



MBBS

Curriculum

Year - I

(2019-20)

National University of Medical Sciences
Pakistan

INTRODUCTION

a. Preamble

Integration has been accepted as an important educational strategy in medical education. The recently revised standards by the Pakistan Medical and Dental Council (PM&DC) encourages integration of major subjects both horizontally and longitudinally. This curriculum meets the standards of Pakistan Medical and Dental Council and our students, on completion of program will develop required competencies as defined worldwide in a graduate doctor.

MBBS Years I & II will deal with the normal structure, function and biochemical aspects of human body which is delivered in an integrated manner in clinical context. Early Clinical Exposure will be ensured by interspersed sessions throughout the curriculum, wherein the students will learn via discussing real life scenarios which they will encounter in clinical settings. This curriculum also aims to improve different skills of the future doctors including communication, leadership & management and research skills and inculcate ethical values and professionalism

This curriculum has been developed by the faculty of basic and clinical sciences from constituent/affiliated colleges in collaboration with NUMS Academic Directorate

b. Curriculum perspective

NUMS curriculum is evolved taking into consideration Constructivist, Cognitivist, behaviorist with some element of Constructivist 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.

c. Level of integration: The 'complementary' approach which is both subject-based and integrated teaching will be used. The integrated sessions will represent a major feature of the curriculum

d. Competencies The focus of this curriculum is on the roles of a general physician as identified in the can MEDS. These are Medical Expert, Manager, Communicator, Health Advocate, Collaborator, Professional and Scholar. Competencies focused in year I and II are: -

- 1) Medical Knowledge
- 2) Problem solving
- 3) Procedural skills
- 4) Communication skills
- 5) Empathy
- 6) Professionalism
- 7) Leadership and Management skills
- 8) Research skills

e. Outcomes

By the end of first year, students should be able to:

- 1) Correlate the developmental and anatomical knowledge of cell, hematology, immunology, nerve, muscle, bone, cardiovascular and respiratory systems to their physiological and biochemical basis.
- 2) Perform basic examination skills related to basic concepts addressed
- 3) Apply the fundamental concepts to improve interpersonal communication
- 4) Use principles of effective learning for metacognition being a self-learner
- 5) Appraise the value of historical development regarding illness from ancient times to the present.
- 6) Develop the basic tenets of leadership and team work
- 7) Analyze multiple perspectives of ethics, Islamic and Pakistan studies
- 8) Discuss the basic principles of research

f. Academic calendar Year I

YEAR ONE										
BLOCK I 12+2=14 weeks				2 w	BLOCK II 8+2=10 weeks		2 w	BLOCK III 8+2=10 weeks		2 W
2 weeks	2 wks	4 wks	4 wks	E O B	8 weeks	E O B	8 weeks	E O B		
Foundation Module	Cell	Nerve & Muscle	Hematology & Immunology		Cardiovascular		Resp and High Altitude			
		Enzymes/ Minerals								
	Locomotor I-a	Locomotor I-b	Locomotor I-c		Thorax		Locomotor II			
	Protein				Lipids		Vitamins			
Longitudinal Themes – Behavioral Sciences & Professionalism(Communication skills, Leadership & Management, Ethics and Professionalism), Research Methodology & Evidence Based Medicine										

g. Proposed Contact Hours Distribution Year-I

SUBJECTS	FIRST YEAR
Anatomy <ul style="list-style-type: none">• Embryology• Histology• Gross Anatomy• General Anatomy	250
Physiology	225
Biochemistry	125
Medicine & Allied	25
Surgery & Allied	25
Behavioral Sciences & Professionalism	30
Research Methodology	10
Islamiyat	15
Self-Directed Learning	100
Co-curricular activities	40
TOTAL HOURS	845

h. Educational Strategies

- 1) Lectures
- 2) Small group discussion
- 3) Lab practical
- 4) Skill lab
- 5) Problem based learning/ Case based learning
- 6) Tutorials

i. Resources. To be filled in by the institute

- 1) Faculty
- 2) Facilities
- 3) Administration for Course
- 4) Administrative structure
- 5) Communication with students

j. Internal Assessment

Students will be assessed at the end of each block. The weighting of internal assessment is 20% in 1st professional MBBS Examination. There will be three end of blocks and one pre -annual examination. The scores of tests of each end block assessment and pre-annual examination will be used for calculation of the internal assessment.

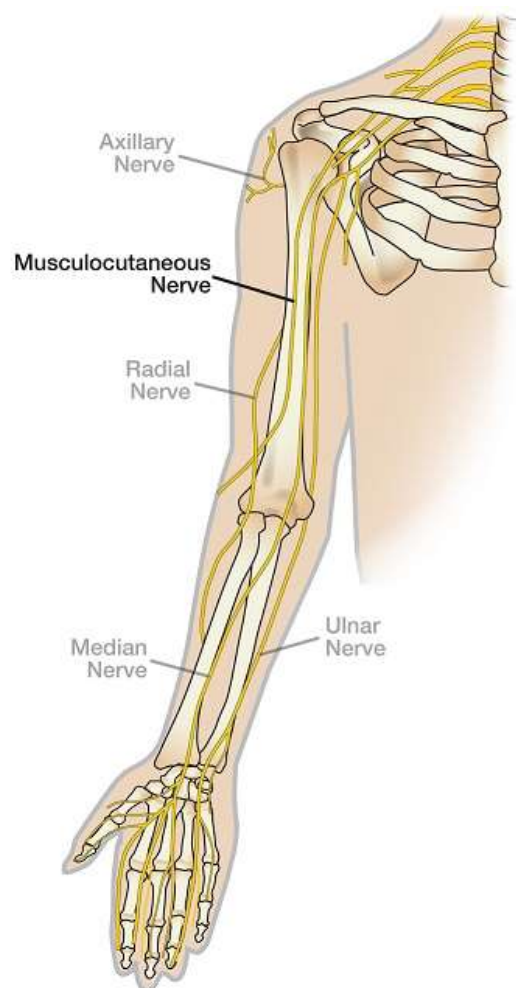
k. Annual Professional Examination.

The University will take the first professional Examination as per PM&DC guidelines 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.

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

BLOCK-I

1. Foundation module
2. Cell
3. Nerve and muscle
4. Hematology and immunology
5. Locomotor I
6. Proteins



1. Introduction:

This block comprises of following modules:

- a. **Foundation module (2 weeks)**
- b. **Cell (2 weeks)**
- c. **Nerve and muscle (4 weeks)**
- d. **Hematology & Immunology (4 weeks)**
- e. **Locomotor I (Throughout the block)**
- f. **Proteins (Throughout the block)**

a. **Foundation module (2 weeks)**

This module focuses on orientation of students to disciplines to be taught in years I & II along with their grooming through basic themes of Behavioral Sciences & Professionalism

b. **Cell (2 weeks)**

This module introduces the student to the basic structure and functioning of the cell and molecules and how dysfunctions in these molecules can lead to disease. The research methodology, Behavioral Sciences & Professionalism will be taught as a part of the longitudinal theme.

Learning Outcomes

At the end of this module, student will be able to:

- Relate the embryological and histomorphological knowledge of cell with their function
- Apply principles of biochemical techniques to explore cell, its organelles and functions.
- Apply the general anatomical terms for describing the structure and function of different regions of gross anatomy
- Correlate the knowledge of gross anatomy of pectoral girdle, pectoral and scapular regions with common clinical presentations.
- Evaluate the levels of human body organization along with the control systems contributing to homeostasis.

c. **Nerve and muscle (4 weeks)**

This module 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 and enzymology are also a part of this module. The research methodology, Behavioral Sciences & Professionalism will be taught as a part of the longitudinal theme

Learning Outcomes:

At the end of this module, student will be able to:

- Relate the knowledge of the microstructure and function of various types of muscle with their outcomes that result from altered structure
- Appraise the embryological basis of common congenital anomalies related with ovulation, fertilization, cleavage, implantation, development of bilaminar germ disc.
- Correlate the knowledge of gross anatomy of axilla, arm and forearm with common clinical presentations.
- Relate the biochemical importance of mineral & trace element and enzymes for understanding their related disorders

d. **Hematology & Immunology (4 weeks)**

This module introduces the student to the connective tissue, cartilage and bones with their function along with physiological imbalances occurring due to deficiencies in

contents, functions & features of blood. 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.

Learning Outcomes:

At the end of this module, student will be able to:

- Correlate knowledge of the microstructure of various types of connective tissue, cartilage and bones with their function and to comprehend the outcomes that result from altered structure.
- Appraise the embryological basis of common congenital anomalies related with trilaminar germ disc.
- Apply the general concept map of the topographic anatomy of joints with relevant presentations encountered in clinical practice.
- Correlate the knowledge of gross anatomy of wrist and hand with common clinical presentations.
- Appraise any physiological imbalances occurring due to deficiencies in contents, functions & features of blood
- Apply the understanding of plasma proteins and haemoglobin to its related disorders

e. Locomotor I (Throughout the block)

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 upper limb

f. Proteins (Throughout the block). Proteins chemistry and metabolism is very important for understanding different metabolic disorders so this topic will be taught longitudinally throughout the module wherever required. At the end of this module, student will be able to apply the biochemical knowledge of proteins and amino acid for understanding their related disorders

2. Duration:

Total duration of the block is 14 weeks. 12 weeks are for teaching & learning and 2 weeks are for end block assessment

FOUNDATION MODULE

ANATOMY

S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1	Introduction	Comprehend 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

PHYSIOLOGY

S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1	Introduction	Comprehend the basic concepts of Physiology		Lecture	Formative

BIOCHEMISTRY

S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1	Introduction	Comprehend the basic concepts of biochemistry		Lecture	Formative

CELL

ANATOMY

S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
		By the end of this module, students will be able to:			
General Histology					
1.	Cell	Operate the microscope according to standard operating procedures while examining slides Apply the knowledge of cytoskeleton in understanding the functions and structures of cellular modifications	Knowledge: <ul style="list-style-type: none">Enumerate various components of a typical animal cellExplain the structure and functions of various components of cytoskeleton. Skill: <ul style="list-style-type: none">Identify the parts of microscopeDemonstrate working of microscope with focusing of slides at different magnifications	LGIS/ Practical	MCQs/ SEQs/ SAQs/ OSPE/ VIVA
2.	Epithelial tissue	Correlate the microstructure of various types of epithelia with their functions and predict the outcomes that may result from altered structure.	Knowledge: <ul style="list-style-type: none">Define epitheliumClassify epithelium with examples of each typeClassify Glands with examples.Define polarityDifferentiate different domains of an epithelial cellList the structural modifications of apical, lateral and basal domains of the cell.Classify the apical modifications according to motility	LGIS/ Practical	MCQs/ SEQs/ SAQs/ OSPE/ VIVA

			<ul style="list-style-type: none"> 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. <p>Skill:</p> <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 Compare the histological features of serous and mucus acini under light microscope. Illustrate different types of exocrine glands and write two points of identification of each 		
General Embryology					
3.	Gametogenesis	Apply the knowledge of gametogenesis to explain the numerical and structural chromosomal abnormalities that	<ul style="list-style-type: none"> Explain the sequence of events of mitosis and meiosis with the help of 	LGIS	MCQs/ SEQs/ SAQs/ OSPE/ VIVA

		result from aberrations in this process.	<p>illustrations and models.</p> <ul style="list-style-type: none"> • Elucidate the morphological changes in male and female gametes during their maturation • Define the following terms: <ul style="list-style-type: none"> ○ Haploid ○ Diploid ○ Euploid ○ Aneuploid ○ Triploid ○ Polyploid ○ Nondisjunction ○ Monosomy ○ Trisomy ○ Mosaicism ○ Translocation • Define azoospermia and oligospermia 		
General Anatomy					
4	Introduction	Use the general anatomical terms in describing the structure of different parts of body	<ul style="list-style-type: none"> • Define and demonstrate the anatomical position. • Describe the planes of the body. • Define the terms of position, movement and laterality. 	LGIS/ SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA
5	Osteology	Apply the general concept map of the osteology in understanding the regional distribution of different bones of body.	<ul style="list-style-type: none"> • List examples and classify the bones on the basis of: <ul style="list-style-type: none"> ▪ Development ▪ Region ▪ Size and shape • Identify the parts of a typical long bone • List different markings on a dry bone with examples 	LGIS/SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA

			<ul style="list-style-type: none"> Define osteogenesis and describe the steps of intramembranous and endochondral ossification. Elucidate the concept of bone growth and remodeling. Describe the blood supply of long bones Enumerate the various types of cartilage with examples 		
Gross Anatomy (Locomotor I-a)					
6.	Clavicle	Correlate the bony features of clavicle, scapula and humerus with their articulations, attachments and anatomical basis of relevant clinical presentations	<ul style="list-style-type: none"> Determine the anatomical position of clavicle and determine its side Identify important bony landmarks of clavicle Locate attachments of major muscles and ligaments attached on clavicle 	SGD	<ul style="list-style-type: none"> MCQs OSPE Viva Voce
7.	Scapula		<ul style="list-style-type: none"> Determine the anatomical position of scapula and determine its side Identify important bony landmarks of scapula Locate attachments of major muscles and ligaments attached on scapula 	SGD	<ul style="list-style-type: none"> MCQs OSPE Viva Voce
8.	Humerus		<ul style="list-style-type: none"> Determine the anatomical position of 	SGD	<ul style="list-style-type: none"> MCQs SEQs/SAQs OSPE

			<p>humerus and determine its side</p> <ul style="list-style-type: none"> • Identify important bony landmarks of humerus • Locate attachments of major muscles and ligaments attached on humerus • Discuss the clinical implications in fractures of humerus at different sites • Correlate the nerves vulnerable to injury in fracture of humerus at different locations 		<ul style="list-style-type: none"> • Viva Voce
9.	Pectoral region and Breast	<ul style="list-style-type: none"> • Correlate the knowledge of gross anatomy of pectoral region with relevant clinical presentations. • Apply the knowledge of Anatomy of breast in analyzing the clinical presentation of breast cancer 	<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 venous drainage of breast • Explain lymphatic drainage of four quadrants 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 	SGD/CBL	<ul style="list-style-type: none"> • MCQs/SEQs/ • SAQs/OSPE/ • VIVA

			<ul style="list-style-type: none"> Identify the muscles attaching upper limb to thoracic wall on models and prosected specimens 		
10.	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 Comprehend the arteries and nerves present in this region Describe type of, and movements at acromioclavicular and sternoclavicular joints 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 Describe the factors providing 	SGD	<ul style="list-style-type: none"> MCQs SEQs/SAQs OSPE Viva Voce

			<p>stability to the shoulder joint inspite of wide range of movements it offers</p> <ul style="list-style-type: none"> • Define rotators cuff and list its components • Elucidate the anastomosis around shoulder joint/scapula with the help of a diagram • Analyze the anatomical basis of a case of winged scapula • Identify the muscles, ligaments and neurovascular structures of this region on prosected specimen and models. 		
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PHYSIOLOGY					
S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1.	Homeostasis	Appraise functional Organization of the Human Body and Control of the "Internal Environment"	<ul style="list-style-type: none"> Recognize the interplay of various organ systems in maintaining homeostasis. Identify the role of feedback mechanisms (positive, negative, feed forward) in maintaining 'internal milieu'. Differentiate between composition of intracellular and extra cellular fluid 	<ul style="list-style-type: none"> Lectures SGD CBL 	<ul style="list-style-type: none"> MCQ SAQ/SEQ Structured viva
2.	Cell Physiology	Relate the structure of cell and its various components to metabolic processes, genetic control and locomotion	<ul style="list-style-type: none"> Revisit the structure and function of the cell and its organelles (cell Membrane, cytoplasmic organelles, nuclear membrane, nuclear organelles) Distinguish various ways of food processing within a cell (ingestion, digestion, synthesis, extraction of energy from nutrients) Recall movements of cells (amoeboid, ciliary, flagellated) Explain the process of protein synthesis (transcription and translation) 	<ul style="list-style-type: none"> Lectures SGD CBL 	<ul style="list-style-type: none"> MCQ SAQ/SEQ Structured viva

			<ul style="list-style-type: none"> • Classify various modes of transport of substances across the cell-membrane • Compare and contrast modes of transport of substances across the cell-membrane with examples (osmosis, diffusion, facilitated diffusion, primary active transport, secondary active transport) 		
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BIOCHEMISTRY					
S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1.	Cell	List various Biomolecules	<ul style="list-style-type: none"> ➤ Explain Cell Biochemistry. ➤ Elaborate various Biomolecules 	<ul style="list-style-type: none"> • Lectures • SGD • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva
		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	Comprehend various 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	➤ Describe the chemistry of cell signaling mechanism and		

			<p>enlist the various receptors involved in it accordingly</p> <ul style="list-style-type: none"> ➤ 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 		
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MEDICINE					
S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1.	Pathogenesis of cancer	Correlate the normal and abnormal cell growth	<ul style="list-style-type: none"> Describe effects of abnormal cell growth Enumerate various predisposing factors in pathogenesis of carcinoma 	LGIS	MCQ

SURGERY					
S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1.	Cell	Recognize the effects of radiotherapy and chemotherapy on different components of cell.	<ul style="list-style-type: none"> Identify physical effects of radiation and chemotherapy on cell 	LGIS	MCQ
2.	Breast	Analyze the anatomical basis metastasis of carcinoma breast	<ul style="list-style-type: none"> Revisit the lymphatic drainage of breast Trace possible roots of spread of carcinoma breast Identify the major sites of metastasis which can be the basis of clinical presentation 	LGIS	MCQs SEQs/SAQs Viva Voce

<u>NERVE AND MUSCLE</u>					
ANATOMY					
S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
		By the end of this module, students will be able to:			
General Histology					
1	Muscular tissue	Correlate knowledge of the microstructure	<u>Knowledge</u> <ul style="list-style-type: none">Describe the light microscopic	LGIS/ SGD/ Practical	MCQs/ SEQs/

		of various types of muscle with their function and predict the outcomes that result from altered structure	<p>characteristics of skeletal, cardiac and smooth muscles</p> <ul style="list-style-type: none"> • Tabulate the microscopic differences between three types of muscles <p>Skill</p> <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. 		SAQs/ OSPE/ VIVA
General Embryology:					
2	Ovulation, Fertilization, First & second weeks of Development	Elucidate the embryological phenomena related to ovulation and fertilization till end of second week, for application of that knowledge in understanding systemic embryology and analyzing relevant clinical conditions	<p>Knowledge</p> <ul style="list-style-type: none"> • Correlate the menstrual and ovarian cycles with each other • Describe the process of ovulation • Define corpus luteum and corpus albicans • Define fertilization. Describe and Illustrate the steps, and outcomes of fertilization • Describe the process of implantation. • Define the following: <ul style="list-style-type: none"> ▪ Cleavage ▪ Morula ▪ Blastula 	LGIS	MCQs/ SEQs/ SAQs/ OSPE/ VIVA

			<ul style="list-style-type: none"> Describe the sequential phases of human development during second week Explain why the second week is known as “week of two’s” Enlist the sites of abnormal implantation and describe their clinical significance. Identify the various phases of development on the given model. 		
General Anatomy					
3	Myology	Apply the general concept map of the topographic anatomy of muscles in understanding the regional distribution of muscles in body.	<ul style="list-style-type: none"> Enumerate three types of muscles according to microscopic appearance and control Enumerate the types of connective tissue associated with muscles Classify skeletal muscles on the basis of shape and fiber architecture, and group action; providing examples of each type Describe the blood supply and nerve supply of skeletal muscle. 	LGIS/ SGD	MCQs SAQ/SEQ Viva Voce
4	Neurology-I	Apply the knowledge of introduction to general principles of neurology in understanding the descriptive part in block-III	<ul style="list-style-type: none"> Describe the organization of nervous system. Enumerate components of central and peripheral nervous system & describe 	LGIS/ SGD	MCQs SAQ/ SEQ/ Viva Voce

			<p>their general features</p> <ul style="list-style-type: none"> Describe the origin, course and distribution of a typical spinal nerve with the help of a diagram. <p>Define: Dermatomes, Receptors and effectors</p>		
Gross Anatomy (locomotor I-b)					
5	Axilla	Correlate the topographic arrangement of axillary 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 Describe the course, 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 Revisit the importance of axillary lymph nodes in metastasis of breast cancer Analyze the anatomical basis of clinical presentation in case of injury to long thoracic nerve 	SGD	MCQs SAQ/ SEQ/ OSPE Viva Voce

			Identify the boundaries and contents of axilla on prosected specimens and models		
6	Radius and Ulna	Correlate the bony features of radius and ulna with their articulations, attachments and anatomical basis of relevant clinical presentations	<ul style="list-style-type: none"> • Determine the anatomical position of radius and ulna and determine their sides • Identify important bony landmarks of radius and ulna • Locate attachments of major muscles and ligaments attached on radius and ulna • Discuss the anatomical basis of clinical implications in fractures of radius and ulna 	SGD	MCQs SAQ/ SEQ/ OSPE/ Viva Voce
7	Arm & Forearm	Correlate the knowledge of gross anatomy of arm and forearm with common clinical presentations.	<ul style="list-style-type: none"> • Appraise the structures present in the anterior and posterior compartments of arm • Tabulate the attachments, nerve supply and actions of muscles of anterior and posterior compartments of arm • Comprehend the neurovascular structures of these compartments • Analyze the anatomical basis of clinical presentation in case of injury to axillary and 	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA

			<p>musculocutaneous nerves</p> <ul style="list-style-type: none"> • 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 • Enlist the boundaries and contents of cubital fossa in a sequential order • Justify the clinical importance of blood vessels present in cubital fossa • Enlist superficial and deep muscles of anterior and posterior fascial compartments of forearm • Trace the course of nerves and arteries present in this region • Enlist the boundaries of anatomical snuff 		
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			<p>box and bony landmarks in its floor</p> <ul style="list-style-type: none"> • 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, Volkman's ischemic contracture, rupture of various tendons and tennis elbow. • Identify the structures present in the models and prosected specimen of arm and forearm. • Perform movements at elbow and radioulnar joints • Identify the bones and ligaments forming the elbow joint • Mark the boundaries and contents of cubital fossa on a model. 		
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PHYSIOLOGY					
S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1.	Membrane Potentials and Action Potentials	Differentiate various types and phases of action potentials on the basis of nerve morphology, concentration of ions in body fluid compartments and clinical significance.	<ul style="list-style-type: none"> Appraise basis of development of membrane potential across excitable membrane. Recognize Nernst potential and its importance in generation of membrane potential. Identify various factors/mechanisms responsible for the genesis of membrane potential (role of channels, carrier proteins, stimuli). Illustrate different phases of action potential mentioning details of ionic changes occurring during each phase of action potential. Distinguish types and importance of refractory period. Differentiate between myelinated and non-myelinated nerve fibers based on their structure and characteristics. Elucidate structural and functional changes taking place in nerve fibers after injury. 	<ul style="list-style-type: none"> Lectures SGD CBL 	<ul style="list-style-type: none"> MCQ SAQ/SEQ Structured viva

2.	Excitation contraction coupling and NMJ	Correlate the physiological mechanism of Neuromuscular, Transmission and Excitation-Contraction Coupling with various neuromuscular diseases.	<ul style="list-style-type: none"> • Tabulate macroscopic, microscopic, functional differences of various types of muscles. • Illustrate neuromuscular junction, sequence of events taking place during neuromuscular transmission and factors affecting this process. • Explain the physiological importance of a motor unit • Describe the ionic and chemical basis of muscle contraction. • Explain the energy expenditure during muscle contraction. • Distinguish between phases of muscle contraction in detail. • Relate the pathophysiology of neuromuscular transmission/ muscle contraction to various clinical presentations (tetanus, rigor mortis, tetanization, contracture remainder, myasthenia gravis, drugs acting on NMJ) 	<ul style="list-style-type: none"> • Lectures • SGD • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva
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			<ul style="list-style-type: none"> Differentiate between isometric and isotonic contraction. 		
3.	Excitation and Contraction of Smooth Muscle	Appreciate characteristics of smooth muscle contraction with their physiological significance.	Describe the role of SER in smooth muscle contraction.	<ul style="list-style-type: none"> Lectures SGD CBL 	<ul style="list-style-type: none"> MCQ SAQ/SEQ Structured viva

BIOCHEMISTRY					
S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1.	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) 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 • CBL/PBL 	MCQ/ SAQ/SEQ
2.	Enzyme	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 	<ul style="list-style-type: none"> • Lectures • SGD • CBL/PBL 	<ul style="list-style-type: none"> • MCQ/ • SAQ/SEQ

			<p>application in enzyme kinetics (no derivation of equations).</p> <ul style="list-style-type: none"> • Compare & contrast different types of enzyme inhibitions with examples & biomedical importance. • Explain regulatory enzymes 		
3.	Practical	Justify the use of different glassware and instruments along with identification	<ul style="list-style-type: none"> ➤ Introduction to use of Glassware ➤ Introduction to use of Laboratory Equipment <ul style="list-style-type: none"> • Spectronic 20 • Microlab • Incubator • Water Bath • Hot Oven • Centrifuge Machine • Electronic Balance • pH Meter 	Practical	OSPE

MEDICINE					
S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1.	Myasthenia gravis	1. Diagnose a case of MG by its clinical features 2. Discuss its pathophysiology 3. Plan treatment strategy	1. Describe effects of abnormal cell growth 2. Enumerate various predisposing factors in pathogenesis of carcinoma	LGIS	MCQ
2.	Drugs acting on Neuromuscular junctions	Enumerate various drugs (stimulants and blockers) acting on NMJ and their clinical importance	1. List various drugs (stimulants and blockers) 2. Discuss their action on NMJ and their clinical importance	LGIS	MCQ

SURGERY					
S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1.	Nerve & Muscle	Develop an understanding of effects of different types of nerve injuries and compressions at different levels of upper limb	<ul style="list-style-type: none"> • Enlist common causes of injuries of brachial plexus • Identify common sites of the injuries of brachial plexus • Correlate clinical presentations of the injuries of different parts of brachial plexus with anatomical distribution • Identify the motor/sensory deficit of the affected nerve roots 	LGIS	MCQ SAQ/SEQ Viva VOce

HEMATOLOGY AND IMMUNOLOGY

ANATOMY

S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
		By the end of this module, students will be able to:			
General Histology					
1.	Connective tissue	Correlate knowledge of the microstructure of various types of connective tissue, cartilage and bones with their function and to comprehend the outcomes that result from altered structure.	Knowledge: <ul style="list-style-type: none">Enlist the components of connective tissue, its cells & matrix.Describe the structure of fibroblast and macrophage, enlist their functionsClassify connective tissueDescribe the characteristic features of each typeExplain the role of fibroblasts in wound contractionDescribe the role of collagen in keloid and hypertrophic scar Skill: <ul style="list-style-type: none">Identify different types of connective tissue under the microscopeIllustrate the types of connective tissue with two identification points of each.	LGIS Practical	MCQs SEQs/SAQs OSPE Viva Voce
2.	Cartilage		Knowledge: <ul style="list-style-type: none">Differentiate in tabulated form the types of cartilage with reference to composition,		

			<p>arrangement of chondrocyte, interstitial matrix and distribution.</p> <p>Skill:</p> <ul style="list-style-type: none"> Identify different types of cartilage under the microscope <p>Illustrate the types of cartilage with two identification points of each</p>		
3.	Bone		<p>Knowledge:</p> <ul style="list-style-type: none"> Describe the origin, histological structure and functions of the following: <ul style="list-style-type: none"> Osteoprogenit or cells Osteoblasts Osteocytes Osteoclasts Define periosteum and endosteum Differentiate between primary and secondary bone. Describe the characteristic histological features of osteon Apply knowledge of histology to explain clinical conditions like osteomalacia, osteopetrosis and osteitis fibrosacystica. <p>Skill:</p> <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.		
General Embryology:					
4.	Third Week of development	Elucidate the embryological phenomena occurring during third week of development, for application of that knowledge in understanding systemic embryology and analyzing relevant clinical conditions	Knowledge: <ul style="list-style-type: none"> Enumerate the sequential phases of human development during third week Define the following: <ul style="list-style-type: none"> Gastrulation Neurulation Explain the steps in formation of germ layers. List the derivatives of all three germ layers Describe the formation of notochord and the establishment of body axes. Elucidate the process of neurulation with reference to: <ul style="list-style-type: none"> Neural plate and neural tube Neural crest formation. Differentiate the features of primary, secondary and tertiary villi in the trophoblast. Correlate the knowledge of embryology with embryological basis of: 	LGIS	MCQs SEQs/SAQs OSPE Viva Voce

			<ul style="list-style-type: none"> ▪ Sacrococcygeal teratoma. ▪ Holoprosencephaly ▪ Caudal dysgenesis ▪ Situs inversus <p>Skill: Identify the various phenomenon during third week of development on the given model and diagrams</p>		
General Anatomy:					
5.	Arthrology	Apply the general concept map of the topographic anatomy of joints in understanding the regional distribution of joints in body.	<p>Knowledge:</p> <ul style="list-style-type: none"> • Classify joints on the basis of presence or absence of joint cavity. • Classify synarthroses (fibrous and cartilaginous joints) and provide examples • Define diarthroses/synovial joint. Enlist salient features of, and types of movements possible at synovial joints. • Classify synovial joints on the following basis and provide examples: <ul style="list-style-type: none"> ○ Complexity of form ○ Degree of freedom of movement ○ Shape of articulating surface • Enlist factors responsible for the 	LGIS/ SGD/	MCQs SEQs/SAQs Viva Voce

			stability of synovial joints. <ul style="list-style-type: none"> Describe the blood supply and nerve supply of synovial joints. 		
Gross Anatomy: (Locomotor I-c)					
6.	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 Elucidate the salient features of skin of palm and dorsum of hand and discuss its cutaneous innervation Correlate palmar aponeurosis and its septa with palmar spaces 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, trigger finger and tenosynovitis of synovial sheaths of flexor tendons Describe boundaries & contents of spaces of palm Analyze the clinical importance of spaces of palm, forearm space of 	SDG	MCQs SAQ/SEQ OSPE Viva Voce

			<p>Parona and pulp spaces</p> <ul style="list-style-type: none"> • Revisit the insertion of long flexor and extensor tendons • Describe the blood supply of hand • Describe the formation of Superficial and Deep Palmar Arches in hand • Trace the pathway and distribution of radial, median and ulnar nerves in hand • Identify the muscles, nerves and vessels of hand on prosected specimens and models 		
7	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 performing these movements • 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 	SDG	MCQs SAQ/SEQ OSPE Viva Voce

			<p>outstretched hand</p> <ul style="list-style-type: none"> Identify the bones and ligaments of wrist joint in a prosected specimen or model 		
8	Cutaneous innervation of supply of upper limb	Predict the area of sensory loss in case of injuries of different nerves of upper limb on the basis of anatomical knowledge of cutaneous innervation.	<ul style="list-style-type: none"> Elucidate the cutaneous innervation of upper limb 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 anesthesia in case of injury to different nerves 	SGD	MCQs SAQs/SEQs Viva Voce
9	Injuries to brachial plexus and its branches	Analyze the areas of motor and sensory loss in case of injuries to various branches of upper limb based on anatomical reasoning	<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 	SGD	MCQs SAQs/SEQs Viva Voce

			<p>are vulnerable to injury / compression</p> <ul style="list-style-type: none"> 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 		
10	Venous and lymphatic drainage of upper limb	Summarize the lymphatic and venous drainage of upper limb in totality	<ul style="list-style-type: none"> Describe the formation & drainage of following veins: <ul style="list-style-type: none"> Axillary vein Basilic vein Cephalic vein Median cubital vein Discuss the lymphatic drainage of upper limb in detail Identify the veins of upper limb in prosected specimens or models. 	SGD	MCQs SAQs/SEQs OSPE Viva Voce
11	Radiology	Correlate the skeletal framework of upper limb with its radiological appearance	Identify the bones and important bony landmarks of upper limb on AP and lateral view radiographs	SGD	OSPE
12	Surface Marking	Utilize the knowledge of topography of important neurovascular structures of upper limb in plotting the same on	<ul style="list-style-type: none"> Mark the following structures on surface of a subject or manikin: <ul style="list-style-type: none"> Axillary nerve Brachial nerve 		

		body surface and inferring relevant clinical presentations.	<ul style="list-style-type: none"> • Ulnar artery • 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 		
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List of Practicals:

S.No.	Topics
At the end of these practicals, students will be able to identify/ illustrate following:	
1.	Epithelium-1
2.	Epithelium-2
3.	Glands
4.	Connective tissue-1
5.	Connective tissue-2
6.	Muscular tissue
7.	Cartilage
8.	Bone

PHYSIOLOGY					
S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1.	Hemopoiesis	Describe the Morphology and Genesis of blood cells	<ul style="list-style-type: none"> Differentiate between various types of blood cells on the basis of their morphological and physiological characteristics. Overview sites of hemopoiesis in the body during different stages of life along with composition and functions of bone marrow. Identify the factors regulating erythropoiesis and maturation of RBC. Appreciate the composition of blood and general functions of blood. 	<ul style="list-style-type: none"> Lectures SGD CBL 	<ul style="list-style-type: none"> MCQ SAQ/SEQ Structured viva
2.	Red Blood Cells Dyscrasias	Differentiate between various types of RBCs abnormalities on the basis of their Etiology, Pathophysiology and Clinical presentations.	<ol style="list-style-type: none"> Relate the morphology and physiology of different types of hemoglobin with hemoglobinopathies. Compare and contrast different types of anemia on the basis of etiology, pathophysiology, clinical presentations and blood picture. Describe etiology, pathophysiology and clinical 	<ul style="list-style-type: none"> Lectures SGD CBL 	<ul style="list-style-type: none"> MCQ SAQ/SEQ Structured viva

			presentation of polycythemia.		
3.	WBCs & Immunity	Classify different types of immunity on the basis of cell types and their role in defense mechanism.	<ol style="list-style-type: none"> 1. Relate the morphology and physiology of different WBCs with clinical presentations of leucopenia, leukocytosis and leukemia. <ul style="list-style-type: none"> • Appraise the clinical significance of RES reticulo-endothelial system. 2. Describe pathophysiology of inflammation and necrosis 3. Describe the physiological basis of vaccination. 	<ul style="list-style-type: none"> • Lectures • SGD • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva
4.	Hemostasis and Blood Coagulation	Compare and contrast various bleeding disorders.	<ol style="list-style-type: none"> 1. Identify role of cells and proteins involved in the process of maintaining hemostasis. 2. Differentiate between intrinsic and extrinsic regulations of blood coagulation 3. Discuss the morphology, etiology, pathophysiology and clinical presentation of thrombocytopenia , thrombocytosis and hemophilia 	<ul style="list-style-type: none"> • Lectures • SGD • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva
5.	Blood grouping and Transfusion reactions	Analyze transfusion reactions	<ol style="list-style-type: none"> 1. Explain the principles of blood grouping keeping in view 	<ul style="list-style-type: none"> • Lectures • SGD • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ

			<p>their physiological significance.</p> <p>2. Identify the various blood groups and hazards of matched and mismatched blood transfusion with especial reference to Erythroblastosis fetalis.</p>		<ul style="list-style-type: none"> • Structured viva
Practicals					
	Practical	Interpret the results of given experiment	<ol style="list-style-type: none"> 1. Study Neubauer's chamber in detail using Compound Microscope judiciously 2. Determine RBC count by using Neubauer's chamber. 3. Count WBC-TLC 4. Platelet count. (Demonstration only) 5. Determination of Haemoglobin in the blood. (Sahili's method) 6. Determine Red cell indices. 7. Estimate haematocrit (PCV). 8. Estimate ESR. 9. Determine ABO & Rh blood groups. 10. Estimate bleeding & clotting time. 11. DLC 12. Osmotic fragility of RBC 	Practical	OSPE

BIOCHEMISTRY					
S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1.	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 various types of Hyperbilirubine mia 	<ul style="list-style-type: none"> • Lectures • SGD • PBL • CBL 	MCQ/SAQ/SEQ/Structure Viva

			<ul style="list-style-type: none"> ➤ Discuss its various types of Jaundice. ➤ Explain various Hemoglobinopathies (Hb-S, Hb-C, Hb-SC, Methemoglobinopathies and thalassemia) and elaborate their biochemical causes 		
2.	Plasma proteins and Immunoglobulins	Relate the basic knowledge of Plasma proteins to its clinical significance	<ul style="list-style-type: none"> ➤ Define Plasma proteins & give their clinical significance ➤ Draw and label the Structure of Immunoglobulins ➤ Enumerate Major types, functions & Properties of Immunoglobulins 	<ul style="list-style-type: none"> • Lectures • SGD • PBL • CBL 	MCQ/ SAQ/SEQ/ Structure Viva

Protein

S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1.	Protein Chemistry	Relate the significance of different proteins in medicine	<ul style="list-style-type: none"> ➤ Describe Proteins, Dipeptides, Tripeptide and polypeptides with example ➤ Outline the Biochemical importance of protein. ➤ Explain the structure of proteins and give a brief account of their significance ➤ Classify proteins on basis of their physiochemical, functional and nutritional properties. ➤ Define amino acids. Draw their structure and explain their various properties & functions. ➤ Classify amino acids and give their nutritional significance ➤ Describe the dissociation & titration curve and importance of amino acids regarding pH maintenance in human body. ➤ Enlist various mechanisms of separation of proteins e.g. salting out, Electrophoresis, Chromatography and Centrifugation. Explain each in detail. ➤ Explain Folding & Misfolding of proteins along with associated disease 	<ul style="list-style-type: none"> • Lectures • SGD • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva

2.	Protein Metabolism	Apply the knowledge of protein metabolism for understanding relevant metabolic disorder	<ul style="list-style-type: none"> ➤ Metabolism of Proteins and amino acids ➤ Explain the mechanism of Amino acid oxidation. ➤ Describe various metabolic fates of an amino acid. ➤ Define and exemplify various mechanisms of transamination, deamination, decarboxylation, deamidation. ➤ Describe the transport of amino group, role of Pyridoxal phosphate, Glutamate, Glutamine, Alanine ➤ Outline the mechanism of Nitrogen excretion from the human body ➤ Explain in detail the concept of Ammonia intoxication. ➤ Draw Urea cycle and discuss its regulation in detail. ➤ Describe Genetic defects of Urea cycle ➤ Comprehend Carbon skeletal metabolism and its importance ➤ Describe Functions, pathways of amino acid degradation and genetic disorders of individual amino acids. ➤ Fibrous protein ➤ Globular protein 		
Practicals					
1.	Experiments on Proteins	Interpret the results of given experiments	Biuret Test	Practical	OSPE
2.			Millon's Test		
3.			Ninhydrin Test		

4.	Qualitative Analysis		Aldehyde Test		
5.			Sulphur Test		
6.			Xanthoproteic Test		
7.	Chemical examination of urine		Salfosalicylic acid test		
8.			Heat coagulation test		

MEDICINE					
S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1	Nutritional anemia	1. Diagnose nutritional anemias by clinical features and relevant investigations 2. Plan strategy for prevention and treatment of various types of nutritional anemia	1. Describe effects of abnormal cell growth 2. Enumerate various predisposing factors in pathogenesis of carcinoma	LGIS/ SGD	MCQs
2.	Hemolytic anemia	1. Enumerate hemolytic anemias 2. Diagnose hemolytic anemia by its clinical features and relevant investigations	1. List various drugs (stimulants and blockers) 2. Discuss their action on NMJ and their clinical importance	LGIS/ SGD	MCQs
3.	Transfusion reactions	1. Diagnosis of various transfusion reactions of both matched and unmatched blood. 2. Plan strategy for safe blood transfusions		LGIS/ SGD	MCQs
4.	Approach to a case of Bleeding disorders	1. Enlist bleeding disorders 2. Diagnose a case of bleeding/clotting disorders 3. Plan relevant diagnostic investigations	Approach to a case of bleeding disorders	LGIS/ SGD	MCQs
5.	Approach to a case of Jaundice	1. Enlist various causes of jaundice. 2. Diagnose clinical features of jaundice 3. Plan relevant investigations for various types of jaundice	Approach to a case of jaundice	LGIS/ SGD	MCQs

SURGERY					
1.	Fractures of Upper limb	<ul style="list-style-type: none"> Relate the clinical presentation of different fractures and dislocation of upper limb with anatomical knowledge 	<ul style="list-style-type: none"> Identify the common sites of fractures of bones of upper limb Identify the possible sites of fractures of bones of upper limb as a result of fall on out stretched hand Discuss the clinical presentations of common fractures of upper limb bones Correlate different fractures of upper limb with nerve injuries Identify the vascular injuries of upper limb due to fractures of bones 	LGIS	MCQ SAQs/SEQs Viva Voce
RADIOLOGY					
2.	Imaging of upper limb	<ul style="list-style-type: none"> Correlate the skeletal framework of upper limb with its radiological appearance 	<ul style="list-style-type: none"> Enumerate the commonly used imaging techniques in clinical practice Explain the principles of differential densities on x-rays Identify the appearance of bone, cartilage, air, fluid and fat on x-rays Differentiate between 	LGIS	OSPE

			epiphyseal line and fracture line <ul style="list-style-type: none"> Identify the bones and important bony landmarks of upper limb on AP and lateral view radiographs Identify common sites of fractures of bones of upper limb on radiographs and correlate with the relevant nerves and vessels vulnerable to damage 		
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Research Methodology					
S.No	Topic/ Theme	Learning Outcomes	Learning Objectives/Contents	Instructional strategies	Assessment Tool
1.	Introduction to research	Discuss historical background of research in medicine	Meaning, historical background, introduction to medical research, important terminologies	LGIS/ SGD	MCQ/ SEQ
2.	Importance of research	Discuss significance of research in medicine	Evidence based practice, application in health sciences	LGIS/ SGD	MCQ/ SEQ
3.	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
4.	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

YEAR I

BLOCK-II

(08 Weeks)

- 1. Cardiovascular System**
- 2. Lipids**
- 3. Thorax**



3. Introduction:

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.

4. Duration:

Total duration of the block is 10 weeks. 8 weeks are for teaching and learning and 2 weeks are for end block assessment

5. Learning Outcomes:

At the end of this module, student will be able to:

- a. Correlate the gross anatomical, developmental & light microscopic features of cardiovascular system with their functions to apply this knowledge in relevant clinical scenarios encountered in subsequent years of training and practice.
- b. Apply the knowledge of Gross Anatomy of thorax in appraising the anatomical basis of relevant clinical scenarios.
- c. Correlate the developmental events during the embryonic and fetal periods, placental formation and multiple pregnancies with embryological basis of relevant clinical conditions.
- d. Analyze basic principles of cardiovascular physiology, interplay of various components of the vascular system and experimental aspects of Cardiovascular Physiology
- e. Relate the understanding of biochemical basis of lipids to its clinical significance.

CARDIOVASCULAR SYSTEM

ANATOMY					
S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1	Histology of Circulatory System	Appraise the light micro-structure of different components of cardiovascular System and predict functional outcomes of their altered structure.	Define capillaries & classify them on the basis of their morphology and describe each class by giving examples	LGIS	MCQs/ SEQs/ SAQs VIVA VOCE
			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.		
		Identify H&E stained slides of different vessels and appreciate their characteristic histological features to distinguish them from common pathological conditions in future.	Identify various vessels under light microscope and enlist at least two identification points for each.	Practical	OSPE/ Viva voce
			Illustrate various vessels emphasizing the differences amongst them with the help of eosin and hematoxylin pencils.	Practical	
2	Histology of lymphoid organs	Appraise the light micro-structure of different lymphoid organs	Explain the light microscopic features of the following: <ul style="list-style-type: none"> • Lymph node • Thymus • Spleen • Palatine tonsil 	LGIS	MCQs/ SEQs/ SAQs VIVA VOCE
			<ul style="list-style-type: none"> • Identify slides of lymph node, thymus, spleen and palatine tonsils under light microscope and enlist at least two 	Practical	OSPE/ Viva voce

			<p>identification points for each.</p> <ul style="list-style-type: none"> • Illustrate lymph node, thymus, spleen and palatine tonsils with the help of eosin and hematoxylin pencils. 		
3	The Embryonic Period (Third to Eight Weeks)	Correlate the developmental events during the embryonic period with relevant congenital anomalies	<p>Define neurulation and describe process of formation of neural plate, neural tube and neural crest cells.</p> <p>Enlist derivatives of:</p> <ul style="list-style-type: none"> • Surface ectoderm • Neuroectoderm • Neural crest • Intraembryonic mesoderm (paraxial, intermediate, lateral plate) <p>Explain the development of Intraembryonic coelom.</p> <p>Correlate the folding of the embryo in the horizontal and longitudinal planes with its consequences.</p> <ul style="list-style-type: none"> • Explain the processes of formation of blood vessels • Define hemangioma and explain its embryological basis. 	LGIS	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE
4	Fetal Period (third month to birth)	Correlate the developmental events during the fetal periods with relevant congenital anomalies	<p>Define fetal period and enlist the external body landmarks from third month to birth.</p> <p>Enumerate various methods to estimate fetal age</p> <p>Enlist factors affecting fetal growth.</p> <p>Define intrauterine growth retardation.</p>	LGIS	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

5	Placenta and fetal membranes	Apply the basic principles behind the formation of placenta and fetal membranes in appraising relevant clinical conditions	Enlist types of chorion and give fate of each.	LGIS	MCQs/SEQs/SAQs/OSPE/VIVA VOCE
			Define decidua. Enlist types of decidua and give fate of each.		
			Enumerate the fetal and maternal components of placenta.		
			Differentiate between stem, anchoring and terminal villi & enumerate the layers forming placental barrier		
			Describe placental circulation (maternal and fetal)		
			Enlist the features of maternal and fetal surfaces of placenta.		
			Describe the structure and enumerate the functions of the placenta		
			Enlist fetal membranes & their fate		
			Describe development of umbilical cord		
			Describe production, circulation and significance of amniotic fluid		
			Define poly & oligohydramnios. Enumerate their causes & adverse effects		
			Describe embryological basis of amniotic bands and umbilical cord defects		
6	Multiple pregnancies	Comprehend the process of multiple pregnancies and related congenital anomalies	<ul style="list-style-type: none"> Appraise the mechanism behind their occurrence. Explain the embryological basis of fetus papyraceus, twin transfusion 	LGIS	MCQs/SEQs/SAQs/VIVA VOCE

			syndrome and conjoined twins.		
7	Development of Cardiovascular System	Comprehend the development of cardiovascular system to explain the relevant congenital anomalies	<p>Explain the formation of heart tube with special reference to primary & secondary heart fields</p> <p>Enlist the subdivisions of heart tube & their fate</p> <p>Appraise the mechanism of cardiac looping and enlist its abnormalities.</p> <p>Explain different methods of septal formation.</p> <p>Describe division of atrioventricular canal.</p> <p>Explain the embryological steps involved in formation of interatrial septum.</p> <p>Describe the formation of left atrium and pulmonary veins</p> <p>Enlist sources of different parts of interventricular septum</p> <p>Explain the division of conotruncus</p> <p>Appraise the embryological basis of the following heart defects.</p> <ul style="list-style-type: none"> • Atrial septal defects • Ventricular septal defects • Fallot's tetralogy • Transposition of great vessels • Persistent truncus arteriosus • Ectopia cordis • Dextrocardia <p>Define aortic arches</p>	LGIS	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

			Explain the development and fate of aortic arches		
			Enumerate the developmental sources of aorta		
			Justify the relationship of recurrent laryngeal nerves on the embryological basis		
			Explain the fate of vitelline & umbilical arteries		
			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 		
			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 		
			Differentiate fetal from adult circulation		
			Identify the structures related to general	SGD	OSPE/VIVA

			development and development of cardiovascular system on given models and diagrams		
GROSS ANATOMY					
8	Gross Anatomy of thoracic wall	Appraise the structure of chest wall & the diaphragm to understand anatomical basis of relevant clinical conditions	Identify structures forming thoracic wall, thoracic inlet, outlet	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE
			Identify important bony landmarks of sternum with reference to its parts, sternal angle and its importance in clinical practice		
			Determine the anatomical position of different ribs, Differentiate between typical and atypical ribs based on their parts		
			Identify the important bony landmarks of thoracic vertebrae Enlist various joints these vertebrae make and identify their types		
			Enlist the muscles of thoracic cage with reference to their attachments, nerve supply and actions		
			Describe a typical intercostal space		
			Discuss the blood supply of the thoracic wall.		
			Describe the course and distribution of a typical intercostal nerve Differentiate it from its atypical counterpart		
			Enlist different dimensions of thorax. Explain the factors (bony, articular and muscular) responsible		

			<p>for changes in these dimensions during respiration</p> <p>Appraise the following clinical conditions on the basis of anatomical knowledge: Rib fractures, flail chest, supernumerary ribs, thoracic outlet syndrome and herpes zoster infection of spinal ganglia</p> <p>Define thoracostomy, enlist the anatomical structures encountered by needle on its way to pleural cavity and precautionary measures to avoid damage to important structures.</p> <p>Describe the parts, attachments and nerve supply of diaphragm</p> <p>Enlist the major apertures in diaphragm with their levels and structures passing through each</p> <p>Analyze the anatomical basis of clinical scenario related to diaphragmatic hernia, phrenic nerve lesions and penetrating injuries of diaphragm.</p> <p>Define referred pain and correlate the tip of shoulder pain with irritation of diaphragm.</p>		
9	Gross Anatomy of thoracic cavity	Appraise the structure of thoracic viscerae, and their relationship for understanding relevant clinical problems.	<p>Define mediastinum. Enumerate the divisions of mediastinum</p> <p>Enlist the structures forming different boundaries</p>	SGD	MCQs/ SEQs/ SAQs/ OSPE VIVA VOCE

			Describe the structure and topographic relations of contents of anterior mediastinum		
			Describe the structure and topographic relations of contents of superior mediastinum		
			Describe the structure and topographic relations of contents of posterior mediastinum		
			Enlist the structures lying at the level of transverse thoracic plane		
			Appraise the anatomical basis of clinical conditions related to mediastinum		
			Identify the contents of anterior, posterior and superior mediastinum on given model/specimen		
			Enumerate and describe various parts of pleura, its reflections, recesses and nerve supply		
			Explain anatomical basis of pneumothorax, pleural effusion, pleuritis, pleurectomy and pleurodesis		
			Determine the sides, surfaces and borders of both lungs		
			Discuss the relations of various surfaces of each lung		
			Describe gross features of bronchi. Name the bronchus which is the more probable site of impacted foreign body and enlist its reasons.		
			Define Broncho pulmonary segments.		

			<p>Illustrate them in each lung. Discuss their significance.</p>		
			Identify the side, surfaces, borders and structures in hilum of each lung on given model/specimen		
			Describe the gross features of various layers of pericardium		
			Summarize the blood supply and innervation of pericardium.		
			Describe anatomical position, borders, surfaces, external and internal features of the heart.		
			Describe the blood supply and innervation of heart		
			Explain the basis of right or left dominance of heart.		
			Analyze a case of coronary artery disease with anatomical reasoning		
			<p>Apply knowledge of gross anatomy of heart to explain following:</p> <ul style="list-style-type: none"> • Coronary angiography • Angina pectoris • Myocardial infarction <p>Cardiac referred pain</p>		
			Identify border, surfaces, chambers, openings of atria and ventricles, major vessels and valves of heart on model/specimen.		
			Identify the radiological landmarks of bony and soft		

			components of thoracic wall and the viscera of thoracic cavity on radiographs		
			Demonstrate the surface anatomy of different components of thoracic wall, thoracic apertures and thoracic viscerae on a subject while following standard procedures.		
GENERAL ANATOMY					
10	General anatomy of cardiovascular including lymphatic system	Appraise the general concept of anatomical organization of cardiovascular system in understanding the basic concepts of gross anatomy and histology with relevant presentations encountered in clinical practice	<p>Summarize the general structural plan of blood vessels.</p> <p>Describe general plan of systemic, pulmonary, portal and coronary circulatory system.</p> <p>Classify blood vessels on anatomical and functional basis with the help of examples.</p> <p>Differentiate between anatomic end arteries and functional end arteries by giving examples.</p> <p>Explain the importance of collateral circulation</p> <p>Describe general plan of the lymphatic circulatory system of the body.</p>	LGIS	MCQs/ SEQs/ SAQs/

PHYSIOLOGY					
S.NO	Topic	Learning Outcomes	Learning Objectives/Contents	Instructional Strategies	Assessment tools
1.	Physiological anatomy of heart and cardiac action potential	Appreciate the functional characteristics of cardiac muscle and action potential	<ul style="list-style-type: none"> • Appreciate the physiological arrangement of right and left hearts along with the parallel arrangement of systemic circulation. • Recognize physiological anatomy of cardiac muscles, its functional syncytium and intercalated disc • Differentiate between cardiac, skeletal and smooth muscles based on macro-, microscopic and functional differences, action potentials. • Distinguish ionic changes in different phases of action potential within cardiac muscle • Correlate the phases with ionic changes during pacemaker action potential in heart 	<ul style="list-style-type: none"> • Lectures • SGD • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva
2.	Cardiac cycle	Compare and contrast the pressure and volume changes in different components of circulatory system during cardiac cycle	<ul style="list-style-type: none"> • Illustrate pressure and volume changes during various phases of cardiac cycle • Illustrate pressure-volume diagram of left heart • Comprehend preload and afterload, its influence on stroke volume (The Frank-Starling's mechanism) • Discuss the autonomic regulation of heart 	<ul style="list-style-type: none"> • Lectures • SGD • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva
3.	ECG	Interpret normal and abnormal ECG changes in health and disease	<ul style="list-style-type: none"> • Comprehend basis of ECG, different ECG Leads and their placements • Draw and label normal ECG showing various 	<ul style="list-style-type: none"> • Lectures • SGD • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva

			<p>waves, segments and intervals</p> <ul style="list-style-type: none"> • Understand significance of waves, segments and intervals of ECG • Calculation of heart rate and various intervals and segments • Appreciate relationship between vector and lead, type and locations of leads and principles for vector analysis in a normal heart • Discuss current of injury and differentiate between systolic and diastolic theories of current of injury • Appreciate the role of re-entry phenomenon in pathogenesis of ventricular fibrillation • Relate the ionic changes in Cardiac tissues to ECG changes in sinus arrhythmias, pathological arrhythmias, Ischemia, infarction and heart blocks. 		
4.	Hemodynamics of circulation	Explain the hemodynamics of systemic circulation	<ul style="list-style-type: none"> • Categorize the components of circulatory systems into. Greater (Systemic), Lesser (Pulmonary) circulations and accessory circulatory system (Lymphatic). • Analyze the relationship between flow, resistance and conductance. • Conceptualize the phenomenon of vascular compliance and resistance • Distinguish between turbulent and laminar flow based on significance, pressure gradient, resistance. 	<ul style="list-style-type: none"> • Lectures • SGD • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva

			<ul style="list-style-type: none"> • Appreciate formation, propagation, damping and abnormalities of arterial pressure pulse • Discriminate jugular venous pulse from arterial pulse based on location, appearance, origin, waves and significance 		
5.	Control of Local Blood	Identify the dynamics of local and peripheral Blood flow	<ul style="list-style-type: none"> • Distinguish between acute and chronic control of local blood flow. • Conceptualize active and reactive hyperemia • Relate the blood flow control to total peripheral resistance 	<ul style="list-style-type: none"> • Lectures • SGD • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva
6.	Capillary dynamics	Elucidate edema types, clinical significance and factors responsible for causing edema	<ul style="list-style-type: none"> • Identify the principles of capillary dynamics and structure of Interstitium. • Analyze the role of starling forces and other safety factors (lymphatics, negative ISF pressure) in prevention of edema. • Appreciate Types of edema, its pathophysiology and safety factors preventing edema formation. • Differentiate between pitting and nonpitting edema based on its etiology, pathophysiology and clinical significance. 		
7.	Cardiac output and venous return	Analyze the factors regulating venous return and cardiac output at rest and during exercise.	<ul style="list-style-type: none"> • Understand the determinants of cardiac output and factors affecting cardiac output. 	<ul style="list-style-type: none"> • Lectures • SGD • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva

			<ul style="list-style-type: none"> • Appreciate the mechanics of low and high cardiac outputs along with their effects on heart. • Comprehend the factors affecting stroke volume, heart rate and total peripheral resistance. • Explain Fick's principle for the measurement of cardiac output • List the functions of veins • Identify factors regulating venous return and significance of venous reservoirs. • Appreciate the equality of cardiac output and venous return. 		
8.	Arterial blood pressure	Summarize regulatory mechanisms of blood pressure & cardiac output control in health and disease	<ul style="list-style-type: none"> • Comprehend the determinants of arterial pressure, factors affecting and mechanisms regulating blood pressure on short- and long-term basis. • Recognize mean arterial pressure and its significance. • Comprehend the individual and integrative role of baroreceptors, chemoreceptor, volume receptors, arterial natriuretic factors and Renin-angiotensin - aldosterone system in regulation of arterial pressure. • Understand the characteristics of 	<ul style="list-style-type: none"> • Lectures • SGD • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva

			regional circulations (skeletal muscles, pulmonary, coronary & cerebral) and factors regulating thereof		
9	Heart sounds	Differentiate among normal and abnormal heart sounds	Analyze heart sounds regarding their origin, abnormalities(murmurs) and their clinical importance	<ul style="list-style-type: none"> • Lectures • SGD • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva
10	Cardiac failure	Analyze cardiovascular and pulmonary changes (including oxygen consumption) during different grades of exercise.	<ul style="list-style-type: none"> • Identify types and severity of exercise in different sports. • Conceptualize general adaptive changes in muscles in response to increased and decreased physical activity. • Appraise fuels available in body during rest and exercise. • Analyze cardiovascular and pulmonary changes (including oxygen consumption) during different grades of exercise. 	<ul style="list-style-type: none"> • Lectures • SGD • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva
11.	Circulatory shock	Compare various types of shock and their pathophysiology	<ul style="list-style-type: none"> • Discriminate various types of shock, its types and stages of development • Differentiate between compensated and uncompensated shock. • Recognize the short term and long-term compensatory mechanisms in circulatory shock. • Diagnose and treat various types of shock based on clinical scenarios and lab investigations 	<ul style="list-style-type: none"> • Lectures • SGD • CBL 	<ul style="list-style-type: none"> • MCQ • SAQ/SEQ • Structured viva

Practicals					
	Practicals relevant to CVS	Record the Blood Pressure of an SP using palpatory and Auscultatory Method	Blood Pressure	Practical	OSPE
		Perform Cardiopulmonary resuscitation on a dummy according to the American Heart Association Guidelines	Cardiopulmonary resuscitation	Practical	OSPE
		Demonstrate Triple Response and Blood Grouping	Triple Response and Blood Grouping	Practical	OSPE
		Record & Interpret normal ECG by placing all the chest and limb leads on an SP	ECG	Practical	OSPE
		Examine the Radial Pulse and comment on rate, rhythm and character	Radial Pulse	Practical	OSPE
		Examine the Heart Sound on Pulmonary, Aortic, Mitral and Tricuspid areas	Heart Sound	Practical	OSPE
		Determine the JVP on an SP	JVP	Practical	OSPE
		Record the effects of posture and Exercise on Blood Pressure	effects of posture and Exercise on Blood Pressure	Practical	OSPE

BIOCHEMISTRY					
S.NO	Topic/ Theme	Learning Outcomes	Learning Objectives/Contents	Instructional Strategies	Assessment tools
1	Lipid Chemistry	Relate the significance of different lipids in medicine	<ul style="list-style-type: none"> Define lipids and enumerate their biomedical functions Describe lipid classification with examples & biochemical significance Draw and label the structure of a Fatty acid. Also discuss their chemistry, classification and biochemical functions Define Essential fatty acids. Give examples with deficiency disorder Give Nutritional significance of lipids. Describe Eicosanoids, their classification and functions in health and disease Describe Steroids, Sterol e.g. Cholesterol, their chemistry, functions and clinical significance. Describe in detail the biosynthesis of fatty acids 	Lecture/SGD/ CBL	MCQ/ SAQ/ SEQ/ Structured Viva
	Lipid Metabolism	Apply the knowledge of lipid metabolism for understanding relevant metabolic disorder	<ul style="list-style-type: none"> Draw the mechanism of Oxidation of fatty acids along with Activation and transport of fatty acids in the mitochondria 	Lecture/SGD/ CBL	MCQ/ SAQ/ SEQ/ Structured Viva

			<ul style="list-style-type: none"> • Explain the B-oxidation of fatty acid and regulation of this B-oxidation • Explain alpha-oxidation, w-oxidation and peroxisomal oxidation • Give oxidation of fatty acids with odd number of carbon atoms • Give a brief account of oxidation of Unsaturated fatty acids • Explain Lipid peroxidation and its significance • Elaborate the phospholipids' synthesis and degradation. Discuss related metabolic disorders • Discuss Synthesis and degradation of phospholipids and their metabolic Disorders • Explain Triacylglycerol synthesis with its regulation • Describe the mobilization and transport of fatty acids, triacylglycerol and sterols • Explain Mechanism of synthesis of ketone bodies and give their utilization and significance in body 		
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			<ul style="list-style-type: none">• Define Ketosis and explain its mechanism• Explain the mechanism of Cholesterol synthesis along with its regulation• Enumerate functions and fate of the intermediates of Cholesterol degradation.• Define and explain Hypercholesterolemia in relation with the pathophysiology of atherosclerosis• Define Plasma Lipoproteins also discuss VLDL, LDL, HDL, and Chylomicrons with respect to their transport, functions and importance in health and diseases• Differentiate between Bile Acids and Bile Salts• Describe the role of Troponins in diagnosis of MI		
Practicals					
Practical	<ul style="list-style-type: none">• Analyze the results of given experiment• Differentiate between types of lipids	Rancidity of Fats	Practical	OSPE	
		Microscopic Examination of Cholesterol Crystals			
		Salkowski's Test			
		Liebermann Burchard Test			
		Chemical Examination of Urine - Rothera's Nitropruside Test			

Medicine

S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1	Risk Factors for IHD	Relate clinical knowledge of prevention of IHD with the physiological and biochemical basis	<ul style="list-style-type: none"> Enumerate risk factors Describe clinical significance of risk factors Plan a strategy for primary/secondary/prevention of IHD 	LGIS/SGD	MCQ
2	Acute MI	Relate clinical knowledge of MI with the physiological and biochemical basis	<ul style="list-style-type: none"> Diagnose a case of MI by its clinical features Suggest appropriate lab test for diagnostic confirmation 	LGIS/SGD	MCQ
3	Heart Failure	Relate clinical knowledge of heart failure with the physiological and biochemical basis	<ul style="list-style-type: none"> Differentiate clinical features of right and left heart failure Describe pathophysiology of heart failure Suggest outline of treatment based on the pathophysiology 	LGIS/SGD	MCQ
4	ECG-Heart Blocks	Identify various types of heart blocks on ECG	Types of heart blocks on ECG	LGIS/SGD	MCQ
5	ECG-Arrhythmias	Identify various types of arrhythmias on ECG	Types of arrhythmias on ECG	LGIS/SGD	MCQ
6	Hypertension	Relate clinical knowledge of hypertension with the physiological and biochemical basis	<ul style="list-style-type: none"> Diagnose a case of hypertension Describe common causes of hypertension Enumerate possible target organ damage by hypertension 	LGIS/SGD	MCQ

7	Shock	Relate clinical knowledge of shock with the physiological and biochemical basis	<ul style="list-style-type: none"> • Diagnose different cases of shocks • Describe pathophysiology of various organs in shock • Outline the treatment strategy in different types of shock 	LGIS/SGD	MCQ
8	Edema	Correlate pathophysiology and complications of shock with the physiological and biochemical basis	<ul style="list-style-type: none"> • Classify Edema • Describe pathophysiology and complications 	LGIS/SGD	MCQ

Surgery

ANATOMY					
S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1	CVS	<ul style="list-style-type: none"> Interpreted different contrast studies in relation to various diseases of cardiovascular system Develop an understanding regarding surgical aspects of various diseases CVS 	<ul style="list-style-type: none"> Interpret findings on Arteriogram to understand various diseases of arteries Interpret findings on venogram to understand various diseases of veins Interpret findings on lymphangiogram to understand various diseases of lymph nodes and lymph vessels Develop an understanding of surgical aspects of various diseases of heart and great vessels 	LGIS/ SGD	MCQ
2	Thorax	Relate radiological and clinical findings of thorax with various traumatic and non-traumatic diseases	<ul style="list-style-type: none"> Interpret findings on Chest X-Rays in relation to various diseases of thorax-1 Interpret findings on Chest X-Rays in relation to various diseases of thorax-2 Apply knowledge of anatomy to understand the effects of trauma to various organs of thorax-1 Apply knowledge of anatomy to understand the effects of trauma to various organs of thorax-2 Appraise the knowledge of anatomy to understand signs caused by various mediastinum nesses 	LGIS/SGD	MCQ

			<ul style="list-style-type: none"> Appraise the knowledge of anatomy to understand signs and symptoms of Thoracic Outlet Syndrome 		
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Research Methodology					
S.No	Topic/ Theme	Learning Outcomes	Learning Objectives/Contents	Instructional strategies	Assessment Tool
1.	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
2.	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
3.	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

YEAR I

BLOCK-III

(08 Weeks)

- 1. RESPIRATORY AND HIGH ALTITUDE**
- 2. LOCOMOTOR II**



1. Introduction:

Asthma and allergic respiratory diseases are on the rise in Pakistan due to increase in pollution. At the same time diseases like lung cancer and chronic bronchitis are also increasing because of cigarette/ shisha smoking. A firm understanding of the respiratory system is therefore very important for undergraduate students so that they can manage these diseases in clinical settings in future. This block focuses on respiratory system along with gross anatomy of lower limb and biochemical knowledge of vitamin. The research methodology, Behavioral Sciences & Professionalism will be taught as a part of the longitudinal theme.

2. Duration:

Total duration of the block is 10 weeks. 8 weeks are for teaching and learning and 2 weeks are for end block assessment

3. Learning Outcomes:

At the end of this module, student will be able to:

- Recognize the normal histomorphological features of different parts of tracheobronchial tree so as to identify common histopathological conditions of respiratory system, in clinical years.
- Appraise the concepts of gross anatomy of bones, muscles & joints of lower limb to deal with the common musculoskeletal diseases (e.g. fractures, sprains, dislocations) and performance of required surgical procedures in the clinical years.
- Analyze physiological mechanisms controlling the functions of respiratory system, its regulation and adjustments in unique environments.
- Apply the biochemical knowledge of vitamin for understanding its associated disorders

RESPIRATORY AND HIGH ALTITUDE

ANATOMY

S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1.	Histology of Respiratory system	<ul style="list-style-type: none"> Recognize the normal histo-morphology of different parts of trachea-bronchial tree. Apply knowledge of histological structure of trachea-bronchial tree in different clinical scenarios. 	<ul style="list-style-type: none"> Enumerate cells comprising respiratory epithelium. Elucidate the light microscopic structure of different components of respiratory tract (conducting and respiratory portion) Explain the progressive modifications of wall of respiratory tract from trachea down to alveoli. Describe the components of respiratory membrane and role of type-II alveolar cells in surfactant production and respiratory distress syndrome. Appraise 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. Skill: Identify and illustrate histological structure of different parts of tracheobronchial tree (trachea and lungs). 	LGIS, Practical	MCQs, SAQs, SEQs OSPE, Viva voce

			<ul style="list-style-type: none"> • Give two points of identification of each slide 		
2.	Develop-ment of Respiratory system	Correlate the development of respiratory system with common congenital anomalies.	<ul style="list-style-type: none"> • Describe the development of trachea. • Comprehend the embryological basis of various types of tracheoesophageal fistulae & justify their relationship with polyhydramnios. • Explain different stages of lung maturation. • Enumerate factors important for normal lung development • Analyze embryological basis and prevention of respiratory distress syndrome in a premature infant. 	LGIS	MCQs/SAQs /SEQs/Viva voce/ OSPE
3.	Birth Defects	Analyze the embryological basis of common birth defects induced by chromosomal and/or environmental factors.	<ul style="list-style-type: none"> • Summarize principles of teratology • Classify teratogens with associated human malformations in a tabulated form (thalidomide disaster, TORCH: toxoplasmosis, rubella, cytomegalovirus, herpes, physical: x rays and hyperthermia, alcohol,smoking, vit A, mercury, lead, androgens, maternal diabetes and obesity, antiepileptics) • Identify critical period of prenatal human development 	LGIS	MCQs/SAQs /SEQs/Viva voce/ OSPE

			<ul style="list-style-type: none"> • Enumerate numerical & structural chromosomal abnormalities. • Relate the embryological basis of Trisomy 13, 18 and 21, Klinefelter and Turner syndrome with their clinical presentations. • Relate the embryological basis of Cri-du-chat, Angelman and Prader-willi syndrome with their clinical presentations. • Explain embryological basis of mosaicism • Discuss invasive and noninvasive approaches for assessing growth & development of fetus in utero 		
4.	Development of body cavities	Correlate the development of body cavities with common 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 	LGIS	MCQs/SAQs /SEQs/Viva voce/ OSPE

			<ul style="list-style-type: none"> Correlate the nerve supply of diaphragm with its developmental sources Correlate the anomalies of ventral body wall and diaphragm with normal development 		
5.	Development of skeletal system	Correlate the development of different components of skeletal system with common congenital anomalies	<ul style="list-style-type: none"> Identify the sources of origin of skeletal system. Revisit the parts and derivatives of a somite. Describe the normal development of vertebral column with emphasis on mesenchymal, cartilaginous and bony stages of development, with special focus on the process of resegmentation. Describe the development of ribs and sternum. Define spina bifida. Distinguish various types of spina bifida on embryological basis Appraise prenatal prevention and prenatal diagnosis of spina bifida. Explain embryological basis of accessory ribs, variation in number of vertebrae, abnormal vertebral curvatures and sternal anomalies. 	LGIS	MCQs/SAQs /SEQs/Viva voce/ OSPE
6.	Development of muscular system	Correlate the development of muscular system with	<ul style="list-style-type: none"> Identify the sources of origin of different types of muscles. 	LGIS	MCQs/SAQs /SEQs/Viva voce/ OSPE

		common congenital anomalies	<ul style="list-style-type: none"> Enumerate the muscles derived from primaxial and abaxial domains of myotome in different regions of body. Discuss the embryological basis of Poland sequence, Prune belly syndrome and congenital torticollis. 		
7.	Development of Limbs	Correlate the development of different components of limbs with different types of limb defects.	<ul style="list-style-type: none"> Describe the formation and growth of limb buds. Define apical ectodermal ridges and discuss its role in limb development including digits. Correlate the rotation of upper and lower limbs with the development of compartments and nerve supply. Compare development of upper and lower limbs. Describe the role of thalidomide in limb anomalies in relation with critical period of limb development. Define various abnormalities of limbs (Amelia, phocomelia, micromelia, meromelia, syndactyly with its types, brachydactyly, ectrodactyly, polydactyly, cleft hand and foot, absence of limb bones). Describe the embryological basis causes, gender distribution and 	LGIS	MCQs/SAQs /SEQs/Viva voce/ OSPE

			clinical features of club foot and congenital dislocation of hip joint.		
8.	General Anatomy of Skin and fascia	Apply the general anatomical concept of skin and fascia in understanding of their regional distribution and differentiation.	<ul style="list-style-type: none"> Enumerate the components of integumentary system. Enumerate skin layers and its appendages with their general features. Elucidate the clinical significance of cleavage lines and fingerprints. Relate the degree of burn to skin layer affected Classify fascia and its modification with examples(superficial and deep fascia, retinacula, capsule, bursa etc.) 	LGIS	MCQs/SAQs /SEQs/Viva voce/
9.	General Anatomy of Nervous system-	Correlatethe general anatomical structure ofdifferent parts of nervous system, with its functional importance.	<ul style="list-style-type: none"> Classify nervous system on anatomical and physiological basis. Enumerate the components of central and peripheral nervous system. Trace the formation, distribution/course and branches of a typical spinal nerve Appraise the formation of nerve plexus in limbs Define a dermatome Appraise the clinical importance of dermatome Define autonomic nervous system (ANS). Tabulate the differences between autonomic and 	LGIS	MCQs/SAQs /SEQs/Viva voce/

			<p>somatic nervous systems.</p> <ul style="list-style-type: none"> • Enumerate the main divisions of ANS. • Describe the differences of two main divisions of ANS in tabulated form. 		
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LOCOMOTOR-II

S.No.	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1.	Hip bone, Femur Tibia, fibula patella	<ul style="list-style-type: none"> Appraise the topographic orientation of major bones of lower limb along with their attachments and articulations. 	<ul style="list-style-type: none"> Demonstrate the anatomical Position of hip bone, femur, tibia fibula & patella. Determine the 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 fracture of femoral neck. 	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE
2.	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	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE
3.	Fascia of lower limb	Appraise the attachments, modifications and of superficial & deep fascia of lower limb	<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 & 	SGD	MCQs/ SAQs/ OSPE/ VIVA VOCE

			importance of iliotibial tract.		
4.	Gluteal region	Correlate the topographic anatomy of muscles and neurovascular structures of Gluteal region with their clinical conditions.	<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 structures passing through them. • Enumerate the nerves entering gluteal region and comprehend the origin, important relations & muscles innervated by each. • Analyze 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 • Skill: Identify muscles & neurovasculature of gluteal on the model/prosected specimen. 	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE
5.	Compartment-ments of the 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 anterior fascial compartment of thigh (muscles, neurovascular bundle, lymph nodes) 	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

			<ul style="list-style-type: none"> • Appraise the topographic presentation and formation of femoral triangle • Name the contents of femoral triangle in a sequential order • Trace the continuity of different walls of femoral sheath with abdominal fasciae • 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 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. • Trace the area of drainage of different groups of inguinal lymph nodes. 		
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			<ul style="list-style-type: none"> • Describe the functions of muscles of thigh to understand the displacement of fragments of fractured femur. • Explain the contents of medial fascial compartment of thigh(muscles, neurovascular bundle, lymph nodes) • Explain the contents of posterior fascial compartment of thigh(muscles, neurovascular bundle, vascular anastomoses, lymph nodes) • Correlate the signs and symptoms of sensory and motor loss with the level of injury of femoral, sciatic,and obturator nerves. <p>Skill:</p> <ul style="list-style-type: none"> • Identify the attachments of muscles of anterior compartment of thigh on skeleton, cadaver, models. • Mark the femoral artery, femoral nerve, & sciatic nerve, superficial and deep inguinal rings on surface of subjects. • Identify the muscles, and neurovascular structures of thigh on the prosected specimens 		
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6.	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 in upper, middle and lower parts of fossa. Draw & label genicular anastomosis and discuss its clinical significance. 	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE
7.	knee joint	<ul style="list-style-type: none"> Analyze the structure and mechanism of knee joint movements Relate the knowledge of knee joint to relevant injuries 	<ul style="list-style-type: none"> Describe the articular surfaces, capsule, ligaments (intra- & extra-articular), synovial membrane, nerve supply, blood supply, important relations of knee joint. Elucidate the various movements of the joint (axes, limiting factors and muscles involved). Analyze mechanism of locking and unlocking of knee joint while foot is off or on the ground. Correlate various types of bursae (communicating and non-communicating bursae) to their clinical significance. Identify the role of vastus medialis in stability of patella. Analyze various meniscal injuries 	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

8.	Tibiofibular joints		Outline various types of tibiofibular joints.	SGD	VIVA VOCE
9.	Compartment- ments of the leg	Apply the knowledge of anatomy of leg in analyzing relevant clinical scenarios	<ul style="list-style-type: none"> • Explain 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 neck of fibula) according to nerve injury. <p>Skill:</p> <ul style="list-style-type: none"> • Mark the common peroneal & tibial nerve on the surface of given subject. • Identify the muscles, • and neurovascular structures of leg on a given prosected specimens. 	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE
10.	Ankle Joint	Correlate the anatomical knowledge of ankle joint with relevant ankle injuries	<ul style="list-style-type: none"> • Describe the articular surface, 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 	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

			<p>joint with emphasis on structures related to various retinaculae.</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. <p>Skill: Identify the arrangement of tendons, arteries, and nerves in the region of ankle joint (in relation to retinacula of ankle) in the given model/ specimen.</p>		
11.	Articulated foot	<ul style="list-style-type: none"> Describe the arches of foot <p>Describe the mechanism of inversion and eversion of foot.</p>	<ul style="list-style-type: none"> Recognize important bony landmarks, muscular & ligamentous attachments on calcaneus & talus Describe the inversion and eversion of foot with reference to joints, axes and muscles involved. Describe the formation of arches of foot and factors responsible for their stability. Justify the clinical importance of arches of foot(flat foot) <p>Skill:</p> <ul style="list-style-type: none"> Identify the bones in an articulated foot and on radiographs <p>Demonstrate anatomical position and</p>	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

			determine the side of calcaneus and talus.		
12.	Foot- Dorsum	Outline topographic anatomy of dorsum of foot.	<ul style="list-style-type: none"> Analyze the formation of dorsal digital expansion. Skill: Palpate dorsalis pedis on a subject Identify extensor digitorum brevis.	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE
13.	Foot- Sole	Appraise various layers of sole in a sequence	<ul style="list-style-type: none"> Correlate the clinical presentation of plantar fasciitis to anatomical knowledge of plantar aponeurosis. Skill: <ul style="list-style-type: none"> Identify the structures in each layer of sole of foot in the prosected specimen /model. Recognize the arteries and nerves of sole of foot. 	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE
14.	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 in lower limb with focus on cutaneous innervation. 	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE
15.	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 Illustrate lumbar & sacral plexus. Analyze the clinical presentation of 	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

			<p>various nerve injuries (sciatic, femoral, obturator, common peroneal, superior gluteal, inferior gluteal)</p> <ul style="list-style-type: none"> Correlate the lower limb nerve injuries to common fractures. 		
16.	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	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE
17.	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. Analyze a case of varicose veins with emphasis on predisposing factors, causes, clinical presentations, role of valves and perforators) Appraise the importance of great saphenous vein in CABG. <p>Skill: Mark great and small saphenous vein on given subject.</p>	SGD	MCQs/ SEQs/ SAQs/ OSPE/ VIVA VOCE

18.	Lymphatic drainage of lower limb	Appreciate the clinical importance of lymphatics in lower limb	Apply the knowledge of lymphatic drainage of lower limb to locate the site of infection or malignancy.	SGD	MCQs/ SEQs/ SAQs/ VIVA VOCE
19.	Surface marking	Locate the site of deeply placed structures of lower limb on skin.	Mark the nerves and vessels of lower limb on the surface with the help of important bony land marks.	SGD	OSPE

List of Anatomy (Histology) Practicals:

Identify & illustrate the given slides of:

- Trachea
- Lungs

PHYSIOLOGY					
S.NO	Topic	Learning Outcomes	Learning Objectives/Contents	Instructional Strategies	Assessment tools
1	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"> Recognize the functional anatomy of various parts of respiratory system Highlight the non-respiratory functions of respiratory tract 	Lectures/SG D/ CBL	MCQ/SAQ/ structured viva
2	Pulmonary Mechanics	<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"> Distinguish functions of inspiratory and expiratory muscles during quiet and forceful respiration Correlate normal lung volumes/capacities to various pressures and volume changes during forceful respiration 	Lectures/SG D/ CBL	MCQ/SAQ/ structured viva
3	Pulmonary Compliance	Explain factors determining pulmonary compliance	<ul style="list-style-type: none"> Discern lung and chest wall compliance Identify composition & role of surfactant in alveolar surface tension State concept of work of breathing 	Lectures/SG D/ CBL	MCQ/SAQ/ structured viva
4	Respiratory Membrane & Diffusion of Gases	Compare the different modes of gas transport in blood	<ul style="list-style-type: none"> Appreciate the layers of respiratory membrane in detail Appraise concept of diffusing capacity through respiratory membrane Identify factors affecting gas diffusion through 	Lectures/SG D/ CBL	MCQ/SAQ/ structured viva

			respiratory membrane		
5	Diffusion of gases & Oxygen transport		<ul style="list-style-type: none"> • State the mechanics of oxygen diffusion from alveoli to blood • Distinguish mechanism of oxygen transport in the arterial blood, tissue fluid and cell 	Lectures/SG D/ CBL	MCQ/SAQ/ structured viva
6	Oxygen transport & Dissociative curve		<ul style="list-style-type: none"> • Identify the role of Hb in oxygen transport • Analyze normal oxygen-hemoglobin dissociation curve by explaining factors that shift oxygen-hemoglobin dissociation curve to right and left 	Lectures/SG D/ CBL	MCQ/SAQ/ structured viva
7	Carbon dioxide transport		<ul style="list-style-type: none"> • Identify various chemical form in which CO₂ is transported in blood • Discern normal CO₂ dissociation curve explaining Bohr effect, haldane effect and chloride shift 	Lectures/SG D/ CBL	MCQ/SAQ/ structured viva
8	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"> • State different group of neurons composing respiratory center • Review nervous control of inspiration and respiratory rhythm • Recognize the regulatory mechanism of hering-breuer inflation reflex 	Lectures/SG D/ CBL	MCQ/SAQ/ structured viva

9	Chemical regulation of respiration		<ul style="list-style-type: none"> • Appraise location, function and stimulation (by CO₂ and H⁺) of central chemosensitive area • Identify the role of peripheral chemoreceptors for control of respiration • Determine the composite effects of PCO₂, pH, & PO₂ on alveolar ventilation 	Lectures/SG D/ CBL	MCQ/SAQ/ structured viva
10	Pulmonary circulation V _a /Q		<ul style="list-style-type: none"> • Appreciate pressure differences b/w pulmonary & systemic circulation • Analyze the pulmonary blood flow and effect of hydrostatic pressure on it and the concept of ventilation perfusion ratio 	Lectures/SG D/ CBL	MCQ/SAQ/ structured viva
11	Hypoxia	Distinguish between various respiratory abnormalities	<ul style="list-style-type: none"> • Identify various causes of hypoxia • Analyze effects of hypoxia on the body and role of oxygen therapy in different types of hypoxia 	Lectures/SG D/ CBL	MCQ/SAQ/ structured viva
12	Cyanosis/Asphyxia/ Hypercapnia		<ul style="list-style-type: none"> • List causes of cyanosis and asphyxia • Enunciate hypercapnia & its association with various forms of hypoxia • Interpret effects of very high blood CO₂ levels on respiratory center 		

13	Obstructive lung Diseases		Discuss the causes and pathophysiology of obstructive lung diseases and evaluate its effects on respiration		
14	Restrictive lung Diseases		<ul style="list-style-type: none"> • Discuss the causes and pathophysiology of Restrictive lung diseases and evaluate its effects on respiration • Draw and explain the spirogram of obstructive and restrictive lung diseases • Differentiate between Obstructive and restrictive lung disease based on spirometry and FEV1 / FVC ratio 		
15	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"> • Analyze 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 		
16	AMS/HAPE/HACE		<ul style="list-style-type: none"> • Explain causes, pathophysiology & clinical features of AMS/HAPE/HACE • State prevention and treatment of AMS/HAPE/HACE 		
17	Deep sea physiology		<ul style="list-style-type: none"> • Analyze changes in physiology under deep sea 		

			<ul style="list-style-type: none"> Describe the pathophysiology, clinical features, prevention and treatment modalities of Decompression sickness, Nitrogen Narcosis, Oxygen and carbon dioxide toxicity Identify uses of hyperbaric oxygen therapy 		
18	Space Physiology		Explain the effects of G forces and microgravity on the body		
19	Exercise Physiology	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. Relate the effects of types of exercise, muscle fatigue and VO₂max on exercise performance Explain the significance of oxygen debt. Describe the effects of training on the heart and coronary circulation and how these changes contribute to an increase in VO₂max. 		
Practicals					
1		Examine respiratory system on an SP in a	Steps for examination of chest	Practical	OSPE

	Practicals related to respiratory system	proper sequence of inspection, palpation, percussion and auscultation			
2		Study the spirometer and operate the instrument	What is Spirometer and its uses		
3		Record of Tidal Volume, Inspiratory Reserve volume, and Expiratory reserve volume by using Student's spirometer and Kymograph and label it.	Uses of Spirometer		
4		Record the forced expiratory Volume by using Student's Spirogram	Recording the forced expiratory Volume by Spirogram		
5		Measure Peak Expiratory Flow Rate (PEFR) and report the reading	Measurement of Peak Expiratory Flow Rate (PEFR)		
6		Analyze with the help of Arterial Blood Gases (ABG) report	ABG report to diagnose respiratory acidosis and respiratory alkalosis		

BIOCHEMISTRY					
S.NO	Topic/ Theme	Learning Outcomes	Learning Objectives/Contents	Instructional Strategies	Assessment tools
1	Vitamins	<ul style="list-style-type: none"> Classify 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, Deficiency manifestations and Daily allowance of water soluble vitamins (Vitamin C, B1, B2, B3, B6, pantothenic acid, Folic acid, Biotin and B12). Discuss daily allowance, sources, chemistry, biochemical functions, deficiency manifestations, and Hypervitaminosis of fat soluble vitamins (Vitamin A, D, E & K). 	Lecture/ SGD/ CBL	MCQ/ SAQ/ SEQ
		Interpret the result of given examination	Vitamin D	Practical	OSPE
			Vitamin C		
			Vitamin A		

Medicine

S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1	Obstructive Lungs disease	Diagnose various obstructive lung diseases on the basis of clinical features and lung function test	<ul style="list-style-type: none"> • Clinical features of obstructive lung diseases • lung function tests • Describe effects on lung physiology 	Lectures/SGD	MCQ
2	Restrictive lungs disease	Diagnose various restrictive lung diseases on the basis of clinical features and lung function tests	<ul style="list-style-type: none"> • Clinical features of restrictive lung diseases • lung function tests • Describe effects on lung physiology 	Lectures/SGD	MCQ
3	Respiratory distress syndrome	Recognize respiratory distress syndrome	<ul style="list-style-type: none"> • Identify respiratory distress syndrome • Enumerate its common causes 	Lectures/SGD	MCQ
4	Acute and chronic mountain sickness	<ul style="list-style-type: none"> • Plan a strategy for prevention and treatment of acute and chronic mountain sickness • Describe HAPE and HACE 	<ul style="list-style-type: none"> • Diagnose acute and chronic mountain sickness by its clinical features • Describe HAPE and HACE • Plan a strategy for its prevention and treatment 	Lectures/SGD	MCQ
5	Respiratory Failure	Plan a treatment strategy for respiratory failure	<ul style="list-style-type: none"> • Diagnose respiratory failure • Enumerate its common causes • Plan a treatment strategy 	Lectures/SGD	MCQ
6	Pulmonary Embolism	Diagnose pulmonary embolism by its clinical features and appropriate	<ul style="list-style-type: none"> • Enumerate risk factors of DVT/ Pulmonary embolism 	Lectures/SGD	MCQ

		investigations relating to its physiology	<ul style="list-style-type: none"> • Diagnose pulmonary embolism by its clinical features • Plan appropriate investigations for diagnosis 		
7	Pleural Effusion	Diagnose pleural effusion by its clinical features and appropriate investigations relating to its physiology	<ul style="list-style-type: none"> • Diagnose pleural effusion by its clinical features • Describe effects of pleural effusion on lung physiology • Plan appropriate diagnostic investigations 	Lectures/SGD	MCQ
8	Pneumonia /Bronchiectasis	Diagnose pneumonia/ Bronchiectasis by its clinical features and appropriate investigations relating to its physiology	<ul style="list-style-type: none"> • Diagnose clinical features of pneumonia/ Bronchiectasis • Describe effects on lung physiology • Plan appropriate diagnostic investigations 	Lectures/SGD	MCQ

Surgery

ANATOMY

S.No	Topic/ Theme	Learning outcomes	Learning Objectives/Contents	Instructional strategies	Assessment tool
1	Respiratory and High altitude				
2	Locomotor- II (Lower Limb)	Correlate the anatomical knowledge of lower limb with various clinical presentations.	<ul style="list-style-type: none"> Analyze the anatomical basis of given clinical conditions: <ul style="list-style-type: none"> Varicose veins Saphenous venous grafts. Venous ulcers Venous thrombosis Thrombophlebitis Identify the sites of Venae sections. Identify effects and causes of fractures of femur, tibia, fibula and hip bone Identify effects and causes of dislocation of hip, knee and ankle joints. Discuss various lower bursae and their clinical significance, popliteal cyst formation, cox valgus/ varus, Genu varus /valgus, flat foot. Discuss clinical presentation of nerve injuries/ compression Appraise the indications and levels of limb various amputations Discuss phantom limb pain 	LGIS	MCQ

Research Methodology					
S.No	Topic/ Theme	Learning Outcomes	Learning Objectives/Contents	Instructional strategies	Assessment Tool
1.	Literature Review	Able to search scientific literature related to the chosen topic from medical data basis and digital library/ from internet/ library	<p>Purpose and types of literature medical literature (original study. Case study systematic review, Meta-analysis); Sources of information Libraries - provide access to many types of resources</p> <ul style="list-style-type: none"> • Internet / Databases • Books • Journals /Conference proceedings 	LGIS/ Group assignment	MCQ/ SEQ
2.	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
3.	Operational definition Hypothesis	Formulate operational definition and research hypothesis	Formulation of operational definition of impotent variables. Types of research hypothesis	LGIS/ SGD	MCQ/ SEQ

Learning Resources:

For Anatomy:

- a. Clinical Anatomy for Medical Students by Richard Snell (9th edition).
- b. Basic Histology Text and Atlas by Luiz Carlos and Junqueira (14th edition)
- c. Basic Histology by Laiq Hussain Siddiqui (5th Revised edition)
- d. Medical Embryology by Langman (14th edition).
- e. Essential Clinical Anatomy by Keith Moore (7th edition).
- f. The Developing Human by Keith Moore (10th edition).
- g. General Anatomy by Laiq Hussain Siddiqui.

TABLE OF SPECIATION

1st YEAR MBBS

- **Anatomy**
- **Physiology**
- **Biochemistry**

First Professional MBBS Examination (2020)

ANATOMY

Table of Specifications for Annual First Professional Examination: Theory

Time Allowed = 03 hrs. *(Including MCQs)*

Marks of theory paper = 80

Internal assessment = 20

Total marks = 100

Pass Marks = 50

Paper-1

40 x MCQs

(40 Marks)

Time =50 min

Paper-2

Q. No. 1,2,3,4,5,6,7,8

4x SAQs/SEQs (Recall) = 05 marks each

4x SAQs/SEQs (Application) = 05 marks each

Total Marks = 40 Marks

Time = 2 hours & 10 min

S. No	Topic	NUMBER OF MCQs (40) Recall: 25 Application: 15 1 mark each	NUMBER OF SAQs/SEQs (08) 05 marks each	
			Recall (04)	Application (04)
1.	General Embryology Special Embryology	04 03		01 (05 marks)
2	General Histology Special Histology	04 02	01 (05 marks)	-
3	General Anatomy	05	-	-
4	Upper limb	08	01 (05 marks)	01 (05 marks)
5	Lower limb	08	01 (05 marks)	01 (05 marks)
6.	Thorax	06	01 (05 marks)	01 (05 marks)
Total		40 (40 Marks)	04 (20 Marks)	04 (20 Marks)
			08 (40 Marks)	

Theory: Internal Assessment (IA) Calculation (20 Marks)

Exams	Weightings	Exams	Percentage
End of Block Pre annual Exams	80%	End of Block Exam - I	20
		End of Block Exam - II	20
		End of Block Exam- III	20
		Pre-Annual Exam	20
Modular Exams	20%	Modular Tests	10
		Assignments	10
Total	100%		100%

Table of Specifications for Annual Professional Exam: Practical

Sr #	Topics	VIVA 40 Marks	OSPE 38 Marks Gross, Embryo, Radiology 02 marks / Station Histology 1 mark /station		Histology Manual 02 Marks	Grand Total/ Component
			Station (unobserved) 26 Marks	Observed Stations 12 Marks		
1	General Embryology Special embryology	10	01 (02 marks)	-		12
2	General Histology Special histology	-	10 (10 marks)	9 marks (long slides)	02 marks	21
4	Lower Limb	10	02 (04 marks)	Surface Marking 1 mark		14
5	Upper Limb	10	02 (04 marks)	1 mark		15
6	Thorax	10	02 (04 marks)	1 mark		15
7	Radiology	-	01 (02 marks)	-		03
Total		40 Marks	18 (26 Marks)	12 Marks	02 Marks	80 Marks

PS SEQ of application level each year can be given from upper limb, lower limb or thorax

***Clinical application of anatomy(surgery)will be asked through application level Questions**

Practical: Internal Assessment Calculation (20 Marks)

Exams	Weightings	Exams	Percentage
End of Block Pre annual Exams	80%	End of Block Practical/OSCE I	20
		End of Block Practical/OSCE II	20
		End of Block Practical/OSCE III	20
		Pre-Annual Exam	20
Portfolio/ Log Book	20%	1) SGD/ CBL/ PBL 2) Projects 3) Presentations 4) Students' Reflections	20
Total	100%		100%

- CBL/Assignments /Gross Sketch copies are part of Formative Assessment.

First Professional MBBS Examination (2020)
PHYSIOLOGY

Table of Specifications for Annual First Professional Examination: Theory

Time Allowed	=	03 hrs (Including MCQs)	
Marks of theory paper	=	80	
Internal assessment	=	20	
Total marks	=	100	
Pass Marks	=	50	
40 x MCQs (on separate sheet)		(40 Marks)	Time =50 min
Q. No. 1,2,3,4,5,6,7,8			
3x SAQs/SEQs (Recall) =		05 marks each	
5x SAQs/SEQs (Application) =		05 marks each	
Total Marks		= 40 Marks	Time = 2 hours & 10 min

S No	Topic	Number of MCQs (40) Recall: 16 Application: 24 01 mark each		Number of SAQs/SEQs (08) 05 Marks each	
		Recall	Application	3x Recall, 3x Application	2 x Application
1	Cell + Nerve muscle	04	05	01	Any 2 from whole course
2	Blood	05	07	01	
3	CVS	04	07	02	
4	Respiration + Environment + Sports	03	05	02	
Total		40 (40 Marks)		08 (40 Marks)	

Theory: Internal Assessment (IA) Calculation (20 Marks)

Exams	Weightings	Exams	Percentage
End of Block Pre annual Exams	80%	End of Block Exam - I	20
		End of Block Exam - II	20
		End of Block Exam- III	20
		Pre-Annual Exam	20
Modular Exams	20%	Modular Tests	10
		Assignments	10
Total	100%		100%

Table of Specifications for Annual Professional Exam: Practical

Viva (Theory) 40 marks		Practical/OSPE			
Internal Examiner	External Examiner	OSPE (35)		Practical Journal	Total
		Observed	Unobserved		
20	20	25	10	5	80

***Number of observed stations are on the discretion of internal examiners but a minimum of three stations must be kept**

Example: - 1 Marks= 25 Maximum Stations = 5 Time per stations= 5 mins Total Time= 25 Minutes	Example: - 2 Marks =25 Stations = 3 Marks/ Stations= 8+8+9 Time / Stations= 8 Minutes
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Practical: Internal Assessment Calculation (20 Marks)

Exams	Weightings	Exams	Percentage
End of Block Pre annual Exams	80%	End of Block Practical/OSCE I	20
		End of Block Practical/OSCE II	20
		End of Block Practical/OSCE III	20
		Pre-Annual Exam	20
Portfolio/ Log Book	20%	5) SGD/ CBL/ PBL 6) Projects 7) Presentations 8) Students' Reflections	20
Total	100%		100%

First Professional MBBS Examination (2020)

BIOCHEMISTRY

Time Allowed =03 hrs (Including MCQs)

Marks of theory paper =80

Internal assessment =20

Total marks =100

Pass Marks =50

40 x MCQs (on separate sheet) **(40 Marks)**

Time =50 min

Q. No. 1,2,3,4,5,6,7,8,9

7x SAQ/SEQs (Recall) = 04 marks each

2x SAQ/SEQs (Application) = 06 marks each

Topic	NUMBER OF MCQs (40)		7 x SAQ/SEQs (Recall) 04 marks each	2 x SAQ/SEQs (Application) 06 marks each
	Recall	Application		
Chemistry of Protein & Amino Acids + Metabolism of Proteins and Amino Acids	06	02	01	02 x whole course
Chemistry of Lipids + Metabolism of Lipids	06	02	01	
Vitamins	04	02	01	
Mineral and Trace Elements	03	02	01	
Porphyrins & Hemoglobin	03	02	01	
Enzymes	03	02	01	
Biochemistry of cell & Biological membrane + Immunoglobulins	02	01	01	
	27	13	07	02
Total	40 (40 Marks)		09 (40 Marks)	

Theory: Internal Assessment (IA) Calculation (20 Marks)

Exams	Weightings	Exams	Percentage
End of Block Pre annual Exams	80%	End of Block Exam - I	20
		End of Block Exam - II	20
		End of Block Exam- III	20
		Pre-Annual Exam	20
Modular Exams	20%	Modular Tests	10
		Assignments	10
Total	100%		100%

Table of Specifications for Annual Professional Exam: Practical

Viva (Theory) 40 marks		Practical/OSPE 40 marks				Total
Internal Examiner	External Examiner	OSPE (20)		Viva + Performance	Journal	
		Observed (2 Station)	Unobserved (10 Station)			
20	20	10	10	15	5	80

Practical: Internal Assessment Calculation (20 Marks)

Exams	Weightings	Exams	Percentage
End of Block Pre annual Exams	80%	End of Block Practical/OSCE I	20
		End of Block Practical/OSCE II	20
		End of Block Practical/OSCE III	20
		Pre-Annual Exam	20
Portfolio/ Log Book	20%	9) SGD/ CBL/ PBL 10) Projects 11) Presentations 12) Students' Reflections	20
Total	100%		100%