembryonic coelom into definitive body cavities • Explain the contribution of different developmental sources of Diaphragm • Correlate the nerve supply of diaphragm with its developmental sources • Correlate the anomalies of ventral body wall and diaphragm with normal development 	LGIS	MCQs/SAQs /SEQs/Viva voce/ OSPE
Development of Heart	Correlate the development of heart with its congenital anomalies	<ul style="list-style-type: none"> • Explain the formation, division of heart tube with special reference to primary & secondary heart fields 	LGIS	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

		<ul style="list-style-type: none"> • Elucidate the mechanism of cardiac looping, and justify dextrocardia on basis of that knowledge • Explain methods of septal formation in atria and ventricles • Describe division of atrioventricular canal. • Describe the formation of left atrium and pulmonary veins • Explain the division of conotruncus • Appraise the embryological basis of the following heart defects. • Atrial septal defects • Ventricular septal defects • Fallot's tetralogy • Transposition of great vessels • Persistent truncus arteriosus • Ectopia cordis 		
Development of vascular system	Correlate the development of vascular system with its congenital anomalies	<ul style="list-style-type: none"> • Explain the development and fate of aortic arches • Enumerate the developmental sources of aorta • Explain the congenital anomalies of arterial system which include: <ul style="list-style-type: none"> • Patent Ductus Arteriosus • Coarctation of aorta • Double aortic arch • Right aortic arch • Abnormal origin of the Right Subclavian Artery • An interrupted aortic arch 	LGIS	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

		<ul style="list-style-type: none"> • Explain the fate of vitelline, umbilical and cardinal veins. • Describe the development of superior & inferior vena cava. • Apply the knowledge of developmental anatomy to explain following anomalies: <ul style="list-style-type: none"> • Double Inferior Vena Cava • Absence of Inferior Vena Cava • Left Superior Vena Cava • Double Superior Vena Cava 		
Fetal circulation	Use the knowledge of fetal circulation for interpreting cardiovascular congenital anomalies	<ul style="list-style-type: none"> • Identify the sites of mixing of oxygenated and deoxygenated blood in a fetus • Justify the needs of these sites in a fetus • List the changes occurring in human circulation after birth • Explicate the embryological basis of various congenital anomalies of CVS based on the knowledge of fetal circulation and changes after birth. 	LGIS	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE
Skills	Recognize the developmental events of fetal period and cardiovascular system on the given models	<ul style="list-style-type: none"> • Identify the developmental events of embryonic and fetal period on the given models and diagrams • Identify the developmental events of cardiovascular system on the given models and diagrams 	SGD	OSPE Viva

GROSS ANATOMY				
Osteology of ribs, sternum and thoracic vertebrae	Recognize the bony features of thoracic vertebrae, ribs, sternum	<ul style="list-style-type: none"> Identify basic features of thoracic vertebrae, ribs, sternum Recognize the site and importance of sternal angle in relation to great vessels and rib counting. 	LGIS/SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE
General organization of circulatory system	Explain the general concept of anatomical organization of cardiovascular system	<ul style="list-style-type: none"> Describe general plan of systemic, pulmonary, and portal circulatory system. Classify blood vessels on anatomical and functional basis with the help of examples. Differentiate between anatomical end arteries and functional end arteries by giving examples. Explain the anatomical basis and clinical significance of collateral/potential circulation Describe general plan of the lymphatic system of the body. 	LGIS/SGD	Formative-- MCQs/ SEQs/ SAQs/
Thoracic wall	Explain the features of thoracic inlet and outlet, sternum, sternal angle, thoracic vertebrae and ribs	<ul style="list-style-type: none"> Identify structures forming the thoracic inlet and outlet/costal margin Mark sternal angle and discuss its importance in clinical practice Identify basic features of thoracic vertebrae, ribs, sternum 	LGIS/SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

	<p>Correlate the gross anatomy of thoracic wall, lungs, pleura and diaphragm with relevant clinical conditions</p>	<ul style="list-style-type: none"> • Revisit basic features of thoracic vertebrae, ribs, sternum • Correlate the cartilaginous, bony, and muscular framework of the thoracic cage with its function • Describe structures forming the thoracic inlet and outlet/costal margin • Mark sternal angle and discuss its importance in clinical practice • Describe the joints of thorax with reference to their types and movements • Describe and differentiate between the pump handle and bucket handle movements and their effect on diameters of chest cavity • Describe the role of the respiratory muscles during inspiration and expiration • Justify the selection of a site for invasive chest procedures (intercostal nerve block, chest intubation on right and left side) giving anatomical reasons. • Describe the arterial supply, lymphatic and 	<p>LGIS/SGD</p>	<p>MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE</p>
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		<p>venous drainage of the thoracic wall.</p> <p>Skill:</p> <ul style="list-style-type: none"> Identify cardiophrenic angle, cardiothoracic angle, hilar shadow and aortic knuckle on chest x ray PA view. Identify Lung consolidation on X ray chest PA view. 		
Anterior Mediastinum	Recognize the boundaries and contents of anterior mediastinum with special emphasis on thymus	<ul style="list-style-type: none"> Outline the boundaries of anterior mediastinum Enumerate the contents of anterior mediastinum Describe the shape, relations, and blood supply of thymus 	LGIS/SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE
Superior Mediastinum	Correlate the anatomical knowledge of the anterior mediastinum with relevant clinical conditions	<ul style="list-style-type: none"> Outline the boundaries of superior mediastinum and describe its general topography Enumerate the contents of superior mediastinum Identify carina at the site of bifurcation of trachea into main principal bronchi Describe immediate relations, blood, and nerve supply of thoracic part of trachea Justify the right bronchus being the most probable site of foreign body impaction in respiratory tract 	LGIS/SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

		<ul style="list-style-type: none"> • Describe the origin, course, relations, and distribution of both phrenic nerves • Interpret the clinical scenarios related to compression of trachea and damage/irritation to phrenic nerve based upon your knowledge of Anatomy 		
Middle mediastinum and Heart	Correlate the anatomical knowledge of the middle mediastinum with relevant clinical conditions	<ul style="list-style-type: none"> • Recognize anatomical position, borders, surfaces, apex and base, chambers of heart as seen from exterior • Describe internal features of various chambers of heart • Describe the arterial supply, venous drainage and nerve supply of heart • Correlate the anatomical basis of opening and closing of AV, aortic and pulmonary valves, with the heart sounds produced by them. • Locate the sites for auscultation of various heart sounds on the chest wall • Describe the anatomical basis of valvular heart diseases • Differentiate between anatomical end arteries and functional end arteries 	LGIS/SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

		<ul style="list-style-type: none"> • Define angina pectoris and myocardial infarction. and explain their anatomical basis in case of coronary artery disease • Explain the anatomical basis of cardiac referred pain in case of ischemic heart disease • List various diagnostic procedures for coronary artery disease • Differentiate between coronary angiography and angioplasty • Name the blood vessels preferably used for coronary catheterization 		
Posterior mediastinum	<p>Correlate the anatomical knowledge of the posterior mediastinum with relevant clinical conditions Explain posterior mediastinum in detail</p>	<ul style="list-style-type: none"> • Outline the boundaries of posterior mediastinum and describe its general topography • Enumerate the contents of posterior mediastinum • Describe the relations and branches of descending aorta • Describe the thoracic duct with reference to its formation, course, tributaries, termination, and area of drainage • Interpret the clinical scenarios related to chylothorax with the help of your knowledge of Anatomy • Describe the course, relations, and 	LGIS/SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

		<p>distribution of both vagii in thorax</p> <ul style="list-style-type: none"> • Describe the azygos system of veins with reference to formation, course, relations, tributaries, and area of drainage of both azygos and hemiazygos veins • Describe the role of azygos vein in case of caval obstruction • Identify the lymph nodes in the posterior mediastinum • Define splanchnic nerves and identify the location of thoracic sympathetic chain 		
Pericardium	Correlate the anatomical features of pericardium with its clinical abnormalities	<ul style="list-style-type: none"> • Describe the layers, innervation, blood supply and functions of pericardium • Correlate the reflections of parietal and visceral pericardium resulting in formation of oblique sinus, and transverse sinus with its surgical significance • Define pericarditis and identify the layers of pericardium involved • Explain the anatomical basis of cardiac tamponade and pericardial rub • Name the layers between which the serous 	LGIS/SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

		<p>accumulation may occur, resulting in pericardial effusion.</p> <ul style="list-style-type: none"> Identify the ideal site for pericardiocentesis, and list the structures pierced during the procedure in an order. 		
Lungs	<p>Correlate the development of lungs with its structure and function</p>	<ul style="list-style-type: none"> Identify the side of lung correctly by recognizing its borders, surfaces, and hilar apertures Describe the blood supply, nerve supply, and relations of various surfaces of both lungs Correlate bronchopulmonary segments with their position and significance. Describe with anatomical reasoning, the clinical presentation of bronchogenic carcinoma and lung trauma 	LGIS/SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE
Pleura	<ul style="list-style-type: none"> Correlate the development of pleura with its anatomy, functions, and diseases 	<ul style="list-style-type: none"> Identify various parts of pleura Recognize the pleural reflections and recesses Relate the innervation of the visceral and parietal layers of the pleura in different clinical presentations of pleurisy Describe the clinical significance of reflections and recesses of pleura and pleural cavity 	LGIS/SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

		<ul style="list-style-type: none"> Recognize signs, symptoms and radiological findings of pleural effusion, pneumothorax, empyema and hemothorax. 		
Diaphragm	Correlate the development of diaphragm with its structure and function	<ul style="list-style-type: none"> Identify parts of diaphragm and their embryological origin List the apertures in diaphragm with their levels and structures passing through each Describe the role of diaphragm and scalene muscles in increasing the vertical diameter of thoracic cavity Explain the clinical scenario related to diaphragmatic hernia and phrenic nerve lesions with anatomical reasoning Justify anatomical basis of referred shoulder tip pain 	LGIS/SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE
Thorax	Correlate the gross anatomy of thoracic wall with its movements, relevant clinical conditions, and requisite surgical interventions	<ul style="list-style-type: none"> Correlate the cartilaginous, bony, and muscular framework of the thoracic cage with its functions Explain the mechanics of respiration Recognize signs, symptoms and radiological findings of 	SGD	MCQs/SAQs/ SEQs/Viva voce/ OSPE

<p>Surface marking</p>	<p>Recognize the muscular, tendinous, and bony landmark of thorax to utilize the knowledge of topography of important neurovascular structures of thorax in plotting the same on body surface</p>	<p>pleural effusion, pneumothorax, empyema and hemothorax.</p> <ul style="list-style-type: none"> • Justify the selection of a site for invasive chest procedures (intercostal nerve block, chest intubation on right and left side) giving anatomical reasons. • Describe with anatomical reasoning, the clinical presentation of bronchogenic carcinoma and lung trauma • Correlate bronchopulmonary segments with their position and clinical significance • Mark the following structures on surface of a subject or mannequin correctly <ul style="list-style-type: none"> • Parietal pleura • Lungs • Borders of the heart • Auscultatory areas 		
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PHYSIOLOGY				
TOPIC/THEME	LEARNING OUTCOMES	LEARNING OBJECTIVES By the end of the session, student should be able to;	INSTRUCTIONAL STRATEGIES	ASSESSMENT TOOLS
CVS-HEART				
Introduction to CVS	Appreciate the <ul style="list-style-type: none"> functional characteristics & electrical properties of cardiac muscle Compare and contrast the pressure and volume changes in different components of circulatory system during cardiac cycle 	<ul style="list-style-type: none"> Differentiate the physiological arrangement of right and left hearts along with the parallel arrangement of systemic circulation. Trace the path of blood flow through the whole circulatory system with comparisons of pressures in various components of heart and circulatory tree Understand the basic functional anatomy of the atrioventricular and semilunar valves, and explain how they operate. 	LGIS CBL	MCQ SEQ/SAQ Viva voce
Difference between cardiac and smooth muscle		<ul style="list-style-type: none"> Compare cardiac and skeletal muscle with respect to: cell size, electrical connections between cells, and arrangement of myofilaments, ion permeability, and electrical resistance. Describe role of gap junctions in creating a functional syncytium. 		
SA nodal action potential		<ul style="list-style-type: none"> Explain the ionic mechanism of pacemaker automaticity and rhythmicity, and identify cardiac cells that have pacemaker potential and their spontaneous rate. Identify neural and humoral factors that influence their rate. Discuss the significance of “overdrive suppression” and “ectopic pacemaker”. 	LGIS CBL	MCQ SEQ/SAQ Viva voce
Cardiac impulse I		<p>Beginning in the SA node, trace the normal sequence of cardiac activation (depolarization) and the role played by specialized cells of the cardiac conductive system.</p> <ul style="list-style-type: none"> Explain the functional significance of the slow conduction through the AV node (delay). Describe factors that influence conduction velocity through the AV node. Draw a diagram and trace the path of spread of cardiac impulse through conductive system, atrial and ventricular myocardium and associate it with the function of heart. 	LGIS CBL	MCQ SEQ/SAQ Viva voce

Ventricular action potential		<ul style="list-style-type: none"> • Sketch a typical action potential in a ventricular muscle labeling both the voltage and time axes accurately. • Describe how ionic currents through various ion channels contribute to the four phases of the cardiac action potential. • Explain what accounts for the long duration of the cardiac action potential and the resultant long refractory period. What is the advantage of the long plateau of the cardiac action potential and the long refractory period? • Contrast the duration of the action potential and the refractory period in a cardiac muscle and a skeletal muscle. Sketch the temporal relationship between AP in a cardiac muscle and the resulting contraction of that cell. Explain why cardiac muscle cannot remain in a state of sustained (tetanic) contraction. 	LGIS CBL	MCQ SEQ/SAQ Viva voce
Regulation of heart pumping		<ul style="list-style-type: none"> • Contrast the sympathetic and parasympathetic nervous system influence on heart rate and cardiac excitation in general. Identify which arm of the autonomic nervous system is dominant at rest and during exercise. Discuss ionic mechanisms of these effects on both working myocardium and pacemaker cells. • Explain how changes in sympathetic activity alter ventricular work, cardiac metabolism, oxygen consumption and cardiac output. • Know the location of vasomotor center. • Enlist the different parts of vasomotor center and their functions 	LGIS CBL	MCQ SEQ/SAQ Viva voce
Cardiac Cycle I		Draw, in correct temporal relationship, the pressure, volume, heart sound, and ECG changes in the cardiac cycle. Identify the intervals of iso-volumic- contraction, rapid ejection, slow ejection, iso-volumic relaxation, rapid ventricle filling, slow ventricular filling and atrial contraction.	LGIS CBL	MCQ SEQ/PBQ Viva voce

Cardiac Cycle II		<p>Compare the various phases of ventricular systole and ventricular diastole. Contrast the relationship between pressure and flow into and out of the left and right ventricles during each phase of the cardiac cycle.</p> <p>Analyze various cardiac events in relation to each other</p>	<p>LGIS CBL</p>	<p>MCQ SEQ/SAQ Viva voce</p>
Cardiac cycle III		<ul style="list-style-type: none"> • Define ejection fraction and be able to calculate it from end diastolic volume, end systolic volume, and/or stroke volume. Predict the change in ejection fraction that would result from a change in a) preload, b) afterload, and c) contractility. • Draw a ventricular pressure volume loop and on it label the phases and events of the cardiac cycle (ECG, valve movement). Describe the role of Starling's Law of the Heart in keeping the output of the left and right ventricles equal. • Describe the difference in the way changes in preload and changes in contractility influence ventricular force development. 	<p>LGIS CBL</p>	<p>MCQ SEQ/SAQ Viva voce</p>
Preload and afterload		<ul style="list-style-type: none"> • Define preload and contractility. Explain why ventricular end-diastolic pressure, atrial pressure and venous pressure all provide estimates of ventricular preload. Explain why ventricular end-diastolic pressure provides the most reliable estimate. • Define afterload and explain how arterial pressure influences afterload. • Describe the impact of changes in preload, afterload, and contractility in determining cardiac performance. 	<p>LGIS CBL</p>	<p>MCQ SEQ/SAQ Viva voce</p>
General principles of ECG	<p>Interpret normal and abnormal ECG changes in health and disease</p>	<ul style="list-style-type: none"> • Define the term dipole. Describe characteristics that define a vector. Describe how dipoles generated by the heart produce the waveforms of the ECG. 	<p>LGIS CBL</p>	<p>MCQ SEQ/SAQ Viva voce</p>

		<ul style="list-style-type: none"> Describe the electrode conventions used by clinicians to standardize ECG measurements. Know the electrode placements and polarities for the 12 leads of a 12 lead electro-cardiogram and the standard values for pen amplitude calibration and paper speed. 		
Normal ECG		<ul style="list-style-type: none"> Name the parts of a typical bipolar (Lead II) ECG tracing and explain the relationship between each of the waves, intervals, and segments in relation to the electrical state of the heart. Explain why the ECG tracing looks different in each of the 12 leads. Correlate between vector and lead, type and locations of leads and principles for vector analysis. Recognize the significance of waves, segments and intervals of ECG recording. 	LGIS CBL	MCQ SEQ/PBQ OSPE Viva voce
Interpretation of ECG I		<ul style="list-style-type: none"> Evaluate the general principles of analysis of ECG. Define mean electrical vector (axis) of the heart and give the normal range. Determine the mean electrical axis from the magnitude of the QRS complex in the standard limb leads. Describe the alteration in conduction responsible for most common arrhythmias: i.e., tachycardia, bradycardia, A V block, bundle branch block, flutter, and fibrillation 	LGIS CBL	MCQ SEQ/PBQ Viva voce
Coronary circulation and MI		<ul style="list-style-type: none"> Describe the phasic flow of blood to the ventricular myocardium through an entire cardiac cycle. Contrast this cyclic variation in myocardial flow a) in the walls of the right and left ventricles and b) in the subendocardium and subepicardium of the left ventricle. Identify the area of the ventricle most susceptible to 	LGIS CBL	MCQ SEQ/PBQ Viva voce

		<p>ischemic damage and why the risk is increased at high heart rates.</p> <ul style="list-style-type: none"> • Explain the mechanism whereby coronary blood flow is coupled to myocardial workload, and identify stimuli that cause increases in coronary blood flow to occur. • Describe what is meant by coronary vascular reserve and the role of collateral blood vessels. Discuss physiological and pathological events that decrease coronary vascular reserve. • Explain the mechanism of myocardial injury during MI 		
ECG changes in MI		<ul style="list-style-type: none"> • Explain the ECG changes in case of ischemia and differentiate them from changes in infarction. • Temporally correlate the ECG changes from the onset of MI to its progression and identification of changes of old MI. • Differentiate between anterior wall MI, lateral wall MI, inferior wall MI and Posterior wall MI based on the leads involved 	LGIS CBL	MCQ SEQ/SAQ Viva voce
Current of injury		Describe electrocardiographic changes associated respectively with myocardial ischemia, injury, and death. Define injury current and describe how it alters the ST segment of the ECG.	LGIS CBL	MCQ SEQ/SAQ Viva voce
Brady-arrhythmias		<ul style="list-style-type: none"> • Discuss the basis of common cardiac arrhythmias, process that produce them and their clinical significance. • Employ the concept of sinus arrhythmia and its clinical significance. • Compare between first degree, second degree and third degree heart blocks based on pathophysiology and ECG changes. • Describe the basis of overdrive suppression and Stokes Adams attacks 	LGIS CBL	MCQ SEQ/PBQ OSPE Viva voce

		<ul style="list-style-type: none"> Assess changes in ECG and cardiac function during common abnormalities in ionic composition of body fluids. 		
Tachy-arrhythmias		<ul style="list-style-type: none"> Explain the following terms: reentry, and circus movement. Differentiate between fibrillation and flutter based on ECG findings Describe the significance of defibrillation in emergency cardiac situations 	LGIS CBL Laboratory practical	MCQ SEQ/SAQ Viva voce OSPE
CVS-CIRCULATION				
Hemodynamics of circulation	Explain the hemodynamics of systemic circulation	<ul style="list-style-type: none"> Write the formulation of the Law of Laplace. Describe how it applies to ventricular function in the normal and volume overloaded (failing) ventricle. Understand the relationship between pressure, flow, and resistance in the vasculature. Apply this relationship to the arteries, arterioles, capillaries, venules, and veins. Explain how Poiseuille's Law influences resistance to flow. Use it to calculate changes in resistance in a rigid tube (blood vessel). Explain the deviations from Poiseuille's law predictions that occur in distensible blood vessels. Define resistance and conductance. Understand the effects of adding resistance in series vs. in parallel on total resistance and flow. Express the concept of blood flow, its types and significance of turbulent and laminar flow, the concept of pressure gradient, resistance to blood flow and its significance. 	LGIS	MCQ Viva voce
Characteristics of systemic circulation + veins and their functions		<ul style="list-style-type: none"> Recognize the physiologic anatomy of different types of blood vessels and their importance. Discuss the Physiology of vascular compliance, changes in compliance of blood vessels with age & comparison 	LGIS CBL	MCQ SEQ/SAQ Viva voce

		<p>b/w the compliance of arteries versus veins.</p> <ul style="list-style-type: none"> • Identify the origin of arterial pressure pulse and its propagation to the peripheral arteries. • Describe the factors damping the arterial pulse and abnormalities of arterial pulse. • Correlate the right atrial pressure with the factors affecting venous return to heart • Correlate the venous resistance with Venous valves and muscle pump and gravitational forces with reference to varicose veins • Understand the Physiology of vascular compliance and explain the reservoir function of veins • Describe changes in compliance of blood vessels with age and comparison between the compliance of arteries versus veins 		
Local Control of local blood flow	Identify the dynamics of local and peripheral Blood flow	<ul style="list-style-type: none"> • Describe how the theory of metabolic regulation of blood flow accounts for active hyperemia and reactive hyperemia. • Identify the role of PO₂, PCO₂, pH, adenosine, and K⁺ in the metabolic control of blood flow to specific tissues. • Diagram the synthetic pathway for nitric oxide (EDRF, endothelial derived relaxing factor), including substrate and the interplay between endothelium and vascular smooth muscle. • Discuss the circumstances and the mechanisms whereby humoral substances contribute to regulation of the microcirculation. • Describe the role of angiogenesis in providing a long term match of tissue blood flow and metabolic need. 	LGIS CBL	MCQ SEQ/SAQ Viva voce

Humoral control of blood flow		<ul style="list-style-type: none"> • Identify the cell membrane receptors and second messenger systems mediating the contraction of vascular smooth muscle by norepinephrine, angiotensin II, and vasopressin. • Identify the cell membrane receptors and second messenger systems mediating the relaxation of vascular smooth muscle by nitric oxide, bradykinin, prostaglandins, and histamine. • Describe the involvement of endothelial cells in the regulation of vascular diameter and inflammatory responses. • Describe triple response 	LGIS CBL	MCQ SEQ/SAQ Viva voce
Capillary Dynamics I	Elucidate edema types, clinical significance and factors responsible for causing edema	<ul style="list-style-type: none"> • Describe the principles of capillary dynamics, structure of interstitium, Starling's forces for fluid exchange across the capillary membrane and factors affecting thereof. • Recognize the concept of Starling's equilibrium, and how the interstitial space is kept dry? • Explain the mechanism of formation of interstitial fluid, its composition and factors creating Starling's disequilibrium leading to the development of edema. 	LGIS CBL	MCQ SEQ/PBQ Viva voce
Capillary Dynamics II and edema		<ul style="list-style-type: none"> • Describe how histamine alters the permeability of the post capillary venules, and how the loss of albumin into the interstitial space promotes localized edema. • Explain how edema develops in response to: <ol style="list-style-type: none"> a. venous obstruction, b. lymphatic obstruction, c. increased capillary permeability, d. heart failure, e. tissue injury or allergic reaction, and f. malnutrition. 	LGIS CBL	MCQ SEQ/PBQ Viva voce

		<ul style="list-style-type: none"> Identify Types of edema, their pathophysiology and safety factors preventing edema formation 		
Cardiac output	Analyze the factors regulating venous return and cardiac output at rest and during exercise	<ul style="list-style-type: none"> Explain the determinants of cardiac output i.e. stroke volume output and Heart rate and factors affecting them. Appreciate the mechanics of low & high cardiac outputs along with their effects on heart. Comprehend the factors affecting stroke volume, heart rate and total peripheral resistance. Understand Fick's principle for the measurement of cardiac output. 	LGIS CBL	MCQ SEQ/SAQ PBQ Viva voce
Venous return and its regulation		<ul style="list-style-type: none"> Understand the concept of "mean systemic filling pressure," its normal value, and how various factors can alter its value. Define venous return. Understand the concept of "resistance to venous return" and know what factors determine its value theoretically, what factors are most important in practice. Construct a venous return curve. Predict how changes in right atrial pressure and mean systemic filling pressure effect the venous return 	LGIS CBL	MCQ SEQ/SAQ PBQ Viva voce
Measurement of cardiac output + Cerebral circulation		<ul style="list-style-type: none"> Understand the principles underlying cardiac output measurements using the Fick, dye dilution, and thermos-dilution methods. Contrast the local and neural control of cerebral blood flow. Discuss the relative important of O₂, CO₂, and pH in regulating cerebral blood flow. Describe the structural components of the blood brain barrier and how this barrier impedes the movement of gases, proteins, and lipids from the blood to neurons. 	LGIS CBL	MCQ SEQ Viva voce

		<ul style="list-style-type: none"> • Contrast the mechanisms of the two major types of stroke, hemorrhagic and occlusive stroke 		
Arterial Blood Pressure	Summarize regulatory mechanisms of blood pressure & cardiac output control in health and disease	<ul style="list-style-type: none"> • Describe blood pressure measurement with a catheter and transducer and explain the components of blood pressure waveform. • Contrast the direct and indirect estimation of blood pressure with a sphygmomanometer. • Given systolic and diastolic blood pressures, calculate the pulse pressure and the mean arterial pressure. • Describe how arterial systolic, diastolic, mean, and pulse pressure are affected by changes in a) stroke volume, b) heart rate, c) arterial compliance, and d) total peripheral resistance • Comprehend the determinants of arterial pressure, factors affecting and mechanisms regulating blood pressure on short and long term basis. • Understand mean arterial pressure and its significance. 	LGIS CBL Practical in laboratory	MCQ SEQ/PBQ OSPE Viva voce
Short term regulation of BP II		<ul style="list-style-type: none"> • Contrast the sympathetic and parasympathetic nervous system control of heart rate, contractility, total peripheral resistance, and venous capacitance • Explain the sequence of events in the following that occur after an acute increase or decrease in arterial blood pressure. Include receptor response, afferent nerve, and CNS integration, efferent to the SA node, ventricles, arterioles, venules, and hypothalamus <ul style="list-style-type: none"> ○ baroreceptor reflex ○ CNS Ischemic response ○ Chemoreceptor reflex 	LGIS CBL	MCQ SEQ/SAQ PBQ Viva voce

		<ul style="list-style-type: none"> ○ Cushing reaction ● Explain the sequence of events mediated by cardiopulmonary volume receptors that occur after an acute increase or decrease in arterial blood pressure. Include receptor response, afferent, CNS integration, efferent to the heart, kidney, hypothalamus, and vasculature. 		
Long term regulation of BP		<ul style="list-style-type: none"> ● With the help of a flowsheet diagram explain the role of renin-angiotensin-aldosterone mechanism in regulation of BP at intermediate term ● Explain the significance of pressure diuresis and pressure natriuresis in long term regulation of BP ● Contrast the relative contribution of short- and long-term mechanisms in blood pressure and blood volume regulation. 	LGIS CBL	MCQ SEQ/SAQ PBQ Viva voce
Hypertension		<ul style="list-style-type: none"> ● Tabulate WHO criteria for categorizing different types of hypertension ● Compare the primary and secondary hypertension. ● Enlist the causes of both 	LGIS CBL	MCQ SEQ/SAQ PBQ Viva voce
Cardiac Failure	Explain pathophysiology of cardiac failure	<ul style="list-style-type: none"> ● Define cardiac failure, its pathophysiology and clinical manifestations ● Differentiate between the factors causing hyper-effective and hypo-effective heart functions. ● Differentiate between right and left heart failure based on their presentation ● Outline the physiology of treatment of cardiac failure 	LGIS CBL	MCQ SEQ/SAQ PBQ Viva voce
Heart sounds & murmurs	Differentiate among normal and abnormal heart sounds	<ul style="list-style-type: none"> ● Enlist the factors that contribute to the formation of turbulent flow. Describe the timing and causes of the four heart sounds. ● Describe the expected auscultation sounds that define mitral stenosis, 	LGIS CBL Practical in laboratory	MCQ SEQ/SAQ OSPE Viva voce

		<p>mitral insufficiency, aortic stenosis, and aortic insufficiency. Explain how these pathologic changes would affect cardiac mechanics and blood pressure.</p> <ul style="list-style-type: none"> • Enlist the types of abnormal heart sounds (murmurs) • Correlate the systolic and diastolic murmurs with valvular heart diseases like stenosis and regurgitation 		
Circulatory Shock I	Compare various types of shock and their pathophysiology	<ul style="list-style-type: none"> • Describe the direct cardiovascular consequences of the loss of 30% of the circulating blood volume on cardiac output, central venous pressure, and arterial pressure. • Describe the compensatory mechanisms activated by these changes. • Explain three positive feedback mechanisms activated during severe hemorrhage that may lead to circulatory collapse and death due to irreversible shock. • Define shock. Explain stages of development and differences between compensated and uncompensated shock. 	LGIS CBL	MCQ SEQ/SAQ PBQ Viva voce
Circulatory Shock II		<p>Differentiate between the etiology, presentation and management of:</p> <ul style="list-style-type: none"> ○ Hypovolemic shock ○ Cardiogenic shock ○ Anaphylactic shock ○ Neurogenic shock ○ Septic shock 	LGIS CBL	MCQ SEQ PBQ Viva voce
Muscle blood flow & Splanchnic circulation + Effect of exercise on CVS	<p>Explain the special blood circulations in the body</p> <p>Analyze cardiovascular and pulmonary changes (including oxygen consumption) during different grades of</p>	<ul style="list-style-type: none"> • Contrast the neural and local control of skeletal muscle blood flow at rest and during exercise. • Contrast the effect of phasic and sustained skeletal muscle contraction on extravascular compression of blood vessels and on central venous pressure. 	LGIS CBL	MCQ SEQ Viva voce

	exercise	<ul style="list-style-type: none"> • Contrast the local and neural control of the splanchnic circulation. Describe the role of the hepatic portal system and the hepatic artery in providing flow and oxygen to the liver. • Describe the blood pressure in the hepatic portal vein, hepatic sinusoids, and the vena cava. • Explain the enterohepatic circulation. • Describe the cardiovascular consequences of exercise on peripheral resistance, cardiac output, A V oxygen difference, and arterial pressure • Describe the redistribution of cardiac output during exercise to the CNS, coronary, splanchnic, cutaneous, and skeletal muscle vascular beds during sustained exercise (distance running). • Explain the relative importance of neural and local control in each vascular bed. • Discuss adaptations to physical training on the cardiovascular system. Explain the mechanisms underlying each. • Contrast the effects of static vs. dynamic exercise on blood pressure. 		
Arterial pressure pulse + Formation of lymph		<ul style="list-style-type: none"> • Correlate the origin of arterial pressure pulse and its propagation to the peripheral arteries with cardiac contractility • Enlist the factors damping the arterial pulse and abnormalities of arterial pulse • Trace the normal arterial pulse waveform • differentiate the jugular venous pulse from arterial pulse • Describe the lymphatics, and explain how the structural characteristics of 	LGIS CBL Practical	MCQ SEQ OSPE Viva voce

		<p>terminal lymphatics allow the reabsorption of large compounds, such as proteins.</p> <ul style="list-style-type: none"> • Contrast the structure of lymphatic capillaries and systemic capillaries, including the significance of the smooth muscle in the walls of the lymphatic vessels. • Identify critical functions of the lymphatic system in fat absorption, interstitial fluid reabsorption, and clearing large proteins from the interstitial spaces. • Diagram the relationship between interstitial pressure and lymph flow. Explain why edema does not normally develop as interstitial pressure increases. 		
Congenital heart diseases	Comprehend pathophysiology of congenital heart diseases	<ul style="list-style-type: none"> • Describe the Pathophysiology of congenital heart diseases like: <ul style="list-style-type: none"> ▪ Tetralogy of fallot ▪ Patent Ductus Arteriosus 	LGIS CBL	MCQ SEQ
Practicals	Record the Blood Pressure of a Subject using palpatory and Auscultatory Method	<ul style="list-style-type: none"> • Demonstrate the use of stethoscope • Identify various parts of sphygmomanometer and stethoscope • Demonstrate the palpatory & auscultatory methods of recording blood pressure • Record the arterial blood pressure by properly placing the cuff 2.5 cm above the cubital fossa and placing the stethoscope on the brachial artery on the medial side of biceps tendon. • Recognize the 4 types of Korotokoff sounds, their physiological basis and relevance to systolic and diastolic blood pressure <p><u>ATTITUDE</u></p> <ul style="list-style-type: none"> • Practice the art of taking consent from the subject/patient prior to performance of procedure. 	Practical	OSPE

		<ul style="list-style-type: none"> Communicate the procedure effectively to the patient 		
Perform Cardiopulmonary resuscitation on a dummy according to the American Heart Association Guidelines	<p>SKILLS</p> <ul style="list-style-type: none"> Identify factors/indications for CPR Perform CPR according to American Heart Association guidelines Practice the art of giving compressions on both adult and infant manikins Demonstrate the use of Ambu bag with mask 	Practical	OSPE	
Demonstrate Triple Response	<p>SKILLS</p> <ul style="list-style-type: none"> Demonstrate the three stages of response of skin (its micro vessels) to blunt mechanical injury Proficiently elicit local axon reflex by carefully applying a stroke on the skin 	Practical	OSPE	
Record & Interpret normal ECG by placing all the chest and limb leads on an SP	<p>SKILLS</p> <p>Recording of ECG</p> <ul style="list-style-type: none"> Practice the procedure to record ECG by placing appropriate chest and limb leads on appropriate points and by adjusting the speed and calibration of the ECG machine Properly position the patient observing the required precautions during the recording of ECG Obtain a 12 lead ECG recording with a long lead II for measurement of heart rate and identification of irregular rhythm Identify normal ECG waves, complexes, segments and intervals Assess cardiac axis, rhythm, origin of cardiac impulse (pace maker) and calculate heart rate from ECG Categorize the conditions affecting the ECG recording Identify bradycardia, tachycardia, and MI by examining the ECG <p>ATTITUDE</p>	Practical	OSPE	

	<ul style="list-style-type: none"> ● Practice the art of taking consent and communicating with the patient prior to conducting ECG ● Explain the procedure, reassure and communicate the precautions to be taken by the patient 		
Examine the Radial Pulse and comment on rate, rhythm and character	<p><u>Skill</u></p> <p><u>Recording of arterial pulse</u></p> <ul style="list-style-type: none"> ● Record the Radial artery pulse by placing three fingers on radial side of semi-pronated arm and counting for one minute. ● Observe the volume, rhythm and character of the pulse ● Compare the radial pulse with the carotid and femoral pulses and note any delay ● Palpate the carotid and dorsalis pedis pulses <p><u>ATTITUDE</u></p> <ul style="list-style-type: none"> ● Introduce yourself to the subject/patient prior to performance of procedure and take consent ● Explain the procedure of conducting arterial pulse measurement to the patient 	Practical	OSPE
Examine the Heart Sound on Pulmonary, Aortic, Mitral and Tricuspid areas	<p><u>SKILLS</u></p> <p><u>Auscultation of heart</u></p> <ul style="list-style-type: none"> ● Properly expose and position a subject and identify the different cardiac areas for auscultation of mitral, tricuspid, pulmonary and aortic valves ● Demonstrate the auscultation of heart sounds by proper use of stethoscope ● Differentiate between first and second heart sounds ● Appraise the physiological basis of various heart sounds ● Demonstrate the location and palpation of apex beat on precordium 	Practical	OSPE

	<ul style="list-style-type: none"> Recognize the displacement of apex beat and its relevance to diseases of heart 		
Determine the JVP on an SP	<p><u>Recording JVP</u></p> <ul style="list-style-type: none"> By adjusting position of subject's head and neck 	Practical	OSPE
Record the effects of posture and Exercise on Blood Pressure	<p><u>Measurement of arterial blood pressure</u></p> <ul style="list-style-type: none"> Record the arterial blood pressure by properly placing the cuff 2.5 cm above the cubital fossa and placing the stethoscope on the brachial artery on the medial side of biceps tendon. Record the effects of changing posture and performing standard exercise on blood pressure <p><u>ATTITUDE</u></p> <ul style="list-style-type: none"> Practice the art of taking consent from the subject/patient prior to performance of procedure. Communicate the procedure effectively to the patient 	Practical	OSPE

BIOCHEMISTRY				
Topic/ Theme	Learning Outcomes	Learning Objectives/Contents	Instructional Strategies	Assessment tools
Enzymes	Elaborate the biochemical importance of enzymes, coenzymes, co-factors, and isoenzymes as well as their role in various clinical conditions	<ul style="list-style-type: none"> ● Define Enzymes and classify them on basis of their mechanism of actions ● Explain coenzymes, co-factors, and isoenzymes with their biochemical importance ● Write down the mechanism of catalysis of enzymes ● Describe the factors affecting enzymes activity ● Define Michaelis-Menten equation & Lineweaver-Burk plot and its application in enzyme kinetics (no derivation of equations) ● Compare & contrast different types of enzyme inhibitions with examples & biomedical importance ● Explain regulatory enzymes ● Application of enzymes in clinical diagnostics and therapeutics (Describe the role of Troponins in diagnosis of MI) 	<ul style="list-style-type: none"> ● Lectures ● SGD ● CBL/INTEGRATED SESSION 	MCQ/ SAQ/SEQ
Lipid Chemistry	Relate the significance of different lipids in health and disease	<ul style="list-style-type: none"> ● Define lipids and enumerate their biomedical functions ● Describe lipid classification with examples & biochemical significance also explain nutritional significance of lipids ● Explain the structure, chemistry, classification and biochemical functions of Fatty acids along with their nutritional role ● Describe Eicosanoids, their classification and functions in health and disease ● Describe Steroids, Sterol e.g. Cholesterol, their chemistry, functions and clinical significance. Explain rancidity of fats, lipid peroxidation and its biochemical significance 	Lecture/ SGD/ CBL	MCQ/ SAQ/ SEQ/ Structured Viva

		<ul style="list-style-type: none"> ● Serum triglycerides ● Serum HIM 		
Digestion and absorption of lipids	Discuss the digestion and absorption of lipids	Overview of digestion & absorption of Lipids	Lecture/ SGD/ CBL	MCQ/SAQ/ SEQ/Structured Viva
Lipid Metabolism	Apply the knowledge of lipid metabolism for understanding relevant metabolic disorders	<ul style="list-style-type: none"> ● Describe in detail the biosynthesis of fatty acids, their regulation and related disorders ● Explain the mobilization and Oxidation of fatty acids along with types of oxidation (beta, alpha, omega etc), bioenergetics, regulation and related disorders ● Give oxidation of fatty acids with odd number of carbon atoms ● Give a brief account of oxidation of Unsaturated fatty acids ● Elaborate the phospholipid synthesis and degradation. Discuss related metabolic disorders ● Explain Triglyceride metabolism ● Explain Mechanism of synthesis of ketone bodies and give their utilization and significance in body. Define Ketosis and explain its mechanism ● Explain the steps of Cholesterol synthesis along with its regulation. ● Enumerate functions and fate of Cholesterol in the body. ● Differentiate between Bile Acids and Bile Salts ● Define and explain Hypercholesterolemia in relation with the pathophysiology of atherosclerosis ● Discuss the metabolism of Plasma Lipoproteins (VLDL, LDL, HDL, and Chylomicrons) with respect to their transport, functions and importance in health and disease. Discuss 	Lecture/ SGD/ CBL	MCQ/ SAQ/ SEQ/ Structured Viva

		apolipoproteins and their role in lipoprotein metabolism		
Practical	<ul style="list-style-type: none"> Analyze the results of given experiment Study the various enzymes related to myocardial infarction 	Rancidity of Fats	Practical	OSPE
		<ul style="list-style-type: none"> Estimation & clinical interpretation of serum cholesterol Lipid profile LDH CK Trop T 		

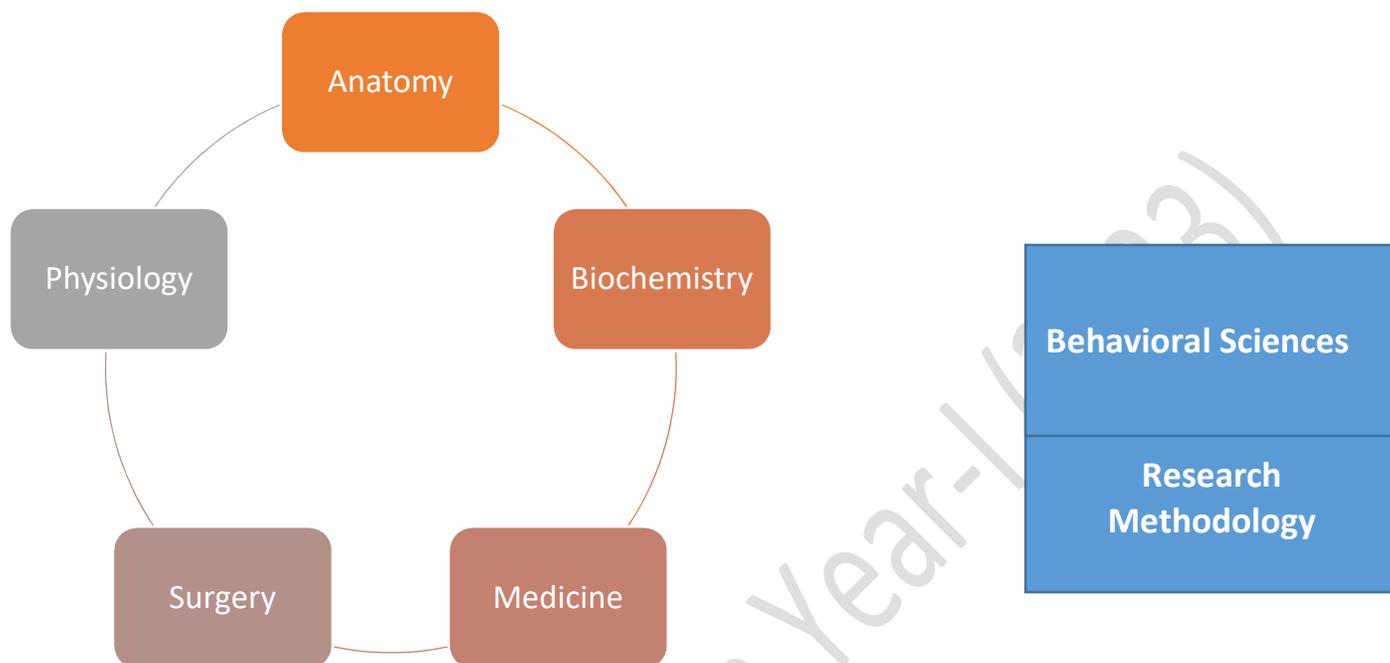
SURGERY				
Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
CVS	<ul style="list-style-type: none"> Explain surgical aspect of various Cardiovascular diseases Describe principles of Coronary angioplasty and CABG Describes clinical presentations of acute and chronic limb ischemia Explain incidence of various aneurysms Describe presentations of varicose veins 	<ol style="list-style-type: none"> Principles of coronary angioplasty and CABG <ol style="list-style-type: none"> Explain basic concepts of angioplasty and CABG Describe different conduits used for CABG Describe basic principles of Heart-lung machine Identify various complications of CABG Causes / clinical presentation of acute & chronic limb ischemia <ol style="list-style-type: none"> Identifies various causes of limb ischemia Describe differences between clinical presentations of acute and chronic limb ischemia Recognise basic features of acute and chronic limb ischemia Explain the importance of early recognition of acute limb ischemia Aneurysm & Varicose veins-an overview <ol style="list-style-type: none"> List different types of aneurysm and their complications Describe the various clinical presentation of varicose veins Explain underlying aetiology of varicose veins on anatomical basis 	<ul style="list-style-type: none"> SGD CBL/INTEGRATED SESSION 	MCQ/ SAQ/SEQ/O SCE

		4. Explain the importance of Imaging studies in Cardiovascular diseases		
MEDICINE				
Hypertension	Correlate the increase in peripheral vascular resistance being manifested in the form of high blood pressure	Causes of hypertension	Lectures/SG D/CBL/INTEGRATED SESSION/Patient	Formative assessment
IHD	Relate the common presentation of IHD with its causes	Causes & common presentation of IHD	Lectures/SG D/CBL/INTEGRATED SESSION/Patient	Formative assessment
CCF	<ul style="list-style-type: none"> Explain the abnormalities in systole & diastole (cardiac cycle) in the patients of CCF Correlate cardiac cycle with ECG 	Clinical presentation of CCF	Lectures/SG D/CBL/INTEGRATED SESSION/Patient	Formative assessment
Heart Arrhythmias & Blocks	Correlate the common abnormalities in the heart rhythm on ECG.	Tachycardia and Bradycardia Heart blocks	Lectures/SG D/CBL/INTEGRATED SESSION/ Skill lab	Formative assessment
BLS	Follow the steps of BLS	Steps of Basic Life Support	Video clip	Formative assessment

MBBS YEAR I
BLOCK III
MODULE VI
Respiratory system
Duration: 04 weeks



Integration of Disciplines in Module VI



MODULE PLANNING COMMITTEE

Module Coordinator	<i>To be filled by the institutes</i>
Members	

Preamble

One of the unfortunate gifts of industrialization is varied respiratory illnesses. However, high prevalence of chronic respiratory diseases, mortality and morbidity associated with it is a burden that is not limited to affluent countries. According to a lancet report, nearly 545 million of world population (7.4% of world's population) suffers from chronic respiratory condition. However, disability remains highest in our part of the world (South Asia), where premature mortality from chronic respiratory diseases is highest! Risk factors for men include air pollution, cigarette and sheesha smoking causing rise in COPD cases. Amongst women, exceptions exist, as household air pollution from solid fuels and ambient particulate matter are the were the leading cause. Genetics also play a part in diseases like asthma, sarcoidosis, interstitial lung diseases. However, certain lifestyle and behavioral modifications can overcome genetic and environmental factors improving the morbidity. Therefore, a firm understanding of the respiratory system is very important for undergraduate students so that they can manage these diseases in clinical settings reducing disease burden in society.

This module focuses on respiratory system along with knowledge of Bioenergetics and Biological Oxidation and

Vita,min. Content of 'Gross Anatomy of thorax, development of body cavities and diaphragm" will be taught in block-II. However, revisit of thorax (lungs pleura and respiratory movements) is included in this block for integration with physiology

The research methodology, Behavioral Sciences & Professionalism will be taught as a part of the longitudinal theme.

Apart from attending daily scheduled sessions, students should engage in self-directed learning to achieve the desired objectives

Learning Outcomes:

At the end of this module, student will be able to integrate the basic knowledge of respiratory system and relate it with its clinical aspects which helps them to practice clinically in the subsequent years

List of Proposed Themes for integrated sessions (at least one/week)

Theme
Cough
Dyspnoea
Hemoptysis
Fever with cough

ANATOMY				
Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
HISTOLOGY				
Histology of Respiratory system	<ul style="list-style-type: none"> Recognize the light microscopic features of different parts of respiratory system. Correlate the microscopic structure of respiratory system with its function and dysfunction. 	<ul style="list-style-type: none"> Enumerate cells comprising respiratory epithelium. Differentiate between the light microscopic structure of conducting and gas exchange portion of respiratory system. Relate progressive structural modifications of wall of respiratory tract (from trachea down to alveoli) with its function Describe the components of respiratory membrane, the role of type-II alveolar cells in surfactant production and respiratory distress syndrome. Explain the histological basis of immotile cilia syndrome. Identify the role of interalveolar septa in preventing alveolar collapse. Describe histological basis of hemoptysis in cardiac failure. <p>Skill:</p> <ul style="list-style-type: none"> Illustrate histological structure of different parts of respiratory system Give two points of identification of each part on slide. 	LGIS, Practical	MCQs, SAQs, SEQs OSPE, Viva voce
EMBRYOLOGY				

Development of Respiratory system	Correlate the development of respiratory system with its congenital anomalies.	<ul style="list-style-type: none"> Describe the development of trachea. Correlate the various types of tracheoesophageal fistulae with their embryological basis & justify their relationship with polyhydramnios. Explain different stages of lung maturation. Enumerate factors important for normal lung development Explain embryological basis and prevention of respiratory distress syndrome in a premature infant. 	LGIS	MCQs/SAQs /SEQs/Viva voce/ OSPE
Development of vertebral column, ribs, and sternum	Correlate the development of vertebral column, ribs and sternum with their related congenital anomalies	<ul style="list-style-type: none"> Describe the development of vertebral column, ribs, and sternum. Explain the embryological basis of Vertebral defects (Klippel-Feil Syndrome, Spina bifida, Chordoma, variations in number of vertebrae, Hemivertebrae, Rachischisis), Rib defects (Accessory ribs, Fused ribs, Cervical rib) and Defects of sternum 	LGIS	MCQs/SAQs /SEQs/Viva voce/ OSPE
Gross Anatomy				
Recap of gross anatomy of lungs, pleura and respiratory movements				
List of Practicals <ol style="list-style-type: none"> Trachea Lungs 				

PHYSIOLOGY				
Topic	Learning Outcomes	Learning Objectives/Contents	Instructional Strategies	Assessment tools
Introduction to respiratory system	<ul style="list-style-type: none"> Correlate the anatomy of respiratory tract with its functions Appreciate the role of conductive and gas exchange zones of lungs 	<ul style="list-style-type: none"> Understand the functional anatomy of respiratory tract Discuss the functions of various parts of respiratory system Highlight the non-respiratory functions of respiratory tract Understand the functions of nose 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva
Pulmonary mechanics -I	<ul style="list-style-type: none"> Analyze the mechanics of respiration Analyze lung volume and pressure changes during quiet and forceful breathing 	<ul style="list-style-type: none"> Discuss the variations in pleural and alveolar pressure causing inspiration and expiration Draw the graphical changes in alveolar + intrapleural + transpulmonary pressure taking place during respiration 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva
Pulmonary mechanics -II		<ul style="list-style-type: none"> Enlist the major and accessory muscles of respiration Discuss the role of respiratory muscles during quiet and forceful respiration. 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva
Pulmonary compliance	<ul style="list-style-type: none"> Explain factors determining pulmonary compliance, lung volumes, lung capacities and pulmonary capillary dynamics 	<ul style="list-style-type: none"> Explain the factors involved in keeping lungs and chest wall compliant Appreciate the role of surfactant in minimizing alveolar fluid surface tension and preventing collapse of lungs 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva

		<ul style="list-style-type: none"> • Discuss pathophysiology of respiratory distress syndrome in infants • Understand the concept of work of breathing 		
Lung volumes and capacities		<ul style="list-style-type: none"> • Enlist and derive the normal lung volumes/capacities • Understand the concept of static v/s dynamic lung volumes/capacities • Draw and explain the normal spirogram 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva
Pulmonary capillary dynamics		<ul style="list-style-type: none"> • Discuss the Starling forces that govern the dynamics of fluid exchange across lung capillary membranes 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva
Dead space and alveolar ventilation	<ul style="list-style-type: none"> • Explain factors determining dead space and alveolar ventilation 	<ul style="list-style-type: none"> • Grasp concept of dead space and alveolar ventilation • Discuss effect of dead space on alveolar ventilation 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva
Nervous regulation of respiration	<ul style="list-style-type: none"> • Compare the chemical and neural regulation of respiration during rest and exercise • Correlate ventilation with perfusion in different lung zones 	<ul style="list-style-type: none"> • Study different group of neurons composing respiratory center • Understand the control of inspiratory Ramp signal and respiratory rhythm through these centers. • Discuss the role of pneumotaxic center in respiration • Draw the reflex pathway of hering-breuer inflation reflex 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva
Chemical regulation of respiration		<ul style="list-style-type: none"> • Differentiate between the peripheral and central chemoreceptors & their stimulation by changes in PO₂, PCO₂ and H⁺ 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva

V_A/Q ratio-I		<ul style="list-style-type: none"> Describe two causes of abnormal V/Q distribution. Define anatomic and physiological shunts, and physiologic dead space (wasted ventilation). Describe the consequences of each for pulmonary gas exchange 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva
Pulmonary blood flow		<ul style="list-style-type: none"> Differentiate between pulmonary & systemic circulation Study the pulmonary blood flow and effect of hydrostatic pressure on it Discuss the 3 zones of pulmonary blood flow 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva
Gas Laws + Respiratory membrane and Factors affecting diffusion of gases	Compare the different modes of gas transport in blood	<ul style="list-style-type: none"> Explain concept of partial pressure gradients and their effect on gas exchange Evaluate the effects of Fick's law, Boyle's law, Dalton's law and Henry's law on gas exchange Know the differences in partial pressures of alveolar and atmospheric air Understand the renewal of alveolar air by atmospheric air Study the layers of respiratory membrane Differentiate between diffusing capacities of various gases through respiratory membrane based on their sizes, concentration gradients and solubility coefficients. 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva

		<ul style="list-style-type: none"> • Discuss the factors affecting gas diffusion through respiratory membrane 		
Oxygen transport-I		<ul style="list-style-type: none"> • Discuss the effect of difference in partial pressures governing the oxygen diffusion from alveoli to blood and tissues 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva
Oxygen transport-II		<ul style="list-style-type: none"> • Discuss the role of Hemoglobin in oxygen transport • Draw the normal oxygen-hemoglobin dissociation curve and discuss how different affinities of Hb at different partial pressures of oxygen result in sigmoid shape curve • Elaborate the factors that shift oxygen-hemoglobin dissociation curve 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva
Carbon dioxide transport I + II		<ul style="list-style-type: none"> • Identify the various chemical forms in which CO₂ is transported in blood as carbaminohemoglobin, dissolved and in bicarbonate form • Study the normal CO₂ dissociation curve • Explain the concept of Haldane effect, Bohr effect + chloride shift 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva
Abnormal breathing patterns	Distinguish between various respiratory abnormalities	<ul style="list-style-type: none"> • Identify and discuss different factors causing abnormal breathing (irritants, brain edema, anesthesia) • Explain the pathophysiology of Cheyne-Stokes breathing • Discuss sleep apnea 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva

Fluid in pleural cavity		<ul style="list-style-type: none"> • Understand mechanism of development of pulmonary edema and pleural effusion • Discuss edema safety factors • Classify edema based on its various causes and discuss its pathophysiology 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva
Restrictive lung diseases	Differentiate between Restrictive and Obstructive lung diseases on physiological background	<ul style="list-style-type: none"> • Discuss Basic respiratory abnormality, effect on lung volumes & capacity • Compare physiological differences between Restrictive and Obstructive lung diseases 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva
Obstructive lung diseases		<ul style="list-style-type: none"> • Discuss Basic respiratory abnormality, effect on lung volumes & capacity • Compare physiological differences between Restrictive and Obstructive lung diseases 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva
Hypoxia + Hyperbaric oxygen therapy	Describe Hypoxia + Hyperbaric oxygen therapy	<ul style="list-style-type: none"> • Classify hypoxia based on etiology into hypoxic, stagnant, anemic and histotoxic types. • Discuss the effects of hypoxia on the body • Correlate the significance of oxygen therapy in different types of hypoxia with their etiology • Understand the working and clinical/therapeutic use of this therapy 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva
Practicals	Examine respiratory system on an SP in a proper sequence of inspection, palpation, percussion and auscultation	Examine respiratory system on an SP in a proper sequence of inspection, palpation, percussion and auscultation	Practical	OSPE/ ATP

Study the spirometer and operate the instrument	Identify parts of Spirometer and its uses	Practical	OSPE/ ATP
Record of Tidal Volume, Inspiratory Reserve Volume and Expiratory reserve volume by using Student's spirometer and kymograph, and label it.	<ul style="list-style-type: none"> Record Tidal Volume, Inspiratory Reserve volume, and Expiratory reserve volume, vital capacity by using Student's spirometer and Kymograph and label it 	Practical	OSPE/ ATP
Record the forced expiratory volume by using Student's Spirogram	<ul style="list-style-type: none"> Record the forced expiratory Volume by using Student's spirometer and Kymograph and label it Calculate & interpret the FEV₁/FVC ratio 	Practical	OSPE/ ATP
Measure Peak Expiratory Flow Rate (PEFR) and report the reading	Measure Peak Expiratory Flow Rate (PEFR) by Wright's peak expiratory flow meter	Practical	OSPE/ ATP
To analyze respiratory acidosis and respiratory alkalosis with the help of Arterial Blood Gases (ABG) report	Interpret ABG reports to diagnose respiratory acidosis and respiratory alkalosis	Practical	OSPE/ ATP

BIOCHEMISTRY

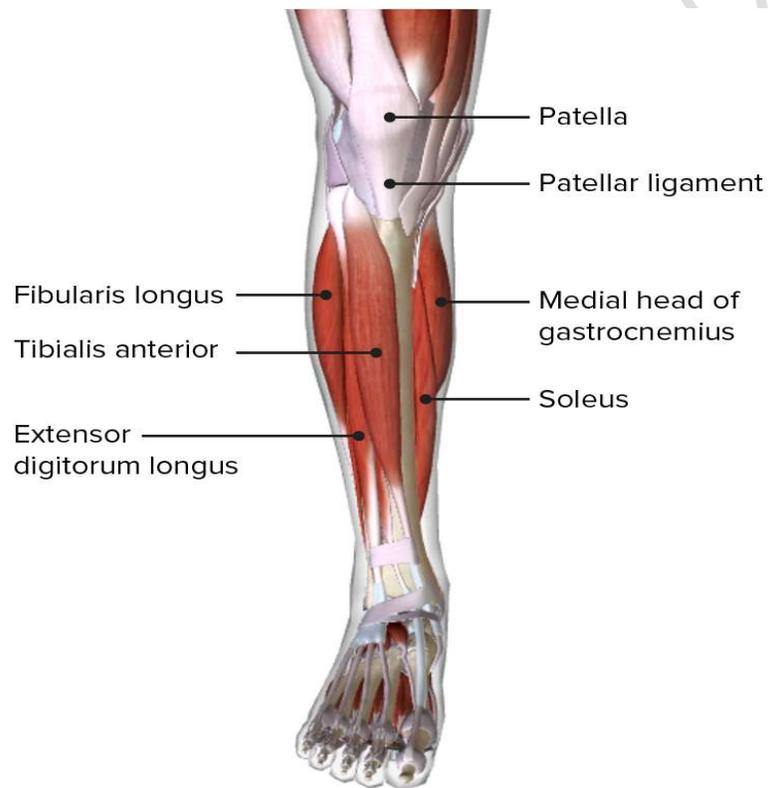
Topic/ Theme	Learning Outcomes	Learning Objectives/Contents	Instructional Strategies	Assessment tools
Bioenergetics and Biological Oxidation	Justify the role of ATP and energy metabolism in health and disease	<ul style="list-style-type: none"> • Discuss Free energy, Free energy change, standard energy change, Endergonic and exergonic reactions and ATP • Describe electron transport chain and its components, organization, reactions, energetics • Phosphorylation of ADP to ATP • Chemiosmotic hypothesis • Membrane transport systems • Inherited defects in OXPHOS • Mitochondria & apoptosis • Describe inhibitors of ETC and inhibitors/Uncouplers of oxidative phosphorylation 	Lectures/ SGD CBLs	MCQ SAQ/SEQ
Vitamins	Relate the knowledge of water soluble and fat soluble vitamins for understanding of its deficiency and excess manifestations	<ul style="list-style-type: none"> • Classify various types of vitamins • Discuss chemistry, sources, biochemical functions, daily allowance, deficiency manifestations and toxicity of water soluble vitamins (Vitamin C & B complex) • Discuss chemistry, sources, biochemical functions, daily allowance, deficiency manifestations and hypervitaminosis of fat soluble vitamins (vitamin A, D, E & K) 	Lecture/ SGD/ CBL	MCQ/ SAQ/ SEQ
Practicals	Estimate Ascorbic acid in orange juice by titration	Estimation of Ascorbic acid in orange juice by titration.	Practical	OSPE

Medicine

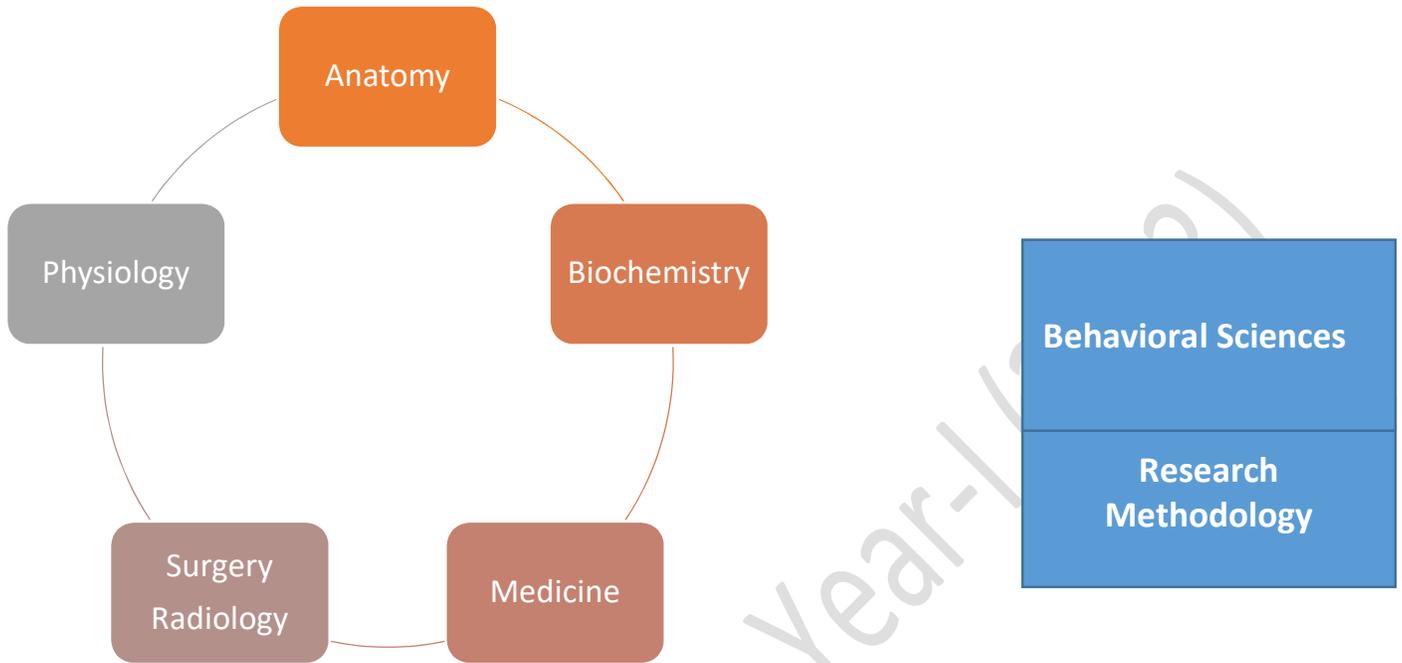
Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
Asthma	Identify clinical presentation of asthma	Respiratory Disease	Lectures/SGD/CBL/ Patient/ video clips	Formative assessment
COPD	Correlate Obstructive Airway Disease with Clinical Manifestations	Obstructive Airway Disease	Lectures/SGD/CBL/ Patient/ video clips	Formative assessment
Restrictive Lung Disease/interstitial lung diseases	Correlate Restrictive Lung Disease with Clinical manifestation (dyspnea)	Restrictive Lung Disease:	Lectures/SGD/CBL/ Patient/ video clips	Formative assessment

Surgery				
Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
Thoracic trauma in general	<ol style="list-style-type: none"> 1. Apply knowledge of anatomy to understand clinical findings in patients presenting with thoracic trauma and other thoracic surgical problems 2. Describe principles of chest intubation in treatment of thoracic injuries 	<ol style="list-style-type: none"> 1. Interpret various clinical findings on chest examination in patients presenting with thoracic trauma 2. Describe and interpret clinical findings on chest examination in various thoracic surgical problems other than trauma 3. Describe principles of chest intubation in treatment of thoracic injuries 	Lectures/SGD/CBL	MCQ
Surgical aspect of various diseases related to chest wall and contents of thoracic cavity- an overview		<ol style="list-style-type: none"> 1. Apply knowledge of anatomy to understand effects of trauma to different organs of thorax 2. Explain surgical aspect of various diseases of chest wall, lungs and pleura 3. Appraise signs of different mediastinal diseases in light of regional anatomy 	Lectures/SGD/CBL	
Radiological aspect of different diseases of chest	<ol style="list-style-type: none"> 1. Identify normal features of soft and bony tissues of thorax on chest X-rays 2. Interpret findings related to various chest diseases of chest including trauma on chest X-rays 	Xray Chest	Lectures/SGD/CBL	

MBBS YEAR I
BLOCK III
MODULE VII
MUSCULOSKELETAL SYSTEM – II
Duration: 05 weeks



Integration of Disciplines in Module VII



MODULE PLANNING COMMITTEE

Module Coordinator	<i>To be filled by the institutes</i>
Members	

Preamble

The locomotor system is responsible for locomotion, support and protection to the human body. This system consists of osteology (the study of bones), arthrology (the study of joints), and myology (the study of muscles) of lower limb

Apart from attending daily scheduled sessions, students should engage in self-directed learning to achieve the desired objectives

Learning Outcomes

By the end of this module, student should be able to apply the knowledge of gross and developmental anatomy of bones, joints, muscles and neurovascular bundle of lower limb in interpreting the basis of common relevant clinical conditions

List of Proposed Themes for integrated sessions (at least one/week)

Theme
Waddling Gait
Swollen knee joint
Foot drop
Numbness in leg

Embryology				
TOPIC/THEME	LEARNING OUTCOMES	COURSE CONTENT/LEARNING OBJECTIVES	MIT	ASSESSMENT TOOLS
Development of limbs	Correlate the development of limbs with the related congenital anomalies	<ul style="list-style-type: none"> • Describe the events in the development of limbs • Identify teratogens causing limb defects • Explain the embryological basis of following Limb Defects: <ul style="list-style-type: none"> ○ Amelia, ○ Meromelia, ○ Phocomelia ○ Micromelia ○ Micromelia ○ Syndactyly, ○ Brachydactyly, ○ Polydactyly, ○ Ectrodactyly ○ Cleft hand & foot ○ Osteogenesis imperfecta ○ Marfan syndrome ○ Congenital absence of radius, ○ Amniotic bands ○ Transverse limb deficiencies ○ Congenital hip dislocation ○ Club foot ○ Clinical significance of ossification centers in determining the bone age 	LGIS	MCQ/SEQ/OSPE/ VIVA VOCE

Development of muscles	Correlate the development of muscles with its anomalies	<ul style="list-style-type: none"> • Explain the development of skeletal, cardiac, and smooth muscles • Describe the patterning of muscles • Describe the embryological basis of various types of congenital anomalies (Poland sequence, Prune belly syndrome, muscular dystrophy) 	LGIS	MCQ/SEQ/OSPE/ VIVA VOCE
Birth defects	Identify the congenital malformations associated with various common teratogens	<ul style="list-style-type: none"> • Enlist the congenital malformations associated with the following teratogens: <ul style="list-style-type: none"> ○ Infectious agents (Rubella virus, cytomegalovirus, herpes simplex virus, varicella virus) ○ Physical agents (X-Rays, hyperthermia) ○ Chemical agents (Thalidomide, phenytoin, opioids, warfarin, ACE inhibitors, Alcohol, Vitamin A) ○ Hormones (Androgenic Agents, DES, Maternal diabetes, Maternal obesity) 	LGIS	MCQ/SEQ/OSPE/ VIVA VOCE

Hip bone, femur Tibia, fibula Patella	Appraise the topographic orientation of major bones of lower limb, their attachments and their articulations.	<ul style="list-style-type: none"> • Demonstrate the anatomical position of hip bone, femur, tibia fibula & patella. • Determine side of bone. • Identify important bony landmarks and attachments of hip bone, Femur, tibia and fibula on gross inspection and radiographs. • Appraise the importance of blood supply of head of femur in relation to age related complications of fractures of femoral neck. 	SGD	MCQ/SEQ/OSPE/ VIVA VOCE
Hip joint	Apply anatomical knowledge of hip joint in various clinical scenarios.	<ul style="list-style-type: none"> • Describe the articular surfaces, types, capsule, ligaments, synovial membrane, nerve supply, blood supply and important relations of hip joint • Analyze movements of hip joint (muscles responsible for these movements, axis of movements, limiting factors) 	SGD/CBL	
Fascia of lower limb	Correlate the attachments, and modifications superficial & deep fascia of lower limb with their clinical significance	<ul style="list-style-type: none"> • Trace the lining of fascia Lata on the skeleton highlighting muscles enclosed and saphenous opening. • Describe the formation, extent & importance of iliotibial tract. 	SGD	MCQ/SEQ/OSPE/ VIVA VOCE
Gluteal region	Correlate the topographic anatomy of muscles and neurovascular structures of Gluteal region with	<ul style="list-style-type: none"> • Demonstrate the major functions of muscles of gluteal region. • Describe formation of greater and lesser sciatic foramina and enumerate 	SGD/CBL	MCQ/SEQ/OSPE/ VIVA VOCE

	their clinical conditions.	<p>structures passing through them.</p> <ul style="list-style-type: none"> Enumerate the nerves entering gluteal region and comprehend the origin, important relations & muscles innervated by each. Describe the effects of injury to superior, inferior gluteal and sciatic nerves with emphasis on various gaits Enumerate structures deep to gluteus Maximus. Locate appropriate site of intragluteal injection with anatomical reasoning 		
Thigh	Correlate the muscular and neurovascular contents of all compartments of thigh with relevant clinical scenarios.	<ul style="list-style-type: none"> Explain the contents of all fascial compartment of thigh (muscles, neurovascular bundle, lymph nodes) Describe the extent, boundaries, & contents of adductor canal. Distinguish different swellings in front of thigh (inflamed lymph nodes, femoral hernia, inguinal hernia) Appraise the precautionary measures in development of femoral hernia. Describe the functions of muscles of thigh to understand the displacement of fragments of fractured femoral neck 	SGD/CBL	

Femoral triangle	Correlate the gross anatomy of femoral triangle and femoral sheath with its clinical significance	<ul style="list-style-type: none"> • Recognize the topography and contents of femoral triangle in a sequential order • Describe division of femoral sheath into different compartments while naming their contents • Relate anatomical knowledge of Femoral canal and femoral ring with femoral hernia. • Justify anatomical basis of presence of femoral nerve outside the femoral sheath. • Describe the area of drainage of different groups of inguinal lymph nodes. 		
Popliteal fossa	Explain the location, boundaries & contents of popliteal fossa	<ul style="list-style-type: none"> • List the structures forming various boundaries of popliteal fossa. • Identify the contents of popliteal fossa in a sequential order • Illustrate the genicular anastomosis 	SGD/CBL	MCQ/SEQ/OSPE/ VIVA VOCE
Knee joint	Relate the gross anatomical knowledge of knee joint to relevant injuries	<ul style="list-style-type: none"> • Describe the type, articular surfaces, capsule, ligaments (intra- & extra- articular), synovial membrane, nerve supply, blood supply, important relations of knee joint. • Demonstrate various movements of knee joint (axes, limiting factors and muscles involved). • Explain mechanism of locking and unlocking of 	SGD/CBL	MCQ/SEQ/OSPE/ VIVA VOCE

		<p>knee joint while foot is off or on the ground.</p> <ul style="list-style-type: none"> • Correlate various types of bursae (communicating and non-communicating bursae) to their clinical significance. • Identify the role of vastus medialis in stability of patella. • Explain various meniscal injuries • Explain the structure and mechanism of knee joint movements 		
Leg	Apply the knowledge of gross anatomy of leg in analyzing relevant clinical scenarios	<ul style="list-style-type: none"> • Describe the contents of three fascial compartment of leg (muscles, neurovascular bundle, lymph nodes) • Justify the role of soleus as peripheral heart with anatomical reasoning • Justify various clinical presentations in injury to lateral side of knee joint (e.g. fracture of neck of fibula) 	SGD/CBL	MCQ/SEQ/OSPE/ VIVA VOCE
Ankle joint	Correlate the anatomical knowledge of ankle joint with relevant ankle injuries	<ul style="list-style-type: none"> • Describe the articular surfaces, type, capsule, ligaments, synovial membrane, nerve supply, blood supply of ankle joint • Elucidate the various movements of the joint (axes, limiting factors and muscles involved). • Explain important relations of ankle joint with emphasis 	SGD/CBL	MCQ/SEQ/OSPE/ VIVA VOCE

		<p>on structures related to various retinacula.</p> <ul style="list-style-type: none"> Justify the sensory /motor loss associated with tibial nerve entrapment in tarsal tunnel syndrome. Describe the anatomical basis of ankle sprain. Identify the arrangement of tendons, arteries, and nerves in the region of ankle joint (in relation to retinacula of ankle) in the given model/ prosected specimen. 		
Foot	Correlate the anatomical knowledge of foot with its clinical significance	<ul style="list-style-type: none"> Explain the topographic anatomy of dorsum of foot. Explain various layers of sole of foot in a sequence Describe the arches of foot Describe the mechanism of inversion and eversion of foot. 		
Cutaneous innervation of lower limb	Correlate the knowledge of dermatomes of lower limb to sensory loss.	<ul style="list-style-type: none"> Describe the cutaneous nerves of lower limb. Illustrate the cutaneous nerves/dermatomes of lower limb Justify the sensory loss in various nerve injuries of lower limb with focus on cutaneous innervation. 	SGD	MCQ/SEQ/OSPE/ VIVA VOCE
Nerves & plexuses of lower limb	Correlate the distribution of lower limb nerves with effects of relevant nerve injuries.	<ul style="list-style-type: none"> Outline the location and formation of lumbar and sacral plexus. List branches of plexuses innervating lower limb 	SGD	MCQ/SEQ/OSPE/ VIVA VOCE

		<ul style="list-style-type: none"> • Illustrate lumbar & sacral plexus. • Interpret the clinical presentation of various nerve injuries (sciatic, femoral, obturator, common peroneal, superior gluteal, inferior gluteal) • Correlate the lower limb nerve injuries to common fractures. 		
Arterial supply of lower limb	Correlate the blood supply of lower limb with effects of occlusion or damage.	<ul style="list-style-type: none"> • Describe the origin, relations, and main branches of arteries (Femoral, gluteal, and Obturator) with their area of distribution. • List the vessels participating in trochanteric and cruciate anastomosis with clinical significance of these anastomoses. 	SGD	MCQ/SEQ/OSPE/ VIVA VOCE
Venous drainage of lower limb	Correlate the anatomical knowledge of superficial & deep veins of lower limb with their surgical significance.	<ul style="list-style-type: none"> • Describe the venous drainage of lower limb (superficial and deep veins) • Describe the formation, course, tributaries, and termination of great and small saphenous veins. • Explain a case of varicose veins with emphasis on predisposing factors, causes, clinical presentations, role of valves and perforators) • Describe the importance of great saphenous vein in CABG. 	SGD	MCQ/SEQ/OSPE/ VIVA VOCE

Lymphatic drainage of lower limb	Appreciate the clinical importance of lymphatics in lower limb	<ul style="list-style-type: none"> Apply the knowledge of lymphatic drainage of lower limb to locate the site of infection or malignancy. 	SGD	MCQ/SEQ/VIVA
Prosected Specimens/ Models	Demonstrate gross anatomical features of lower limb on the models & prosected specimens	Skill: <ul style="list-style-type: none"> Identify muscles & neurovascular structures of lower limb on the give models & prosected specimen. 	SGD	OSPE
Surface marking	Locate the site of deeply placed structures of lower limb on skin.	Attitude: <ul style="list-style-type: none"> Mark the nerves and vessels of lower limb on the surface of given subject with the help of important bony landmarks exhibiting effective communication skills, professionalism & ethics. 	SGD	OSPE

PHYSIOLOGY				
Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
Exercise physiology-I	Summarize the respiratory and cardiovascular adjustments in body during exercise	<ul style="list-style-type: none"> Correlate the various muscle metabolic systems used as energy substrates with the type of exercise i.e. aerobic and anaerobic. Explain how each of the following can alter exercise performance: types of exercise, muscle fatigue, VO₂max, anaerobic threshold, gender, and age Discuss concept of oxygen debt. 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva
Effect of exercise on respiration and cardiovascular system		<ul style="list-style-type: none"> Explain oxygen consumption and pulmonary ventilation during exercise Discuss the respiratory changes and body's regulation of respiration during exercise 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva
Acclimatization at high altitude	Discern the respiratory adjustment at high altitude, in deep sea and space and analyze various maladjustments in unusual environment	<ul style="list-style-type: none"> Understand the mechanism of acclimatization of the body to low O₂ Identify and explain the causes of natural acclimatization in natives of High altitude Study the principles of acclimatization 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva

Hazards of high altitude/AMS & CMS	<ul style="list-style-type: none"> • Explain the change in composition of air at high altitude and the effects of low oxygen pressure on the body • Discuss the change of alveolar PO₂ at different elevations • Explain the causes & clinical features of Acute Mountain Sickness, High Altitude Pulmonary Edema, & High Altitude Cerebral Edema • Identify various treatment modalities for AMS/HAPE/HACE 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva
Space physiology	<ul style="list-style-type: none"> • Differentiate between positive and negative “G” • Discuss the effects of acceleratory forces on body in space 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva
Deep sea Physiology-I	<ul style="list-style-type: none"> • Discuss pressure changes in sea depth • Discuss O₂ and CO₂ toxicity occurring at high pressures in sea depth 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva
Deep sea physiology-II	<ul style="list-style-type: none"> • Discuss the pathophysiology, effects and treatment of Caisson’s disease • Understand the functioning of SCUBA 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva
Artificial Respiration	<ul style="list-style-type: none"> • Identify mechanisms/types of artificial respiration • Understand the therapeutic indications of putting a person on ventilator • Get an overview of ventilator settings 	Lectures/ SGD/ CBL	MCQ/SAQ/ structured viva

BIOCHEMISTRY				
Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
Mineral & Trace Elements	Apply the basic knowledge of minerals for understanding their related disorders	<ul style="list-style-type: none"> ➤ Classify minerals ➤ Write down the sources, biochemical role and related diseases of Macro minerals (Na, K, Ca, Cl, PO₄, Fluorine, Sulphur) in human body ➤ Write down the sources, biochemical role and related diseases of Micro minerals (Fe, Zn, Mg, Se, I, Cu, Cr, Cd, Mn) 	<ul style="list-style-type: none"> • Lectures • SGD 	MCQ/SAQ/SEQ
Practicals		Serum Electrolyte Analyzer	Practical	OSPE

MEDICINE				
Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
Mountain sickness/ HAPE/HACE	Correlate adaptive mechanisms of high altitude with clinical manifestations	Mountain sickness/ HAPE/HACE	LGIS/ SGD/CBL/ Video clips	Formative assessment
Caisson's disease (Decompression sickness)	Identify clinical presentation of Caisson's disease	Caisson's disease (Decompression sickness)	LGIS/ SGD/CBL/ Video clips	Formative assessment
O₂ therapy in respiratory failure	Comprehend the significance of O ₂ therapy in respiratory failure	O ₂ therapy in respiratory failure	LGIS/ SGD/CBL/ Video clips	Formative assessment
Poliomyelitis & Gullain Barrie syndrome	Recognize Poliomyelitis & Gullain Barrie syndrome	Introduction to Poliomyelitis & Gullain Barrie syndrome	LGIS/ SGD/CBL/ Video clips	Formative assessment
Duchenne muscular dystrophy/ Becker's muscular dystrophy	Recognize Duchenne muscular dystrophy/ Becker's muscular dystrophy	Introduction to Duchenne muscular dystrophy/ Becker's muscular dystrophy	LGIS/ SGD/CBL/ Video clips	Formative assessment
Gout	Identify clinical presentation of Gout	Gout	LGIS/ SGD/CBL/ Video clips	Formative assessment

<u>Surgery</u>				
Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
Fractures and dislocations of lower limb	Identify & relate clinical presentation of different fractures/dislocations of lower limb with anatomical knowledge	a. Describe the definitions of fractures, dislocation and sprain b. Identify various causes of fractures, dislocations and sprains c. Enlist different types of fractures, dislocations in lower limb d. Identify effects of fractures, dislocations and sprains in lower limb e. List complications of fractures, dislocations in general f. Correlate different fractures of lower limb with nerve & vascular injuries g. Identify common sites of dislocations/ sprains in lower limb h. State first-aid principles of fracture / dislocations management	LGIS/ SGD/CBL	Formative assessment
Radiology	Correlate skeletal framework of lower limb with its radiological appearance	a. Enumerate the commonly used imaging techniques used in clinical practice to diagnose fractures, dislocations & sprains in lower limb b. Explain the basic principles of different densities on X-rays	LGIS/ SGD/CBL	OSPE

		<ul style="list-style-type: none"> c. Identify appearance of bone, cartilage, air, fluid and fat on x-rays d. Identify different bones of lower limb on Ap and Lateral view of X-rays e. Identify fractures , dislocations and sprains in lower limb injuries and correlate with likely important nerve and vessels damage 		
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MBBS Curriculum Year-I (2023)

Research Methodology
Course Outline
Block-I

Blocks	Topic/ Theme	Learning Outcomes	Learning Objectives/Contents	Instructional strategies	Assessment Tool
I	Introduction to research	Discuss historical background of research in medicine	Meaning, historical background, introduction to medical research, important terminologies	LGIS/ SGD	MCQ/ SEQ
	Importance of research	Discuss significance of research in medicine	Evidence based practice, application in health sciences	LGIS/ SGD	MCQ/ SEQ
	Introduction to research process	Explain the process and requirements of a good research for a doctor	Overview of process of research, characteristics of a good research, qualities of a good researcher	LGIS/ SGD	MCQ/ SEQ
	Types of research	Classify different types of research and its applications	Basic and applied; quantitative and qualitative, observational and interventional studies	LGIS/ SGD	MCQ/ SEQ
II	Research problem and a good research question	Able to identify research problem. Formulate a good research question	Identification of research problem. Criteria of selection of research topic	LGIS/ SGD	MCQ/ SEQ
	Title rationale & objectives of the study	Able to justify the research study title with reference to objectives	Characteristic of a good title & Justification of topic Formulation of SMART research objectives.	LGIS/ Group assignment	MCQ/ SEQ
	Introduction of variable and data	Identify different types of data and variables	Data types Define and identify different types of Qualitative and Quantitative variables. Independent and dependent variables	LGIS/ Group assignment	MCQ/ SEQ
III	Literature Review	Able to search scientific literature related to the chosen topic from medical data basis and digital library/ from internet/ library	Purpose and types of literature medical literature (original study. Case study systematic review, Meta-analysis);	LGIS/ Group assignment	MCQ/ SEQ

			<p>Sources of information Libraries - provide access to many types of resources</p> <ul style="list-style-type: none"> • Internet / Databases • Books <p>Journals /Conference proceedings</p>		
	Literature search	Perform scientific literature search on selected topic by using different technique/ methods.	<p>Search techniques, use of keywords, Boolean searching</p> <ul style="list-style-type: none"> • Understand the steps in conducting a systematic review • Develop an answerable question using the “Participants Interventions Comparisons Outcomes” (PICO) framework • Interpret the results of meta-analyses 	LGIS/ Group assignment	MCQ/ SEQ
	Operational definition Hypothesis	Formulate operational definition and research hypothesis	<p>Formulation of operational definition of impotent variables. Types of research hypothesis</p>	LGIS/ SGD	MCQ/ SEQ

Islamic Studies



Course Content of Islamiat

NATIONAL UNIVERSITY OF MEDICAL SCIENCES

خاکہ مجوزہ نصاب اسلامیات لازمی

(MBBS/BDS)

Periods	Chapter / Topic	S/N
Chapter 1	ترجمہ و تشریح قرآنی آیات (Selected Verses from Quran)	
	ا۔ اولاد کو ناحق قتل کرنے سے ممانعت (لا تقتلوا اولادکم خشية املاق.... (سورة الاسراء: 31)	1
	ب۔ منشیات سے بچنے کا حکم (انما الخمر والميسر والانساب والازلامرجس۔ (سورة المائدہ: 91)	2
	ج۔ پردہ پوشی کی اہمیت (يا ايها النبي قل لازواجك وبناتك..... (سورة الاحزاب: 59)	3
	د۔ معاشرہ کی اصلاح (سورة الحجرات کمل (18 آیات) تمام اخلاقی، اصلاحی عنوانات)	4
	ہ۔ مریض کے روزے کا حکم (ومن كان منكم مريضا..... (سورة البقرة: 184، 185)	5
	و۔ تخلیق انسانی کی وضاحت	6
	(i) هو الذي خلقكم من تراب ثم من نطفة ثم من علقه... (سورة غافر: 68)	
	(ii) ولقد خلقنا الانسان من سلاله من طين..... سورة المؤمنون: 12 تا 14)	
	ز۔ مسلم سائنسدانوں کی سائنس اور میڈیسن کے لیے خدمات (انسائیکلو پیڈیا آف مسلم سائنٹسٹس)	7
Chapter 2	منتخب احادیث ترجمہ و تشریح (Selected Ahadees)	
	ا۔ قرآن سے تعلق (کتاب فضائل القرآن از مشکوٰۃ المصابیح ص 183، الفصل الاول کی تین احادیث)	8
	ب۔ ایمان اور اسلام (کتاب الایمان از مشکوٰۃ المصابیح ص 11، الفصل الاول کی تین احادیث)	9
	ج۔ صحت اور فراغت کی اہمیت (مصنف ابن ابی شیبہ کی حدیث، پانچ باتوں سے قبل غنیمت جانو۔۔۔۔۔)	10
	د۔ حسن اخلاق (کتاب الآداب از مشکوٰۃ المصابیح ص 397، باب الرفق والحياء وحسن خلق کی تین احادیث)	11
	ہ۔ خوش کامی (کتاب الآداب از مشکوٰۃ المصابیح ص 429، باب الخذر والتانی فی الامور کی تین احادیث)	12
	و۔ مریض کی عیادت (مشکوٰۃ المصابیح، باب عیادة المریض وثواب المرض ص 133 کی تین احادیث)	13
	ز۔ اسلام میں بیماری کا تصور (مشکوٰۃ المصابیح، باب عیادة المریض وثواب المرض ص 133 کی تین احادیث)	14
	ح۔ ناک میں دوا ڈالنا (الفقه علی المذاهب الرابع ذاکر محمد ضیائی الحق انتز/ 5) دو احادیث)	15
	ط۔ غلط دواؤں سے پرہیز کرنا اور بچانا (باب عیادة المریض متعلقہ دو احادیث)	16
	ی۔ پانی سے بخار کو ٹھنڈا کرنا (مشکوٰۃ المصابیح باب ما یقال عند من حضره الموت) متعلقہ دو احادیث)	17
	ر۔ مریض کے لیے دعا (باب عیادة المریض سے متعلقہ تین احادیث)	18
	ض۔ علاج کے لیے علم کی ضرورت (مشکوٰۃ المصابیح سے کتاب العلم کی متعلقہ تین احادیث)	19

Chapter – 3 Basic Belief of Islam اسلام کے بنیادی عقائد (توحید، رسالت، آخرت)	
	کتاب فیائے اسلامیات سے متعلقہ عنوانات	20
Chapter – 4 Arkan-e-Islam ارکان اسلام (کلمہ، نماز، روزہ، زکوٰۃ، حج)	
	کتاب فیائے اسلامیات سے متعلقہ عنوانات	21
Chapter – 5 علم الاخلاق کی تعریف و اہمیت (ایک سوال)	
	انسان کی صحت و خواص (ایک سوال) مذہب و اخلاق کا تعلق (ایک سوال)	22
Chapter – 6 مقاصد شریعت اور انسانی صحت (جان کی حفاظت)	
	انسانی جان کی حرمت (کتاب فیائے اسلامیات بی۔ ایس لیول کا متعلقہ باب)	23
Chapter – 7 پیشہ طب کی اہمیت اور فضیلت	
	(کتاب مجوزہ نصاب برائے ملحقہ میڈیکل کالجز)	24
Chapter – 8 معالج (ڈاکٹر) کی صفات	
	ا۔ حقوق اللہ اور حقوق العباد کا علم	25
	ب۔ حکمت و دانائی	26
	ت۔ ایثار و ہمدردی	27
	ث۔ ذمہ دارانہ زندگی	28
	ج۔ صبر	29
	ح۔ نرم گفتاری، تواضع، راز کی حفاظت، عفو و درگزر، رحم دلی، احسان، خود مختاری، عہد و پیمان اور مساوات	30
	نوٹ: ہر عنوان پر مشتمل ایک ایک سوال تیار کروایا جائے گا۔ فیائے اسلامیات (لازمی) سے متعلقہ جوابات۔	
Chapter – 9 معالج کا معالج سے تعلق	
	ا۔ نیک کاموں میں تعاون	31
	ب۔ حسد، غیبت، بغض و عناد، امر بالمعروف و نہی عن المنکر، آداب مجلس (کتاب فیائے اسلامیات سے متعلقہ جوابات)	32
Chapter – 10 معالج اور مریض کا تعلق	
	خوش کامی، عیب پوشی، رحم و شفقت، مریض کو تسلی دینا، مریض کی عیادت، مریض کی اخلاقی تربیت (کتاب مجوزہ نصاب سے متعلقہ ابواب سے ایک ایک سوال تیار کروایا جائے گا)	33

Reference Books

کتابی حوالہ جات

1. "Islamyat (Lazmi) for Degree classes" Allama Iqbal Open University, Jadeed Book Depot, Urdu Bazar Lahore.
2. "Islamic Education, BA, B Sc, B. Com, BBA, MBA, Engineering, MBBS, PCS, CSS." By A S Bukhari, MD Zafar, Dr M Yahya etc, Urdu Bazar Lahore.
3. "Islamyat (Lazmi) for Medical Colleges and Affiliated Institutions", Khyber Medical University, Feroz Sons Limited, Lahore, Rawalpindi, Karachi

Syllabus of 'Ethics 'For Non-Muslim Undergraduate Students

Rationale

The subject of 'Ethics' is offered to Non-Muslim undergraduate students in lieu of Islamiyat which is a compulsory subject for all Muslim students. In developing this syllabus, the aims and objectives laid down in the National Education Policy, 2017 has been kept in mind. The proposed topics in the National Curriculum for Ethics are pertinent to the moral dilemmas of everyday life and can be applied to all students studying this subject.

It is extremely significant to introduce the students to the subject of Ethics as it deals with the major aspects of human conduct. It gives the students an insight into the morality of human behaviour in terms of right or wrong and good or evil. This syllabus has been developed to address the major aspect of ethical learning using modern teaching methodologies to discuss and comprehend their relevance and application in their lives and in the society as a whole. It directs the attention of students and teachers to examine how ethical values can guide their actions.

Thus, the syllabus of Ethics is progressive and all inclusive. It covers ethical and moral dilemmas with special reference to the cultural diversity of Pakistan.

Objectives

The specific objectives encompassing the progressive, and all-inclusive syllabus of 'Ethics' are as follows:

1. To build character of the students so as to enable them to play a vital and positive role in the society.
2. To develop a sense of moral reasoning for decision making in life.
3. To equip students with social skills and to bring about a change in their thought and behaviour towards fellow human beings.
4. To develop students as responsible members of society.
5. To understand the importance of religious teachings and their value in social life.
6. To discuss the tenets of professionalism e.g. integrity, accountability, humanism and altruism.
7. To translate human values into practice, through 'role-models'. (Therefore, various outstanding personalities are included in the syllabus.)
8. To promote and practice multi-culturism for global understanding and world peace.

Topic/ Theme	Learning Outcomes At the end of this course, students will be able to:
1. Introduction to Ethics	
Definition and scope	<ul style="list-style-type: none"> • Define ethics; • Discuss the importance of ethics in a society; • Illustrate with examples different ways with which ethics manifests in various disciplines; • Suggest ways in which ethics can be applied in personal, social and public life.

Impact of ethics on Society in general.	<ul style="list-style-type: none"> • Define society; • Discuss some ethical values that should be a part of a society.
Common Beliefs and Values of different Religions	<ul style="list-style-type: none"> • Discuss some of the common basic beliefs of various religions; • Explore the ways to make people realise that all religions have common moral values; • Discuss the importance of inter-faith dialogue in today's society.
Ethics and Science	<ul style="list-style-type: none"> • Elaborate the scientific process (observation, examination, experiment, testing, validation); • Discuss the relationship between ethics and science; • Discuss the ethical & unethical approaches in science. • Discuss the impact of unethical practices in science/research
2. Historical development of Ethics	
Development of ethics from ancient, medieval to modern eras	<ul style="list-style-type: none"> • Explore the origins and development of various ethical eras; • Discuss various theories of ethical and moral development.
Theories and their impact on modern times	Evaluate the various theories and their impact on modern times;
3. Moral Ethics and Society	
Moral Philosophy & ethics education	<ul style="list-style-type: none"> • Discuss the significance and role of ethics in a society; • Identify & explain the elements that can corrupt a society; • Explain how different religions and society interact with each other • Discuss whether a society can survive without ethics.
Justice Bhagwan Das	Critically analyse the life of the mentioned personality for promotion of justice
Emotion, Habit & Social Life	<ul style="list-style-type: none"> • Discuss the virtuous habits and emotions for our moral, social, and political lives; • Compare different approaches to the emotions and moral cultivation from the history of philosophy (emotional intelligence).
Bishop Anthony Lobo	Critically analyse the life of the mentioned personality for promotion of education and social justice.

Social Justice	<ul style="list-style-type: none"> Define social justice and trace its historical background; Discuss the environment, race, gender, and other causes and manifestations of inequality in society; Discuss the rights and duties of individuals in a society.
Abdul Sattar Edhi/Ardeshir Cowasjee (Philanthropist/Businessman)	Critically analyse the life of the mentioned personalities for promotion of social justice.
4. Professional Ethics	
Work Ethics	<ul style="list-style-type: none"> Define work ethics; Exemplify desirable ethical work practices such as honesty, self-respect and self-discipline, punctuality and respecting the rights of others; Demonstrate with examples the importance of time and punctuality in discharging duties at work places; Explain the etiquettes/behaviour patterns at various places of work; Elaborate how organizational ethical environment and performance at work place affect overall
Quaid e Azam Mohammad Ali Jinnah	<ul style="list-style-type: none"> Discuss the personality of our Quaid as an example of personal excellence; Discuss the moral values demonstrated by the illustrious personality.
Professionalism	<ul style="list-style-type: none"> Define professionalism; Discuss the role of professionalism in the field of medicine; Consider various tenets of professionalism and their role in medical education. Define reflection; Critically analyze a case study according to the Gibbs model of reflection.
Mohtarma Fatima Jinnah	<ul style="list-style-type: none"> Explain how the knowledge about the life and commitment of the mentioned personality can promote professional values; Explain how can we learn and adapt in our lives the exemplary behaviour of this personality.
Medical Ethics	<ul style="list-style-type: none"> Define and discuss medical ethics; Discuss the role of medical ethics in the life and career of healthcare professionals; Critically analyze unprofessional behaviour and its implications.
5. Multiculturalism	
Cultural pluralism	<ul style="list-style-type: none"> Define cultural pluralism; Discuss way and means to preserve cultures for identity.

Inter-culturalism	<ul style="list-style-type: none"> • Define inter-culturalism; • Anticipate ways and means for acceptance of multiculturalism in a society; • Discuss the promotion of dialogue and interaction between cultures.
Capt. Cecil Chawdhery	Explore the contribution of this personality as a human rights activist

References

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