LEARNING OBJECTIVES

DEPARTMENT OF PHYSIOLOGY

FOUNDATION MODULE

PHYSIOLOGY (LGIS)	Learning Objectives
FIRST WEEK	***At the end of lecture students should be able to:***
Introduction to Physiology & Physiology Dept.	Introduction of faculty members
Introduction to Cell & Homeostasis	Understand functional organization of human body Describe homeostasis/control systems of the body
Concept of Body Fluid, Internal Environment and Contribution of Body System towards homeostasis	Enlist the proportion of intra cellular and extra cellular fluids Enlist four control mechanisms of body
Homeostatic Control System	Explain the mechanism of positive feedback, negative feedback, feed forward control and adaptive control with one example each. Define gain of control system
Cell & Cell Membrane Physiology	Describe structure, functions of cell membrane
Physiology of Cell Organelles (ER Golgi Apparatus)	Describe structure, functions of ER, Golgi apparatus
SECOND WEEK	
Lysosome & Perxosome	Describe structure functions of lysosomes and perxosomes
Cell cytoskeleton & Cell locomotion	Describe the structure and functions of cilia and amoeboid movement
Mitochondria	Describe structure and functions of mitochondria
Physiological importance of mitochondria & ATP	Describe the mechanism of ATP generation
Cell membrane, Ion channels	Describe the structure of cell membrane in detail and explain various ion channels
Diffusion	Transport mechanism across the cell membrane
THIRD WEEK	
Transport across cell membrane : Osmosis	Transport mechanism across the cell membrane with special emphasis on osmosis
Transport across cell membrane : Active transport	Explain the types of active transport
Transport across cell membrane : Active transport	Explain the types of active transport
Intracellular communication and cell junctions	Describe the various intracellular connections in detail
Signal Transduction	Describe the various 2nd messenger systems in detail
Structure of nucleus and ribosomes	Understand basic concepts about DNA and RNA
FOURTH WEEK	
Cell Division	Describe mitosis and meiosis
Cell cycle, apoptosis & Pathophysiology of	Explain Cell differentiation, apoptosis, and cellular

cancer	changes in cancer
Cellular control mechanism	Describe different cellular control mechanisms regarding gene regulation

MUSCULOSKELETAL MODULE

PHYSIOLOGY (LGIS)	Learning Objectives
FIRST WEEK	***At the end of lecture students should be able to:***
Stimulus and Response & Types of Stimuli	Define stimulus Describe various types of stimuli and response
Transport revisit	Overview of different modes of transport across the cell membrane
Nernst Potential	Understand the Nernst potential and equilibrium potential for different ions
RMP	Define resting membrane potential of nerves. Explain thefactors which determine the level of RMP
RMP: & Measurement & effect of Electrolytes, Polarized and Hyperpolarized states	Describe the terms polarized and hyperpolarized Describe the role of various ions for these states
SECOND WEEK	
Action Potential	Define and draw action potential
Stages of Action Potential	Describe different phases of action potential
Recording of Action Potential	Briefly describe the method of recording resting membrane potential and action potential
Propagation of Action Potential & Factors effecting nerve conduction	Describe the mechanism of propagation of action potential Describe various factor that effect nerve conduction
Refractory Period, Different types of Action Potentials	Define refractory period and discuss its types Describe various types of action potential
Graded Potential, Comparison with action potential	Define graded Potential Comparison between graded potential and action potential
THIRD WEEK	
Classification of neurons and nerve fibres	Describe the classification of neurons and nerve fibres
Properties of nerve fibres	Discuss the properties of nerve fibres
Introduction to muscle physiology, Structure of sarcomere	Explain the physiologic anatomy of skeletal muscle Draw and label the sarcomere
Sliding filament model of muscle contraction	Discuss the sliding filament model of muscle contraction
Sarcotubular system, Types of Muscle Fibres	Describe the structure of sarcotubular system and its

	importance in muscle contraction Discuss slow and fast types of muscle fibres
FOURTH WEEK	
Concept of Motor unit and motor unit recruitment	Define motor unit Discuss recruitment and its effect on force of contraction
Length duration curve Load and velocity of contraction	Discuss the isotonic and isometric contraction Describe the differences between these two types of contraction
Energetic and efficiency of contraction, heat production in nerve and muscle	
Properties of skeletal muscles, Tetanus & Fatigue	Discuss various properties of skeletal muscle in detail
Neurophils, NGF, Concept of degeneration and regeneration	Explain degeneration of nerve fibres
Synapse and synaptic transmission	Describe synapse and its types Differences between electrical and chemical synapse
FIFTH WEEK	
EPSP, IPSP, Properties of chemical synapse	Discuss in detail various properties of chemical synapse
Properties of chemical synapse	Discuss in detail various properties of chemical synapse
NMJ , Synthesis and release of Ach	Describe the physiologic anatomy of neuromuscular junction.
Excitation-Contraction coupling	Describe the mechanism of transmission of impulses from nerve endings to skeletal muscle fibers Describe briefly the biochemistry of acetyl choline
Drugs acting and NMJ, Myasthenia Gravis Lamber Eaton Syndrome	Enlist drugs that enhance and block transmission at neuromuscular junction Describe the salient features of myasthenia gravis briefly
Physiology of Smooth Muscle	Enlist type of smooth muscles and explain their characteristics
SIXTH WEEK	
Mechanism of Smooth muscle Contraction	Explain the chemical and physical basis of smooth muscle contraction
Properties of smooth muscle	Explain the properties of smooth muscle
Clinical lecture EMG and EMG disorders	
Introduction to myocardium	Describe the physiologic anatomy of myocardium
Properties of myocardium	Discuss in detail various properties of myocardium
Comparison of three types of muscle	Discuss differences among three types of muscle in detail

BLOOD MODULE

PHYSIOLOGY (LGIS)	Learning Objectives
FIRST WEEK	***At the end of lecture students should be able to:***
Composition of blood and functions of blood	Describe composition and general functions of blood
Plasma proteins	Enumerate plasma proteins, their properties, sites of productions and their function
Bone marrow, erythrocytes and hemopoiesis	Explain the role of bone marrow in hemopoiesis and erythropoiesis
Erythropoiesis	Describe the stages of production of RBC
Erythropoietin	Enumerate and explain factors which affect erythropoiesis
Hemoglobin & Hemoglobinopathies	Understand the structure, synthesis and functions of hemoglobin and its types
SECOND WEEK	
Iron metabolism	Role of iron in hemoglobin synthesis and details about iron metabolism in body
Red Cell fragility, ESR and RBC indices	Define various blood indices
Anemias	Enumerate various types of anemias
Anemias and polycythemia	Details about various types of anemias and polycytemia and their effect on circulatory system
Fate of RBCs	Give life span of RBCs and explain their destruction
Jaundice	Describe various types and differences between various types of jaundice
THIRD WEEK	
WBC classification & formation	Enumerate and explain various types of leukocytes and leucopoiesis
Neutrophils, Eosinophils	Explain the characteristics and functions of neutrophils & eosinophils
Basophils, Monocytes, & Lymphocytes	Explain the characteristics and functions of basophils, nonocytes, & lymphocytes
Monocyte-macrophge system	Explain monocyte-macrophge system in detail
Inflammation	Describe the role of neutrophils and monocytes in inflammation
Clinical Lecture Inflammation	
FOURTH WEEK	

Platelets and spleen	Explain thrombocytopoiesis and describe the functions of spleen
Platelets Hemostasis	Functions of platelets
Blood Coagulation	Explain hemostasis, mechanism of blood coagulation, fibrinolysis and anticoagulants
Factor keeping blood in fluid state & bleeding tendencies	Describe the role anticoagulants in hemostasis and various bleeding and clotting disorders
ABO blood grouping system	Explain blood groups and their role in blood transfusion
Rh blood grouping system	Explain blood typing and its importance & describe various blood transfusion reactions
FIFTH WEEK	
Blood groups clinical lecture	Effect of incompatible blood transfusion
Immunity	Define immunity and its types
Immunity	Enumerate various types of lumphocytes and their important characteristics and their preprocessing
Immunity	Define clone and explain the roles of T and B lymphocyte clones in immunity
Immunity	Compare and contrast innate and acquired immunity
Immunity	Difference between passive and active immunity
SIXTH WEEK	
Immunity	Describe immunization and EPI
Immunity	Role of lymphocytes in transplants

CVS MODULE

PHYSIOLOGY (LGIS)	Learning Objectives
FIRST WEEK	***At the end of lecture students should be able to:***
CVS introduction, Heart valves, AV ring	Describe scheme of circulation through the heart and body
Pericardium, Myocardium, Atria & its functions	Describe the physiologic anatomy of cardiac muscle Describe properties of cardiac muscle
Excitation contraction coupling Cardiac action potential	Describe the mechanism of production of action potential and its propagation in cardiac muscle Describe excitation contraction coupling in detail
Autonomic regulation of myocardial activity	Describe the regulation of pumping of heart
Origin, Spread of cardiac impulse & abnormalities	Describe the conductive system of heart in detail Enlist the various components of conductive system of heart Describe the mechanism of production of action

	potential in SA node, AV node, ventricles.also describe its propogation
Cardiac cycle-1	Describe the cardiac cycle in detail Enumerate and explain its events
SECOND WEEK	
Cardiac cycle-2	Explain the events of cardiac cycle
Cardiac cycle-3	Draw various events during cardiac cycle
Physiology of Heart sound	Describe four heart sound and differences between 1^{st} and 2^{nd} heart sounds
Cardiac output & its measurement	Explain cardiac output and various method to measure cardiac output
Factors regulating heart rate & stroke volume	Explain various factor which help in regulation of heart rate and stroke volume
ECG-1	Enumerate and describe normal components of ECG Draw normal ECG Describe the method of recording ECG
THIRD WEEK	
ECG-2	Describe the following. Bipolar limb leads. Einthovians law and Enthovian triangle. Chest leads. Augmented unipolar limb leads Describe how to read normal ECG Describe the principles of vectorial analysis of ECG. Describe the vectorial analysis of normal ECG
Arythmias	Define arrhythmia Describe abnormal sinus rhythms
Heart Block	Describe abnormal rhythms resulting from the block of heart signals within the intra cardiac conduction pathways Describe different degrees of heart block and ECG changes
Ectopic beats Ectopic rhythms	Describe abnormal rhythms resulting from the block of heart signals within the intra cardiac conduction pathways
Flutter, fibrillation and effect of electrolyte abnormalities	Explain the following with the help of relevant ECGs. Premature contractions. Paroxysmal tachycardia. Ventricular fibrillation.

	Atrial fibrillation. Atrial flutter. Cardiac arrest.
Clinical Lecture Murmurs, Pericardial effusion, Cardiac tomponade, stoke adom syndrome overdrive suppression	
FOURTH WEEK	
Clinical Arrythmias, Heart blocks, Sick sinus syndromes, flutter, fibrillation	Describe different degrees of heart block and ECG changes Explain atrial and ventricular flutter and fibrillation
Introduction to circulation & hemodynamic	Describe the physical characteristics of circulation Describe the basic theory of circulatory function
Blood flow; types, regulation	Define and describe Resistance Blood flow Blood pressure Poiseuilles law Blood viscosity
Veins, venous return	Describe how veins are different from arteries Various factors that affect venous return
Blood pressure, Measurement variations	Describe various types of blood pressure Describe method used to record the blood pressure
Vasomotor canter, Baroreceptor & chemoreceptor reflex	Explain short term regulation of blood pressure
FIFTH WEEK	
CNS Ischemic response Cushing reaction, atrial & pulmonary artery reflexus	Explain central nervous system ischemic response & cushing reaction
Long term regulation of arterial pressure	Explain the role of kidneys in long term regulation of blood pressure
Coronary circulation	Understand the physiologic anatomy of coronary blood supply and normal coronary blood flow
Coronary circulation	Control of coronary blood flow
Cerebral blood flow, splanhnic and fetal circulation	Describe the physiologic anatomy and blood flow in normal state Control of blood flow
Skeletal muscle blood flow and CVS charges during exercise	Discuss the blood flow regulation in skeletal muscle at rest and during exercise
SIXTH WEEK	
Clinical Congestive cardiac failure	Define cardiac failure. Classify cardiac failure.
Clinical Hypertension	

	Enumerate the causes of cardiac failure Describe the following in detail. Compensated heart failure. Decompensated heart failure. Low and high output cardiac failure. Cardiac reserve.
Clinical Shock	Define shock. Describe the physiologic causes of shock. Enumerate various types of shock. Describe the stages of shock. Describe the following types of shock in detail. Circulatory shock. Hypovolemic shock. Neurogenic shock. Septic shock. Anaphylactic shock

RESPIRATION MODULE

PHYSIOLOGY (LGIS)	Learning Objectives
FIRST WEEK	***At the end of lecture students should be able to:***
Introduction to respiration	Enlist goals of respiration and discuss physiological anatomy of respiratory system h
Physiology of Alveolus and pleural space	Discuss the role of alveoli and pleural space in respiration and pressure changes during respiration
Functions of respiration	Enlist non-respiratory and respiratory functions of respiration
Mechanics of pulmonary ventilation	Enumerate muscles of inspiration and expiration and Describe mechanics of pulmonary ventilation
Alveolar surface tension and surfactant	Describe surfactant, surface tension and collapse of alveoli
Compliance	Compliance Define compliance. Draw compliance diagram of lungs. Explain relation ship of surface tension,radius of alveoli,elastic forces of lungs with compliance
SECOND WEEK	
Lungs volume and capacities	Define lung volumes and capacities. Define the four pulmonary volumes and capacities. Enlist normal values of all the lung volumes and capacities
Lungs volume and capacities	Draw a graph representing all the lung volumes and

	capacities. Describe how lung volumes and capacities can be measured with spirometer. Enlist the lung volumes and capacities which cant be measured by spirometer
Dead Space	Define dead space. Describe physiological and anatomical dead space
Respiratory Reflexes	Describe in detail cough reflex and sneeze reflex
Pulmonary blood flow	Describe the physiologic anatomy of pulmonary circulatory system. Describe three zones of lung with respect to blood flow. Explain the effects of gravity and heavy exercise on the blood flow of lungs Explain starling forces acting on the lung capillaries to maintain pulmonary interstitial fluid dynamics
Pulmonary edema, effusion, pheumothorax	Define pulmonary edema. Give two most important cause of pulmonary edema. Describe pulmonary edema safety factor. Describe the mechanism of development of pulmonary edema
THIRD WEEK	
Composition of Air	Describe the composition alveolar and atmospheric air Differences between the two types of air and partial pressure of oxygen and carbon dioxide in alveolar air
Respiratory membrane	Define and explain the concept of respiratory membrane. Define and draw respiratory unit Draw a diagram showing the exchange of gases through the respiratory membrane Enlist four factors affecting the rate of gas diffusion through the respiratory membrane
Diffusion across respiratory membrane	Define diffusing capacity of respiratory membrane. Describe the diffusing capacity for oxygen. Describe the diffusing capacity for carbon dioxide. Describe the changes in diffusing capacity of oxygen and carbon dioxide during exercise Compare the diffusing capacities of oxygen and carbon dioxide
VP ratio	Define Explain importance. Draw ventilation perfusion diagram Explain the concept of physiologic shunt and dead space.

	Describe the abnormalities of ventilation perfusion ratio
Transport of oxygen	Describe in detail the transport of oxygen from lungs to tissues
Oxygen-Hb dissociation curve	Describe the role of hemoglobin in oxygen transport. Draw oxy-hemoglobin dissociation curve.
FOURTH WEEK I	
Oxygen-Hb dissociation curve	Enlist and explain factors which shift the curve towards right and left. Briefly explain the transport of oxygen in plasma
Transport of CO_2 Respiratory exchange ratio	Enumerate and explain the various transport forms of carbondioxide in blood.Also state percentages of all these forms Explain the carbondioxide dissociation curve
Transport of CO_2 Respiratory exchange ratio	Define respiratory exchange ratio. Describe haldanes effect ,bohr effect and chloride shift
Control of breathing	Describe term respiratory center. Enumerate the various respiratory centers. Give the anatomical location of respiratory centers
Chemical control of berating	Describe in detail the role of respiratory centers in the regulation of respiration. Explain chemical control of respiration in detail
Chemical control of berating	Describe changes in respiration during exercise. Enumerate and briefly explain factors which affect respiration. Describe briefly the mechanism of periodic breathing and sleep apnea
FIFTH WEEK	
Hypoxia	Define hypoxia. Enumerate and explain its various types. Enumerate the roles of oxygen therapy in different types of hypoxia
Clinical disorders	Explain the physiologic peculiarities of chronic pulmonary emphysema, pneumonia, ateiectasis, asthma and tuberculosis
Pulmonary function tests	Describe all the non-invasive & invasive tests to assess the pulmonary functions
Deep sea diving	Affect of high partial pressure of individual gasses on the body
Deep sea diving	Oxygen toxicity at high pressure Carbon dioxide toxicity at high pressure Explain in detail the process of decompression in deep sea divers
High altitude physiology	Describe the effects of low oxygen pressure on body Enumerate the acute effects of hypoxia on body

SIXTH WEEK	
High altitude physiology	Define and explain the process of acclimatization to low oxygen tension Describe acute and chronic mountain sickness Describe the effects of acceleratory forces on body in aviation and space physiology
Exercise Physiology	Define exercise Describe the effects of exercise on muscle metabolic system
Exercise Physiology	Effects of exercise on respiration and CVS

ANATOMY

DEPARTMENT

LEARNING OBJECTIVES

FOUNDATION MODULE - 1) FOR FIRST YEAR M.B.B.S

LEARNING OBJECTIVES OF LECTURES

Lectures	Learning Objectives
1st Week	**At the end of the lecture students should be able to:**
Introduction to Anatomy	• Define the term Anatomy and its various branches • Use different terminologies related to Anatomy • Describe different Anatomical planes and directions in relation to anatomical position • Understand different phases in life span of man
Anatomical organization of body (Gen. Anatomy)	• Able to define basic tissues of human body • Describe general outlines and functions of basic tissues • Describe formation of different systems of body
Simple Epithelium (Histology)	• Define epithelium. • Discuss general features of epithelial cells (basal, apical and lateral surfaces). • Describe the classification of epithelium. • Describe the location and function of different types of simple epithelium
Lectures	**At the end of the lectures students should be able to:**
2nd Week	
(Introduction to Embryology)	• Able to use different terminologies to describe developmental stages • Discuss significance and importance of studying embryology • Learn series of critical events that take place during embryonic development • Appreciate difference between embryonic and fetal period • State chromosomal theory of inheritance
Ovarian and Uterine cycle (Embryology)	• Describe different stages of mitosis and meiosis • Appreciate differences of mitosis and meiosis • Define and correlate Ovarian and Uterine cycle • Describe different phases of Ovarian and Uterine cycle
Stratified Epithelium (Histology)	• Describe the classification of stratified epithelium. • Describe the function and distribution of stratified epithelium • Appreciate the differences between stratified

	and psuedostratified epithelium • Describe characteristics of transitional epithelium

Lectures	**At the end of the lecture students should be able to:**
3rd Week	
Oogenesis (Embryology)	• Describe anatomy and functions of the female Reproductive system • Discuss role of female hormones during oogenesis • Discuss origin and migration of primordial germ cells • Describe the role of oocycte maturation inhibitor factor • Delineate the stages of oogenesis
Lateral modification of cells (Histology)	• Differentiate types, location and functions of cell junctions associated with lateral domain of cells • Describe histological structure of different cell junctions
Spermatogenesis(Embryology)	• Describe anatomy and functions of the male Reproductive system • Define and explain the spermatogenesis. • State the functions of male hormones during spermatogenesis • Discuss stages of spermiogenesis
Lectures	**At the end of the lecture students should be able to:**
4th Week	
Ovulation and fertilization (Embryology)	• Describe follicular development,ovulation and subsequent events in ovary • Give an account on role of leutinizing hormone in ovulation • Discuss capacitation in female genital tract • Describe different phases and results of fertilization • Understand in vitro fertilization(IVF) • Enlist causes of female infertility.
Apical domain of cell(Histolgy)	• Differentiate types and functions of apical cell modifications • Describe histological structure of apical modifications with clinical significance

Lectures	At the end of the lecture students should be able to:
5th Week	
Implantation (Embryology)	• Outline the process of implantation • Describe changes in Gravid endometrium • Discuss formation of Amniotic cavity, embryonic disc and Umbilical vesicle • Ectopic pregnancy

BLOOD AND IMMUNITY MODULE 3 FOR FIRST YEAR M.B.B.S

LEARNING OBJECTIVES OF LECTURES

Lectures	At the end of the lecture students should be able to:
1st Week	
Integumentary system (Histology)	• Enlist components of integumentary system • Describe histological structure of skin with special reference to cells residing in epidermis. • Describe and differentiate thick and thin skin • Discuss importance of dermal papillae
Notochord formation (Embryology)	• Define notochord • Delineate different stages of notochord formation • Discuss the importance of notochord in development of central nervous system • Describe role of notochord in development of axial musculoskeleton • Understand fate of notochord
Lymphoid system (Histology)	• Define lymphoid system • Enlist components of lymphoid system • Name the cells of immune system with functions • Describe different types of lymphoid tissue
Lectures	**At the end of the lecture students should be able to:**
2nd Week	
Establishment of body axis and fate map (Embryology)	• Discuss establishment of body axis • Draw fate map and discuss its importance in future development • Describe body wall defects and appreciate difference between omphalocele and gastroschisis. • Describe other congenital abnormalities

	associated with gastrulation
Lymphoid Organs (histology)	• Describe general histological structure of tonsils • Enumerate and describe different types of tonsils • Differentiate histological structure of palatine, lingual, and pharyngeal tonsils

Lectures	**At the end of the lecture students should be able to:**
3rd Week	
Integumentary System (Histology)	• Enlist appendages of skin • Describe histological structure of hair and nails • Discuss microscopic structure of sebaceous and sweat glands
Neurulation (Embryology)	• Define neurulation • Understand the formation of neural plate and neural tube • Discuss the formation of neural crest and neural crest cells • Enlist derivatives of neural crest cells • Describe development of primordia of forebrain, midbrain and hind brain along with spinal cord
Lymphoid Organs (Histology)	• Define lymph node • Enlist functions of lymph node • Enumerate supporting elements of lymph node • Draw and label microscopic structure of lymph node • Describe filtration of lymph through lymph node • Discuss importance of high endothelial venules in lymph node
Lectures	**At the end of the lecture students should be able to:**
4th Week	
Lymphoid Organs (Histology)	• Describe the location and functions of thymus • Enumerate different types of reticuloepithelial cells with their location and functions • Draw microscopic structure of thymus • Describe blood thymus barrier • Describe the location and functions of spleen • Draw microscopic structure of spleen • Differentiate between red and white pulp

	• Describe blood circulation through spleen
Neural tube defects	• Recollect the development of central nervous system • Understand the developmental errors leading to the anencephaly • Describe spina bifida • Discuss different types of spina bifida • Understand the importance of folic acid in the prevention of spina bifida
Placenta and membrane 1	• Discuss Implantation and establishment of the embryo within the uterus • Describe the differentiation of the uterine lining into a specialized decidual membrane • Understand the development of a placenta • Describe fetal – maternal association throughout pregnancy • Understand the functions of placenta • Explain placenta previa and its types • Placenta accrete and its complications

Lectures	
5th Week	
Neural tube defects	
Fetal Period 1	• Discuss different phases of prenatal development • Tell importance of all these phases • Differentiate between embryonic and fetal period • Describe major developmental events taking place in specific week • Tabulate growth in length and weight • Tell developmental horizons during fetal period
Placenta and membrane 2	• Enlist human membranes develop during pregnancy • Discuss origin, composition, location, function and fate of yolk sac • Define amnion and explain its origin, composition, location, function and fate • Describe functions of amniotic fluid

	• Describe formation of umbilical cord and its structure • Define allantois along with its impotanceand function
Lectures	**At the end of the lecture student should be able to:**
6th Week	
Fetal Period 2	• Tell the age of viability of fetus • Discuss factors influencing fetal growth • Describe procedures for assessing fetal status • Define amniocentesis and chorionic villous sampling • Describe advantages of chorionic villous sampling over amniocentesis • Tell importance of alpha feto proteins in assessing fetal well being • Describe procedure of fetoscopy, Percutaneous Umbilical Cord Blood Sampling

MUSCULOSKELETAL MODULE (2) FOR FIRST YEAR M.B.B.S
LEARNING OBJECTIVES OF LECTURES

Lectures	**At the end of the lecture students should be able to:**
1st Week	
Cartilage(Gen histology)	• Define cartilage • Discuss types, location and functions of cartilage. • Describe and differentiate histological structure of different types of cartilage • Growth of cartilage
Connective tissue (Histology)	• Define connective tissue • Discuss functions of connective tissue • Describe different types of cells in connective tissue with special reference to their functions.
Germinal layers and their derivatives (Gen. Embryology)	• Define gastrulation • Describe formation and fate of primitive streak • Discuss different types of cell movements during gastrulation • Describe molecular regulation of gastrulation • Congenital anomalies related with primitive streak

Lectures	**At the end of the lectures students should be able to:**
2nd Week	
Bone (Gen Anatomy)	1. Define bone 2. Differentiate between macerated and decalcified bone 3. Describe general features of bones 4. Classify bones 5. Describe composition of bone 6. Explain importance of growth plate
Connective tissue (Histology)	• Enlist constituents of extracellular matrix • Discuss different types of fibers • Explain composition of ground substance
Germinal layers and their derivatives (Embryology)	• Describe formation of ectoderm,mesoderm and endoderm • Enlist derivatives of germinal layers • Explain formation of primordia of different system derived from ectoderm, mesoderm and endoderm

Lectures	**At the end of the lecture students should be able to:**
3rd Week	
Joints (General Anatomy)	• Classify joints according to their structure and function • State different types of synovial joints and describe structure and function of typical synovial joint
Bone (Gen Anatomy)	• Classify bones based on different criterias • Describe blood supply of bones • Discuss differences of arterial supply of bones in children and adults • Describe ossification centers of bones • Discuss endochondral and intramembranous ossification
Connective Tissue (Histology)	• Distinguish loose and dense connective tissue • Contrast between white and brown adipose tissue • Discuss distribution of white and brown in infants and adults
Lectures	**At the end of the lecture students should be able to:**
4th Week	

Joints (Gen.Anatomy)	• Outline the different types of fibrous joints • Describe characteristic features of fibrous joints • Describe features of primary and secondary cartilaginous joints • Compare the features of rheumatoid arthritis and osteoarthritis
Bone (Histology)	• Identify the compact bone and spongy bone.on the basis of their histological structure • Discuss function and location of spongy and compact bone • Differentiate between osteoblasts, osteocytes and osteoclast
Muscle (Gen.Anatomy)	• Classify the muscles according to their shape (architecture) • Describe effect of shape and architecture on force and range of movement

Lectures 5th Week	**At the end of the lecture students should be able to:**
Muscle (Gen Anatomy)	• Classify muscles according to direction of fibres and their action. • Express the principles of innervation and blood supply of muscles
Bone (Histology)	• Discuss the bone matrix. • Discuss the osteons and Haversian canal • Enlist contents of haversion system • Enlist
Bones (Histology)	• Discuss different stages of intramembranous and endochondral ossification • Appreciate differences between intramembranous and endochondral ossification • Describe congenital acquired pathologies related to bone.
Lectures	**At the end of the lecture students should be able to:**
6th Week	
Muscle (Histology)	• Be able to classify and distinguish the three types of muscle.

	• Be able to describe histological structure of skeletal muscle
Muscle 2 (Histology)	• Able to describe microscopic structure of cardiac and smooth muscles
Development of Musculoskeletal System (Embryology)	• Enlist the different sources of origin of musculoskeletal system • Describe development of somites • Appreciate development of lateral somitic frontier • Enumerate mesodermal domains • Describe development of limbs • Discuss molecular regulation of muscle development • Discuss congenital anomalies of limbs
Lectures	**At the end of the lecture students should be able to:**
7th Week	
Musculoskeletal system (Embryology)	• Discus development of axial and appendicular skeleton • Describe Congenital anomalies associated with skeletal system

RESPIRATORY MODULE FOR FIRST YEAR M.B.B.S

LEARNING OBJECTIVES OF LECTURES

Lectures	**At the end of the lectures students should be able to:**
1st Week	
Respiratory system 1(Histology)	• Explain division of the respiratory system • Describe different functions of respiratory system. • Describe details of respiratory epithelium
Respiratory system 2(Histology)	• Discuss microscopic structure of vestibule • Describe structural specialization in mucosa of nasal cavity proper • Appreciate differences between respiratory mucosa and olfactory mucosa • Give a detailed account on olfactory mucosa
Development of Nose	• Describe general development of face • Discuss role of facial prominences in development of face • Explain formation and importance of different nasal prominences in nose development • Enlist derivatives of different nasal prominences

	• Discuss formation of nasal placode • Describe development of paranasal sinuses • Describe postnatal development of paranasal sinuses
Lectures	**At the end of the lecture students should be able to:**
2nd Week	
Respiratory System 3	• Describe microscopic structure of paranasal sinuses • Describe general histological organization of respiratory system • Appreciate different histological layers of Nasopharynx
Development of larynx 1	• Define pharyngeal arches • Describe formation of pharyngeal arches • Enumerate components of pharyngeal arches • Enlist derivatives of pharyngeal arches
Development of larynx 2	• Describe importance of4th and 6th pharyngeal arches in development of laryngeal cartilages • Discuss role of 4th and 6th pharyngeal archesin forming the musculature of larynx
Lectures	**At the end of the lectures students should be able to:**
3rd Week	
Respiratory System 4(histology)	• Discuss components of larynx • Describe histological structure of laryngeal cartilages • Discuss components of tracheal wall
Development of epiglottis and trachea	• Discuss role of 5th pharyngeal arch in development of epiglottis • Describe formation of respiratory premordium • Discuss formation of laryngeotracheal diverticulum • Describe formation of trachea esophageal septum and its importance • Describe Congenital defects associated with development of nose and larynx

Development of larynx	• Describe nerve supply of larynx and their association with pharyngeal arches • Describe Congenital defects associated with development of nose and larynx

Lectures	At the end of the lectures students should be able to:
4th Week	
Respiratory System 5	• Describe division of bronchial tree • Discuss microscopic structure of extra and intra pulmonary bronchi • Describe histological structure of bronchioles • Appreciate differences between bronchi and bronchioles
Development of lungs(EMBRYOLOGY)	• Describe formation and division of respiratory buds • Discuss development of bronchi • Describe formation of brochopulmonarysegmentssegments and their clinical importance • Describe development of plerual cavities
Lectures	**At the end of the lecture students should be able to:**
5th Week	
Respiratory System (Histology)	• Discuss microscopic structure of terminal bronchioles • Appreciate the significance of Clara cells with their functions • Discuss other cells present in terminal bronchioles • Understand microscopic structure of respiratory bronchioles • Describe differences between respiratory and terminal bronchioles
Respiratory System (Histology)	• Describe characteristics of alveolar ducts • Describe histological structure of alveolar ducts and their functions • Identify type 1 and type II alveolar cells
Development of Lungs	• Discuss process of maturation of lungs • Enlist different stages of lung maturation • describe all the developmental changes in each stage • Explain the production of surfactant
Lectures	**At the end of the lectures students should be able to:**
6TH Week	
Respiratory System (Histology)	• Describe histological structure of interalveolar septum • Discuss role of alveolar macrophages

	• Describe Blood – Air barrier in detail • Discuss histology of pleura in detail
Development of Lungs	• Describe role of fetal breathing movements in maturation of lungs • Discuss postnatal development of lungs • Describe congenital anomalies associated with lungs

CVS MODULE FOR FIRST YEAR M.B.B.S

LEARNING OBJECTIVES OF LECTURES

Lectures	**At the end of the lectures students should be able to:**
1st Week	
CVS 1(Gen Anatomy)	• Describe general organization of cardiovascular system • Describe different types of circulation • Discuss general structural patterns of arteries and veins • Classify capillaries • Explain functional importance and location of continuous, fenestrated and sinusoidal capillaries
CVS 1(Histology)	• Describe general histological structure of arteries and veins • Histological differences between arterioles, medium sized arteries, and large arteries • Appreciate histological differences between continuous, fenestrated and sinusoidal capillaries
CVS Development 1	• Discuss molecular regulation of development of CVS • Describe venous drainage of embryo • Enlist derivatives of vitelline veins • Discuss role cardinal veins • Development of inferior vena cava
Lectures	**At the end of the lectures students should be able to:**
2nd Week	
CVS 2 (Gen Anatomy)	• Classify arteries on the basis of function and size • Classify veins on the basis of function and size • Describe differences between arteries and veins • Define anastomosis and discuss different types of arterial and venous anastomosis
CVS 2 (histology)	• Describe histological details of endocardium, myocardium and epicardium • Enlist functions of endothelium

	• Describe components of lymph vascular system • Give detailed account on histological features of lymph vessels, lymphatic vessels and lymphatic ducts • Tabulate differences between blood capillaries and lymphatic capillaries
CVS Development	• Describe development and transformation of aortic arches • Enlist derivatives of 1-6th aortic arches • Discuss formation of intersegmental arteries • Describe sources and formation of coronary arteries • Describe development of aorta
Lectures	**At the end of the lecture students should be able to:**
3rd Week	
CVS 3 Gen Anatomy	• Discuss general organization of lymphatic system • Enlist components of lymphatic system • Describe formation and drainage of extra cellular fluid • Define lymph and describe its circulation • Explain Sterling hypothesis
CVS Development 3	• Describe fetal circulation in detail • Discuss role of foramen ovale, ductusarteriosis and ductusvenosis in fetal circulation and their fate • Differentiate between fetal and postnatal circulation
CVS Development 4	• Discuss establishment of cardiogenin field • Describe formation and position of heart tube in developing embryo • Discuss formation of cardiac loop • Describe development of sinus venosus
Lectures	
4th Week	
CVS Development 4	• Explain importance of septum spurium • Describe development of cardiac septa • Discuss different methods of septum formation • Explain septum formation in right atrium • Give detailed account on development and differentiation of atria
CVS Development 5	• Discuss formation of septum in atrioventricular canal • Describe formation of atrioventricular valves • Explain septum formation in truncusarteriosis

	& conuscordis
CVS Development 6	• Describe septum formation in ventricles • Discuss formation of semilunar valves • Molecular regulation of cardiac development
Lectures	**At the end of the lectures students should be able to:**
5th Week	
CVS Development	• Describe bases of following developmental defects of arterial system 1. Coarctation of aorta 2. Double aortic arch 3. Abberent right subclavian artery
CVS Development 8	• Explain bases of following developmental defects of venous system 1. Absent inferior vena cava 2. Left sided superior vena cava 3. Double superior vena cava
Congenital defects 1	
Lectures	**At the end of the lecture students should be able to:**
6th Week	
Congenital defects 2	

DEPARTMENT OF ANATOMY
DISSECTION
LEARNING OBJECTIVE

TENTATIVE TIME TABLE FOR BLOOD IMMUNITY MODULE

Dissection 1st Week	Learning objective
Hip joint	Student should be able to describe the ➢ type of joint ➢ articular surfaces, ➢ capsule ➢ synovial membrane ➢ ligaments and their attachments ➢ movements possible at hip joint and muscles producing them ➢ blood supply and nerve supply.
Tibia	➢ Identify bone ➢ determine side ➢ normal anatomical position ➢ bony features like condyles, intercondylar areas, tuberosity, fibular facet, shaft border and surfaces, distal end ➢ muscle and ligament attachment ➢ articular surfaces ➢ nutrient foramen ➢ ossification ➢ applied anatomy of tibia..
Fibula	➢ Identify bone ➢ determine side ➢ normal anatomical position ➢ bony features like head, tibial facet, shaft border and surfaces, distal end, muscle and ligament attachment ➢ nutrient foramen ➢ articular surfaces ➢ ossification ➢ Applied anatomy of fibula.
Bones of foot	➢ Identify talus and calcaneum ➢ determine side ➢ bony features ➢ muscle and ligament attachment ➢ applied anatomy
Bones of foot	➢ Identify cuneforms, cuboid, and articulated foot ➢ determine side ➢ bony features ➢ muscle and ligament attachment ➢ applied anatomy

Dissection 2nd Week	Learning objective
Popliteal fossa	➢ Student should have knowledge of ➢ surface landmarks

	➢ cutaneous innervations ➢ boundaries, roof, floor ➢ contents like popliteal artery and its branches ➢ popliteal vein and its tributeries ➢ tibial and common peroneal nerve and their branches ➢ posterior cutaneous nerve of thigh ➢ genicular branch of obturator nerve ➢ popliteal lymph nodes and fat of popliteal fossa.
Anterior compartment of leg	➢ Surface landmarks ➢ cutaneous innervations ➢ superficial fascia ➢ superficial veins ➢ Deep fascia including retinecula i.e. superior and inferior extensor retinecule of anterior compartment of leg.
Anterior compartment of leg	➢ Origin, insertion, nerve supply and action of all muscles of anterior compartment of leg ie tibialis anterior, extensor hallucis longus, and extensor digitorum longus and peroneus tertius.
Lateral compartment of leg	➢ Surface landmarks ➢ cutaneous innervations ➢ superficial fascia ➢ superficial veins ➢ deep fascia including the retinecula ie superior and inferior peroneal retinecula ➢ Origin, insertion, nerve supply and action of all muscles of lateral compartment ie peroneus longus and brevis.
Dissection 3rd Week	**Learning objective**
Posterior compartment of leg	➢ student should be able to describe ➢ surface landmarks ➢ cutaneous innervations ➢ superficial fascia ➢ superficial veins ie long and short saphenous veins ➢ deep fascia and subdivisions of posterior compartment of leg
Dissection	➢ identify boundaries and contents of popliteal fossa ➢ Origin, insertion, nerve supply and blood supply of muscles of anterior and lateral compartments of leg.
Posterior compartment of leg	➢ origin, insertion, nerve supply and action of all muscles of posterior compartment of leg
Neurovascular organisation of leg	➢ origin, course and relations, branches or tributeries of arteries, veins and nerves of anterior compartment ie anterior tibial artery and deep peroneal nerve, lateral compartment ie superficial peroneal nerve, posterior compartment ie, popliteal artery, peroneal artery, tibial nerve.
Knee joint	➢ Type of joint ➢ Articular surfaces ➢ Capsule,

	➢ Synovial membrane, ➢ Ligaments and their attachments ➢ Movements possible at hip joint and muscles producing them. ➢ Blood supply and nerve supply.
Dissection 4th Week	**Learning objective**
Skin and fascia of foot	➢ Surface landmarks ➢ Cutaneous innervations ➢ Planter aponeurosis ➢ Flexer retinaculum
Muscles of foot	➢ Origin, insertion, nerve supply and action of muscles of all four layers of sole of foot
Neurovascular organisation of foot	➢ Origin, course and relations, branches of arteries of sole of foot,, ie posterior tibial artery and medial and lateral planter arterys ➢ tributeries of veins of sole of foot
Neurovascular organisation of foot	➢ Origin, course and relations and branches nerves of sole of foot ➢ tibial nerve ➢ medial and lateral planter nerve
Arches of foot	➢ Medial longitudinal arch ➢ Lateral longitudinal arch ➢ Transverse arch
Dissection 5th Week	**Learning objective**
Tibio-fibular joints	➢ Student should be able to describe the articular surfaces, mark the capsule, describe the synovial membrane, enumerate the ligaments and tell their attachments, and discuss the movements possible at tibiofibular joints and muscles producing them, their blood supply and nerve supply and interosseous membrane.
Ankle joint	➢ Student should be able to describe the articular surfaces, mark the capsule, describe the synovial membrane, enumerate the ligaments and tell their attachments, and discuss the movements possible at ankle joint and muscles producing them, its blood supply and nerve supply.
Joints of foot	➢ Student should be able to describe the articular surfaces, mark the capsule, describe the synovial membrane, enumerate the ligaments and tell their attachments, and discuss the movements possible at talocalcanean, talocalcaneonavicular,calcaneocuboid, midtarsal, tarsometatarsal, metatarsophalangeal and interphalangeal joints and muscles producing them, their blood supply and nerve supply.

Cutaneous innervation, lymphatics and venous drainage of lower limb	➢ Student should have knowledge of segmental and dermatomal innervation, superficial lymphatics ie, medial and lateral groups, superficial inguinal deep lymphatics ie,anterior tibial, posterior tibial, peroneal, popletial, deep inguinal, external iliac, lumbar or aortic, superficial veins ie, long and short sephanous and their tributeries, deep veins popletial and femoral, venae cometentes of anterior and posterior tibial arteries..
Nerve injuries	➢ Student should have sound knowledge of mechanism and signs and symptoms and diagnosis of injuries to lumber plexus and nerves of lower limb ie, obturator nerve, femoral nerve, superior and inferior gluteal nerves ,sciatic nerve, common peroneal , tibial nerve, medial and lateral planter nerves

Dissection 6th Week	**Learning objective**
Surface anatomy	➢ Student should be able to trace surface projections of deep structures ie, nerves, arteries of lower limb.
Clinical anatomy	➢ Student should be able to apply his knowledge of normal human anatomy in order to recognise abnormalities and pathologies i.e., phanthom limb pain.
Radiological anatomy	➢ Student should be able to study the structure of human body by various imaging techniques like X-rays.
Dissection	➢ Student should have developed skills of dissection and should be able to identify boundaries and contents of popliteal fossa, origin, insertion, nerve supply and blood supply of muscles of posterior compartments of leg and sole of foot.

TENTATIVE TIME TABLE FOR FOUNDATION MODULE

FOR FIRST YEAR M.B.B.S

Dissection 1st Week	
(Anatomical organization of body planes)	After the session the student should be able to, ➢ Identify and discuss the anatomical position, terms, axes and planes of the body. ➢ Co-relate the anatomical viscera and systems with the applied anatomy.
Clavicle	➢ Determine the side and anatomical position ➢ Discuss general features, attachments and articulations (medial and lateral). ➢ Intramembranous development and cleido-cranial dysostosis. ➢ Role in pectoral girdle formation movement and dislocation. ➢ Age and site related fractures and applied.

Scapula	➢ Determine the side and anatomical position ➢ Discuss general features, attachments, and articulation. (clavicle and shoulder joints) ➢ Scapular anastomosis and its clinical significance ➢ Scapular movements. ➢ Ossification and the related clinical.
Dissection 2nd Week	
Humerus	➢ Determine the side and anatomical position. ➢ Discuss general features, attachments and articulation (shoulder and elbow). ➢ Know the importance of anatomical, and surgical neck. ➢ Correlation of axillary, radial, median and ulnar nerve damage with respect to various fractures of humerus. ➢ Significance of bicipital groove, angle of humeral torsion and carrying angle ➢ Ossification and the related clinical.
Pectoral region	➢ Superficial fascia with cutaneous nerve and vessels ➢ Platysma (origin, insertion, nerve supply, action and applied). ➢ Muscles of the pectoral region (origin, insertion, nerve supply, action and applied). ➢ Discuss the pectroral and clavipectoral fascia.
Joints of pectoral region	➢ Classify the joints (type, shape and movement) ➢ Discuss the attachment of capsule and ligaments ➢ Briefly describe the neurovascular supply ➢ Movements (axes and planes) in detail with site and most common direction of dislocation and consequences.
Breast	➢ Define extent, relations and structure of gland. ➢ Discuss the blood supply, venous drainage and lymphatics. ➢ Sensory and sympathetic innervations with role of hypophysis cerebri in its functioning. ➢ Clinical picture and lymphatic spread in breast carcinoma. ➢ Other congenital and pathological applied of the gland.
Scapular region	➢ Muscles of scapular region (origin, insertion, nerve supply, action). ➢ Quadrangular and triangular spaces (boundaries, contents and clinical) ➢ Rotator cuff muscles and their significances.

Dissection 3rd Week	
Brachial plexus	➢ Location and formation of the plexus ➢ Roots, trunks, division, cords and branches, (sensory and motor supply). ➢ Brachial plexus injuries at various levels in detail.
Axilla	➢ Define axilla and its boundaries, ➢ Contents of axilla, (axillary artery with its branches, axillary vein and tributaries, axillary lymphatics, lymph nodes and brachial plexus). ➢ clavipectoral fascia (extent, contents, structures piercing and applied).
Axilla	➢ Relationship of brachial plexus (cords) in axilla, with the axillary artery. ➢ All the related clinical.
Dissection 4th Week	
Radius	➢ Determine the side and anatomical position. ➢ Discuss general features, attachments and articulation (at elbow and wrist). ➢ Fractures of radius at various levels their correlation with radial artery, median nerve, and cephalic vein and nearby muscles. ➢ Ossification and related clinical.
Flexor compartment of arm	➢ Muscles of flexor compartment with their origin, insertion, nerve supply and action, relevant clinical. ➢ Define space of Parona.
Extensor compartment of arm	➢ Muscles of compartments with origin insertion, nerve supply action and relevant clinical.
Neurovascular organization of arm	➢ Nerves and vessels of arm, their formation, commencement, route, branches and relevant clinicals.
Dissection 5th Week	
Shoulder joint	➢ Classify the joint (according to type, shape and movement) ➢ Discuss the attachments of capsule and ligament ➢ Know the intra-articular structure (tendon of biceps brachii) ➢ Attachment of glenoidal labrum and its significance regarding the joint and synovial membrane relation. ➢ Briefly discuss the neurovascular supply ➢ Advantages and disadvantages of a shallow joint. ➢ Joint stabilizer (coracoacromial arch,

	musculotendinous rotator cuff, glenoidal labrum, role of long head of biceps and triceps. ➢ Discuss the movements (axes and planes in detail. Special analysis of degrees of abduction). ➢ Know the related bursae. ➢ Explain the related clinicals and their consequences.
Surface /radiological /clinical anatomy	➢ Identify the surface land mark and mark it. ➢ Discuss the view, area and compare the normal findings on the X-ray. ➢ Discuss the bones, their different parts and visibility of epiphysis (with age correlation). ➢ Comparison of normal / dislocated/fractured/accessory bone/asymmetry/irregularity in the plain skiagram. ➢ Correlate the clinical findings with radiological and surface findings.

TENTATIVE TIME TABLE FOR MUSCULOSKELETAL MODULE

Dissection 1st Week	**Learning objective**
Flexor compartment of forearm	After the session the student should be able to, ➢ Explain the fascial compartment of forearm ➢ Discuss the boundaries contents and applied anatomy of cubital fossa ➢ Know the muscle of forearm (origin, insertion, nerve supply, action and applied).
Arrangement of tendon at front of the wrist	➢ The neurovascular supply of flexor compartment with their clinical.
Extensor compartment of forearm	➢ Know the muscles and their (origin, insertion, nerve supply, action and applied). ➢ Discuss the extensor expansion (formation) muscles attached action.
Neurovascular organization of forearm	➢ Course relations branches and applied of median nerve, ulnar nerve and radial nerve. ➢ Course relations branches and applied of radial artery, ulnar artery and common interossious artery.
Dissection 2nd Week	
Anastomosis around the elbow joint	➢ Discuss the blood vessels involved in the formation of anastomosis. ➢
Elbow joint	➢ Describe the type of joint with its articualr surfaces ➢ Synovial membrane, capsular, ligamental

	attachments . ➢ Related bursae, axis and plane of movement, muscle produce the required action.
Proximal and distal radioular joints	➢ Type's of joints, articular surfaces, capsular attachments, synovial membrane (communication of out pouching) ligaments. ➢ Supination and pronation; muscle producing it and axis of movement. Which action is more powerful.
Nerve injuries	➢ Explain the course of all the nerves with their respective branches, injures and consequences at different levels.
Superficial and deep veins of upper limb	➢ Know the entire venous drainage of the whole upper limb with tributaries (with special emphasis on commencement of cephalic vein, veins in anatomical snuffbox, median cubital vein and perforator veins) with applied anatomy.

Dissection 3rd Week	
Carpel bones	➢ Identify the salient features of carpel bone. ➢ Discuss the special blood supply of scaphoid bone. ➢ Mid carpal joint. ➢ 1st carpometacarpal joint. ➢ With type of joint capsule and ligamental at 1st carpometacarpal joint with axis of movement and plane of movements. ➢ Muscle producing these movements.
Wrist joint	➢ Discuss the type of joint; bones involved; attachment of capsule and various ligaments; types of movements occurring at wrist joint; muscles producing the movements.
Flexor retinaculum	➢ Know the attachment of flexor retinaculum with structures related to it Guyon's canal. ➢ Carpal tunnel and its applied.
Extensor retinaculum	➢ Attachment of extensor retinaculum and its various compartments with structures passing through it. ➢ De Qurviann's disease
Muscle of hand	➢ Should know the various muscles forming thenar eminence and hypothenar eminence. ➢ Lumbricals ➢ Palmar and dorsal interossei with attachments and

	actions.
Arteries	➢ Know the course of ulnar artery in hand formation of superficial arch and deep palmar arch. The course of radial artery in hand and distribution.
Nerves in hand	➢ Explain the couse of ulnar nerve in hand along with its branches. ➢ Course of median nerve along with relations and branches. ➢ Course of radial nerve along with its relation and branches.
Dissection 4th Week	
Fascial spaces of hand	➢ Discuss the formation and attachements of palmar aponeurosis. ➢ Formation of palmar spaces and its divisions ➢ Thenar and mid palmar spaces. ➢ Pulp spaces. ➢ Dorsal subcutaneous spaces. ➢ Surgical incisions.
Hand	➢ As a functional unit various types or grips.

Dissection 5th Week	
Hip bone	➢ Describe the anatomical positon, parts of hip bone. ➢ Muscular, ligamentous, and capsular attachments. ➢ Ventral and dorsal articular surfaces, ossification and applied.
Femur	➢ Explain the anatomical position, different parts, proximal and distal articulations, angle of femoral torsion. ➢ Know the muscle attachments, ossification, applied (especially forensic and obstertrical) various fractures esp neck of femur in old age. ➢ Anatomy of patella and factors responsible for its stability.
Fascia, cutaneous nerves, lymphatic's of lower limb	➢ Explain fascia lata, intermuscular septas, iliotibial tract. Inguinal ligament, femoral sheath (formation, contents, applied) ➢ Femoral canal, location contents. ➢ Femoral hernia. ➢ Superficial and deep lymph vessels. ➢ Inguinal lymph nodes applied ➢ Cutaneous innervations and applied.
Veins of lower limb	➢ Describe the dorsal venous arch. ➢ Course and relation of short saphneous vein, great

	saphenous vein, saphenous opening . ➢ Levels of perforators. ➢ Applied esp DVT, varicose veins, for bypass surgery etc.
Dissection 6th Week	
Front of thigh	➢ Describe the muscles origin insertion, nerve supply action of the muscle of the front of thigh . ➢ Explain the femoral triangle and its contents esp vein, artery, nerve and femoral canal. Describe the boundaries of subsartorial canal contents, subsartorial nerve plexuses.
Medial aspect of thigh	➢ Know the various adductor muscles with their origin, insertion action, nerve supply. ➢ Course and relations of branches of obturator nerve .
Neurovascular	➢ Origin course distribution of femoral nerve obturator nerve and its applied. ➢ Describe femoral artery its course branches and area supplied. ➢ Describe obturator artery its course branches.

Dissection 7th Week	
Gluteal region	➢ Should be able to name the various muscles of gluteal region with origin, insertion, action nerve supply. ➢ Name the various structures undercover of gluteal maximus i.e. muscles, vessels, nerves, bones and joints, ligaments, bursae. ➢ Trochancteric anastomosis and cruciate anastomosis . ➢ Structures living greater sciatic foraman. ➢ Discuss the formation course relations, branches, distribution of sciatic nerve with applied anatomy. ➢ Clinical of gluteal region.
Posterior aspect of thigh	➢ Hamstring muscles their origin insertion, nerve supply action. ➢ Describe the boundaries and contents of popliteal fossa and applied anatomy. ➢ Anastomosis around the knee joint.
Weight transmission and walking mechanism	➢ Posture ➢ Gait cycle
Surface marking	➢ Lower limb
Clinical of lower limb	➢ Revision

TENTATIVE TIME TABLE FOR RESPIRATORY SYSTEM

Dissection 1st Week	**Learning objective**
Over view of thorax	After the session the student should be able to, ➢ Identify the anatomical land marks and boundaries of thorax.
Thoracic skeleton	➢ Differentiate typical and atypical ribs; muscle attachments.
Thoracic skeleton	➢ Identify various parts of sternum. ➢ Typical and atypical thoracic vertebra. ➢ Attachments of muscle and ligaments.
Intercostals spaces	➢ Recognize the intercostals muscles, their attachment. ➢ Know the typical and atypical intercostals space.
Dissection 2nd Week	
Thoracic aperture	➢ Know the boundaries of inlet and outlet of thorax. ➢ Structures passing through thoracic inlet and outlet.
Joints of thoracic wall	➢ Define the joints between rib, sternum, between and vertebra, ribs and costal cartilages ➢ Menubriosternal and xiphisternal joint.
Movement of thoracic wall	➢ Discuss the handle and pump handle movement.
Vessels of thoracic wall	➢ Explain the posterior vein and anterior intercostals arteries (course, relations branches tributarites and applied)
Dissection 3rd Week	
Mediastinum	➢ Define the boundaries of superior mediastinim ➢ Define the boundaries of inferior mediastinum
Nose	➢ Describe formation of nasal cavity ➢ Blood supply and nerve supply of nose with clinical significance.
PNS	➢ Define para nasal sinuses, location and their opening ➢ Clinical significance with surgical innervations.
Larynx	➢ Able to components of larynx and various cartilags.

Dissection 4th Week	
Larynx	➢ Interinsic and extrinsic muscle of larynx ➢ Intrinsic and extrinsic membrane ➢ Movements of vocal cords ➢ Blood supply and nerve supply of larynx
Trachea	➢ The anatomy of trachea, tracheal cartilages division of

	trachea ➢ Nerve supply and blood supply of trachea
Pleura	➢ Know visceral and parietal pleura. ➢ Pleural recesses and pleural cavity. ➢ Nerve and blood supply of pleura.
Lungs	➢ Identify the features of right and left lung. Branchopulmonary segments.
Dissection 5th Week	
Lung	➢ Root of lung, hilum of lung and nerve plesuses. ➢ Blood supply of lungs and pleura.
Clinical	➢ Concept of flail chest, rib fracture. Mediastinitis, mediastinal tumor and cysts. ➢ Pleurisy, pneumothorax, empyema, pleural effusion, Mediastinum, barrel chest, bronchogenic carcinoma, paracentesis throax, mediastinal syndrome, compression of SVC.
Dissection 6th Week	
Radiological anatomy	➢ Mediastinal or heart borders, trachea, hilum, aortic knuckle, costophrenic angles, cardiophrenic angles, dooms of diaphragm. Anterior middle and posterior mediastinum counting of ribs. ➢ Cervical rib, paranasal sinuses, naso and oropharynx, nasal septum.

TENTATIVE TIME TABLE FOR RESPIRATORY SYSTEM

Dissection 1st Week	**Learning objective**
Over view of thoracic wall	➢ Boundaries of thoracic cage, intercostals spaces, contents of i.e spaces, throcic cavity.
Viscera of thoracic cavity	➢ Disposition of pleura, pleural cavity, luns, description / demonstration of mediastinal structures.
Mediastinum	➢ Sub division and contents of mediastinum.
Pericardium	➢ Cavity, oblique and thransverse sinuses and their clinical significance, blood supply and nerve supply of pericardium.
Heart	➢ Position and orientation of heart, external morphological features of heart, roots of great vessel.
Dissection 2nd Week	
Heart	➢ Epicardium, myocardium, endocardium, fibrous skeleton of heart, internal features of right atrium.
Heart	➢ Internal features of right ventricle tricuspid valve papillary muscles, pulmonary trunk.
Heart	➢ Internal features of left atrium, intatrial septum, left vesicular cavity, interventriuclar septum, mitral valve.

Heart	➢ Mitral valve, intervetntricular septum, aortic vestibule, arotic valve.
Dissection 3rd Week	
Blood supply of heart	➢ Origin of coronary arteries course and distribution of right coronary arteries, left coronary artery, branches and distribution concept of right and left dominance, venous drainage of heart.
Cardiovascular accident	➢ Myocardial infarction, hypertension, complication of myocardial infractions and arrythrmis.
Coronary angiography	➢ Structure of superior mediastinum trachea, esophagus, neurovascular structure, great vessels in superior mediastium arch of aorta.
Cardiac plexus	➢ Formation of superficial and deep cardiac plexus.

Dissection 4th Week	
Variation of great arteries	➢ Patient ductus arteriosus, coarction of arota, (perductal and post ductal) double superior vena cava, fallot's tetralogy.
Azygous system	➢ Formation of tributaries of azygous veins.
Posterior mediastinum	➢ Structure in Posterior mediastinum , esophagus thoracic duct, vagi, lymph nodes, sympatheic chain, splanchnic nerves. ➢
Septal defects	➢ Patent foramen oval, (ASD) VSD, fallot's tetralogy.
Dissection 5th Week	
Level of viscera, relation to mediastinum	➢ Relation of mediastinal structure indentification of mediastinal structures.
Surface anatomy	➢ Surface projection of heart, great vessels, trachea, oesphagus, postion of heart valve.
Radiology anatomy	➢ Radiological inditification of mediastinal viscera. ➢ Mediastinal structures on prosetid specimen /cadavers models
Dissection 6th Week	
Revision	➢ Thoracic cage, mediastinal structures, arch of aorta, brachiocephalic vein, nerves.
Dissection	➢ External features of pericardium heart
Dissection	➢ Internal features of heart ➢
Dissection	➢ Coronary arteries, coronary sinus, structures in posterior mediastinum.

LEARNING OBJECTIVES

DEPARTMENT OF

BIOCHEMISTRY

FOUNDATION MODULE

Biochemistry (LGIS)	Learning Object
Introduction of faculty members Prokaryotic and eukaryotic cells.	Introduction of faculty members Differences between prokaryotic and eukaryotic.
Normal cell	Method to separate different organelle of cells. Composition of normal cell. Composition of cell membrane.
Cell membrane	Composition of cell membrane. Function performed by each component.
Functions of cell membranes	Function & importance of cell membrane
Cell organelles	Structure and detail of ER, Golgiapparetus Function performed by ER and Golgiapparetus Marker enzymes of these organelles and their importance
Cell organelles	Structure of lysosome, peroxisome, cytosole. Function of these organelle. Markers of enzymes for these organelle. Defects of these organelle.
Cell organelles	Structure and function of mitochondria and Nucleus. Their marker Enzymes. Congenital defects.
Transport across cell membrane	Transport of various substances by active and passive transport Diffusion, Phagocytosis, endocytosis and exocytosis
Receptors and signal transduction	Structure of various receptors and G- proteins and ion channels. Classification of various receptors. Introduction to second messenger system. Signal transduction.
Osmosis, osmotic pressure and oncotic pressure.	Definition of osmosis, osmotic pressure. Methods to measure them. Biochemical application of osmotic and oncotic pressure.
Phenomenon of viscosity, surface tension.	Definition of phenomenon of viscosity, surface tension. Methods to measure them. Biochemical applications
Physico chemical principals	Like pH, Pka, body buffers
Donnons equilibrium, adsorption and ion exchange resins.	Definition of Donnons equilibrium, adsorption and ion exchange resins. Their effects on tissue fluids. Biochemical importance
	Biochemical aspects of Nucleic acids.

Nucleic acids.	*Analogs of Nucleic acids*
DNA	*Structure and biological importance of DNA*
RNA	*Structure and types of RNA.* *Functions of RNA*
Enzymes	Definition of Enzymes. General function of enzymes. Difference between coenzyme and cofactors
Mechanism of enzyme action	Different mechanism of enzyme action. General mechanism for action of enzymes.
Classification of enzymes	Different classes of Enzymes
Properties of Enzymes	Properties of Enzymes Such as specificity for substrate and stereo specificity.
Factors affecting Enzyme action.	Different factor which increase or decrease the activity of enzymes
Enzyme inhibitors	Enzyme inhibitors and how the activity of the regulatory enzymes can be modulated for benefit of body
Marker enzymes	Role of measuring the activity of different enzymes in the diagnosis and prognosis of different diseases
Enzmye as medicines	Role of Enzyme as medicine and their effects on body.

MUSCULOSKELETAL MODULE

Biochemistry (LGIS)	**Learning Object**
Minerals calcium	Classification of minerals macro and minor elements. Types of Ca, sources, daily requirement in different condition.
Biochemical role of calcium and phosphate	Cause of hypercalcemia and hypocalcemia. Effects of hypercalcemia and hypocalcemia. Phosphate sources, daily requirement. Biochemical functions of phosphate.
Copper and other micro minerals	Daily sources and requirements of copper, Zinc selenium, manganese.
Iodin floride sulfur and magenisium	Their biochemical functions. Biochemical functions of iodine, fluoride, sulfur, magnesium. Sources of iodine, fluoride, sulfur, magnesium. Deficiency effects.

Vitmains and their classification	Fat soluble and water soluble vitamin. Sources of vitamin A. Biochemical function of vitamin A. Deficiency effects of vitamin A. Toxic effects of vitamin A.
Vitamin D	Source of vitamin D and its activation in body. Biochemical function of vitamin D. Deficiency effects of vitamin D. Toxic effects of vitamin D.
Vitamin E	Sources of vitamin E. Biochemical function of vitamin E.
	Deficiency effects.
	Toxic effects.
	Source of ascorbic acid.
Vitamin C.	Biochemical functions of vitamin C. Deficiency effects of vitamin C Toxic effects of vitamin C.
Thiamine.	Source of Thiamine. Biochemical functions of vitamin C. Deficiency effects of vitamin C.
Vitamin B_3 and pantothenic acid.	Source of vitamin B_3 and pantothenic acid. Biochemical function of B_3 and B_6. Deficiency effects of B_3 and B_6.
Riboflavin (Vitamin B_2)	Source of Riboflavin (Vitamin B_2) Biochemical function vitamin B_2 Deficiency effects.
Biotin and pyridoxine.	Sources of Biotin and pyridoxine. Biochemical functions. Deficiency effects.
Seminar	Seminar will be held or clinical lecture on the diseases related with vitamins deficiency or their excess.
Class test	Class test will be held.
Amino acids	Structure of amino acids and classification of amino acid.
Isomerism of amino acid.	Classification of amino acids, isomerism of amino acid.
Properties of amino acids.	Amphoteric properties of amino acids. Titration curve for alanine. Peptide bond.

Important peptides and proteins.	Important peptides. Importance of proteins Classification of proteins.
Classification of proteins.	Classification of simple proteins. Functions of simple proteins.
Compound proteins.	Classification of compound proteins. Compound proteins. Functions of Compound proteins.
Structure of protein.	Primary structure of protein. How it helps in folding of protein. How to determine the primary structure.
Types of secondary structure.	Types of secondary structure. Secondary structure of proteins. Significance of secondary structure.
Disorders related with protein structure	(Clinical lecture).
Tertiary and quaternary structure	Tertiary and quaternary structure of proteins. Folding of proteins. Significance of folding of proteins.
Collagen.	Synthesis of collagen. Factor regulation and helping in strengthen of collagen. Defects in collagen synthesis.
Technique for separation of proteins.	Technique for separation of proteins. Significance of separation of proteins.

BLOOD AND IMMUNITY MODULE

Biochemistry (LGIS)	**Learning Object**
First Week	**At the end of lecture students should be able to:**
	Introducion of faculty members
Blood	Introduction to blood. Various functions performed by blood. Composition of blood. Various steps in Heme synthesis.
Heme synthesis	Enzymatic regulation of regulated steps in heme synthesis.
Breakdown of Heme.	Various steps in the breakdown of Heme. Various types of porphyrias. Able to distinguish between porphyrias and other common disorders.
Types of Hemoglobin	Various types of Hemoglobin. Importance of heme and globin components. Importance of HbA1c in diagnosis of Diabetes.

Structure of haemoglobin and myoglobin	Structure of haemoglobin and myoglobin. Biochemical roles of haemeglobin and myoglobin.
Oxygen dissociation curve.	Importance of oxygen dissociation curve. Various factors affecting the curve.
Abnormalities in Hemoglobin.	Congenital abnormalities in Hemoglobin. Structure and various diseases processes due to the structural defects. Preventive measures.
Haemoglobinpathies	Introduction to haemoglobinpathies. Types of thalasemias. Familial counseling. Preventive measures.
Breakdown of hemoglobin	Various steps in the breakdown of hemoglobin. Step in synthesis of Bilirubin Normal level of S. Bilirubin.
Jaundice.	Definition of jaundice. Normal level of Bilirubin. Various types of Jaundice. Biochemical tests to distinguish various types of jaundice. Physiological Jaundice.
Plasma proteins	Introduction to plasma proteins. Biochemical role of various plasma proteins. Normal levels of plasma proteins Role of A/G ratio.
Type of proteins raise	Various proteins raise in inflammation. Role of albumin. Role of C- reactive protein.
Heptoglobin and transferin	Structure of Heptoglobin and transferin. Biochemical Role of Heptoglobin and transferin.
Ferritin and hemosedrin	Biochemical role of ferritin and hemosedrin. Hemosidrosis.
Cerruloplasmin.	Biochemical role of cerruloplasmin. Wilsons disease.
Antiproteases and amyloidosis	Biochemical role of antiproteases and amyloidosis.
Immunoglobulins	Structure of Immunoglobulins. Biochemical role of various Immunoglobulins. Class switching.
AIDs	What is AIDs. Immunological defects in AIDs. Various preventive measures.
Vitamin K	Structure of Vitamin K. Biochemical role of vitamin K in Hemorrhagic diathesis.

	Important of I/M injection of vitamin K in new born.
Folic acid.	Sources of folic. Deficiency effects of folic and Biochemical role of folic acid. Recommended Dietary allowance.
Vitamin B12	Sources of Vitamin B12 Biochemical role of vitamin B12 Deficiency effects of B12
Iron	Sources of iron. Transport and absorption of iron. Effects of hyper and hypo functions.

RESPIRATORY MODULE

Biochemistry (LGIS)	Learning Object
Intracellular and Extracallular compartments.	Composition of intracellular and Extracallular compartments. Daily requirement of water. Water balance in the body Biochemical functions of water.
pH and pka	Definition of pH and pka. Understanding of Handerson Hassel batch equation. Measurement of pH by equation.
pH meater	Introduction of pH meater. Principal of PH meter. Working of pH mater. Body mechanisms for maintenance of pH.
Body buffers	Introduction to various body buffers. Mechanism of various buffers in maintenance of blood pH.
Thermodynamics.	Laws of thermodynamics. Introduction to energetics and various definitions. Difference between high energy and low energy compounds along with their examples.
Mitochondria	Structural importance of Mitochondria. Compartmentalization of enzymes. Role of Mitochondria in energy generation.
Electron transport chain	Components/ complexes of Electron transport chain. Enzymes and Co-enzymes of each component. Inhibitors of these complexes.

Mechanisms of energy generation in the body.	Various mechanisms of energy generation in the body. Oxidative Phosphorylation. Concept of uncouples.
Energy change.	Free energy change. Standard free energy. Various sources of electrons.