STUDY GUIDE

FIRST PROFESSIONAL MBBS

Block II

Pak Red Crescent Medical & Dental College

48-KM Multan Road, Lahore-Pakistan.

(ANATOMY)

Knowledge			
Knowledge			
Topics	**Learning Objectives**	**Mode of Info Transfer**	**Assessment Tool**
UPPER LIMB Pectoral Region	Describe the topographical anatomy of Pectoral Region. Describe muscles of the Pectoral Region with their origin, insertion, nerve supply and actions. Explain the role of muscles of pectoral region in stabilizing the pectoral girdle. Mention the neurovascular supply of pectoral region.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Breast (Mammary Glands)	Describe the extent, structure, neurovascular supply, lymphatic drainage of Breast (Mammary Glands).	LGIS	SEQs MCQs
Pectoral girdle	Describe the osteology of the bones in pectoral region. Enumerate the muscles of pectoral girdle. Describe the attachments of muscle of pectoral girdle with nerve supply and action.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Fascia & Myotomes of upper limb	Describe the fasciae, cutaneous nerves and blood vessels of the Upper Limb. Describe the extent, attachments, and structures passing through Clavipectoral Fascia.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Back region	Describe muscles of the back with their origin, insertion, nerve supply and action. Describe the triangle of auscultation.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Bones of Upper Limb: Clavicle	Describe the Osteology of Clavicle (morphological features, side determination, attachments, ossification. Describe the functions of Clavicle in terms of weight transmission of upper limb.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Scapula	Describe the Osteology of Scapula (morphological features, attachments, ossification). Determine the side and identify the landmarks of scapula. Describe the movements of Scapula	Demonstration	SEQs MCQs

	associated with movements of Shoulder Girdle. Tabulate the movements of scapula with muscles acting on it. Tabulate the attachments, innervation, and actions of muscles of Scapular Region.		OSPE VIVA VOICE
Joints of Upper Limb: Sternoclavicular Joint Axilla	Describe the Sternoclavicular Joint in terms of articulating surfaces, ligaments, articular disc, nerve supply, blood supply, axes and planes of movements and stability factors.	Demonstration	SEQs MCQs OSPE VIVA VOICE
	Develop clear concepts of the topographical anatomy of Axilla and its contents. Describe the boundaries of Axilla. (Identification of muscles forming the boundaries of axilla). List the contents of Axilla.	Demonstration	SEQs MCQs OSPE VIVA VOICE
	Describe Axillary Artery with reference to its 3 parts their relations, branches, and anastomoses. Describe the formation, tributaries, and drainage of Axillary Vein. Describe the Axillary Lymph Nodes in terms of location, grouping, areas of drainage and clinical significance. Describe the course, relations, root value and distribution of cutaneous nerves.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Bones of upper limb: Humerus	Describe the Osteology of Humerus (Side Determination, morphological features, attachments, ossification.	Demonstration	SEQs MCQs OSPE VIVA VOICE

Shoulder Joint	Describe the Shoulder Joint under the following headings: Articulation, Type/ Variety, Capsule, Ligaments, Innervation, Blood supply, Movements. Tabulate the attachments, origin, insertion, innervation, and actions of Anterior Axioappendicular Muscles. Describe the 3 parts of Deltoid Muscle and correlate them with its unique functions. Explain its role in abduction of shoulder joint. Explain mechanism of Abduction of arm. Describe, in detail, the Scapula-Humeral Mechanism in relation to movement of abduction. Discuss important clinical condition.	LGIS Demonstration	SEQs MCQs OSPE VIVA VOICE
Rotator Cuff	Describe Rotator Cuff Muscles, state their Anatomical significance and explain Rotator Cuff Tendinitis. Describe Frozen Shoulder in relation to anatomical features.	Demonstration	SEQs & MCQs OSPE VIVA VOICE
Nerves of Upper Limb	Demonstrate and identify the formation of brachial plexus and its branches. List the branches of brachial plexus and give their areas of distribution and muscles they innervate. Identify & Describe Musculocutaneous Nerve in terms of its Origin, Course, Termination, Relations, Branches, and distribution. Describe and illustrate the cutaneous innervation of the arm.	LGIS Demonstration	SEQs MCQs OSPE VIVA VOICE
Blood supply of arm	Describe the Brachial Artery in terms of its course, relations, branches, and distribution. Identify & Describe the Profunda Brachii Artery giving its course, relations, branches, and distribution.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Muscles of Arm	Tabulate the attachments, innervation, and actions of muscles of anterior Fascial Compartment of Arm. Describe Cubital Fossa with emphasis on its boundaries, contents, and clinical significance. Tabulate the attachments, innervation, and actions of Triceps brachii as a muscle of Posterior Fascial Compartment of Arm.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Bones of Forearm	Determine the side and identify the landmarks of radius and ulna. Describe the Osteology of Radius (Side Determination, morphological features, attachments, ossification). Describe the Osteology of Ulna (Side Determination, morphological features, attachments, ossification).	Demonstration	SEQs MCQs OSPE VIVA VOICE
Muscle of Anterior/Flexor Compartment of Forearm	Describe in detail, the features of each flexor muscle of forearm, proximal & distal attachments, relations, and actions. Describe the action of paradox with examples.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Muscle of Posterior/Extensor Compartment of Forearm	Describe in detail, the features of each muscle of extensor compartment of forearm, proximal & distal attachments, relations, and actions with nerve supply.	Demonstration	SEQs MCQs OSPE VIVA VOICE

Forearm: Neurovascular supply & topographical anatomy	Identify the muscles and neurovasculature of flexor and extensor compartments of forearm. Develop clear concepts of the topographical anatomy of Forearm. Describe and illustrate the cutaneous innervation of the Forearm. Compartmentalize the forearm and give its anatomical basis. Tabulate the attachments, innervation, and actions of Flexor & Pronator Muscles of the Forearm.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Retinacula of Forearm Carpel Tunnel	Identify the Extensor & Flexor Retinacula and describe their attachments and relations. Describe the features, attachments, relations and structures passing under Flexor Retinaculum. Describe Carpel Tunnel Syndrome.	LGIS Demonstration	SEQs MCQs OSPE VIVA VOICE
Forearm: Blood supply and Venous drainage	Describe the Origin, Course, Relations, and branches of Ulnar Artery in Forearm. Describe the Origin, Course, Relations and list the tributaries of veins of Forearm.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Joints of Upper Limbs: Elbow Joint	Describe the Elbow Joint in terms of articular surfaces, type, variety, ligaments, muscles producing movements, blood supply {Anastomosis around elbow joint}, nerve supply and radiological imaging. Describe Carrying Angle and justify its importance in limb movement.	LGIS Demonstration	SEQs MCQs OSPE VIVA VOICE
Joints of Upper Limbs: Radioulnar Joint	Describe the Radioulnar Joints in terms of articular surfaces, type, variety, ligaments, and muscles producing movements, blood supply, nerve supply and radiological imaging. Demonstrate mechanisms of movements of Pronation & Supination. Describe the features of Interosseous Membrane with structures that pierce through it.	LGIS Demonstration	SEQs MCQs OSPE VIVA VOICE
Fascia & Muscles of Hand	Describe the features and explain the importance of Fibrous Flexor Sheaths, synovial flexor sheaths and extensor expansion. Identify the muscles and neurovasculature of the palm. Explain the morphology and tabulate the attachments, innervation, and actions of Intrinsic Muscles of the Hand. Demonstrate the various grips. Explain the mechanism of writing.	LGIS Demonstration	SEQs MCQs OSPE VIVA VOICE
Blood Vessels and Nerves of Forearm& Hand	Describe the radial artery course, relation and termination in hand with its clinical significance in the region. Describe the ulnar artery course, relation and termination in hand with its clinical significance in the region. Describe the formation, branches, and areas of distribution of Superficial and Deep Palmar Arch. Describe the course, relations, and branches of Ulnar, Median and Radial Nerves in the Hand.	Demonstration	SEQs MCQs OSPE VIVA VOICE

Joints of Hand	Describe the First Carpometacarpal Joint in terms of; Type, Variety, Articular Surfaces, Ligaments, Relations, Blood Supply, Innervation, movements. Describe the Metacarpophalangeal & interpharyngeal Joints in terms of; Type, Variety, Articular Surfaces, Ligaments, Relations, Blood Supply, Innervation & Movements.	Demonstration	SEQs MCQs OSPE VIVA VOICE
LOWER LIMB Hip Bone	Describe the parts, attachments, and ossification of hip bone Identify the parts and bony features of the hip bone, with its attachments, important relations Demonstrate the side determination of hip bone, its bony features, attachments, sex differences, and important relations.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Femur	Describe the parts, attachments, ossification, side determination, and Sex differences of femur. Describe coxa Vara and coxa valga and their clinical significance.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Fascia Lata	Describe the extent, attachments, and modifications of Fascia Lata.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Neurovascular Supply of thigh	Describe the cutaneous nerves and vessels of thigh Human Anatomy Neurovascular Supply of thigh.	Demonstration	SEQs & MCQs OSPE VIVA VOICE
Venous drainage of lower limb	Describe the surface anatomy, course, relations, tributaries, and communications of the superficial and deep veins of the lower limb. Describe the formation, course, relations, tributaries, and termination of the superficial veins. Describe the formation, course, relations, tributaries, and termination of the superficial veins Explain the anatomical justification of venesection, varicose veins, and saphenous venous grafts. List the factors favoring venous return of the lower limb .Explain the anatomical basis of the formation, and signs and symptoms of deep venous thrombosis.	LGIS Demonstration	SEQs MCQs OSPE VIVA VOICE
Lymphatic drainage of lower limb	Describe the lymphatic drainage of the region with special emphasis on afferent and efferent of inguinal lymph nodes Identify the superficial and deep lymph nodes Explain the anatomical justification for enlargement of inguinal lymph nodes.	LGIS Demonstration	SEQs MCQs OSPE VIVA VOICE

Femoral Triangle & Canal	Describe and identify the Boundaries and contents of femoral triangle Human Anatomy Femoral Triangle & Canal. Describe the formation of femoral sheath and its significance Describe the formation of femoral canal and its contents and significance Describe the formation and significance of femoral ring. Compare and contrast the anatomical features of femoral and inguinal hernias.	LGIS Demonstration	SEQs MCQs OSPE VIVA VOICE
Muscles of Anterior Compartment of Thigh	Describe the Muscles of anterior compartment of thigh with their proximal and distal attachments, actions, and innervation. Explain the anatomical basis of psoas absces	Demonstration	SEQs MCQs OSPE VIVA VOICE
Neurovascular supply of Anterior Compartment of Thigh	Describe the origin, course, relations, branches, distribution, and termination of femoral artery Describe the origin, course, relations, tributaries, area of drainage and termination of femoral vein Describe the origin, course, relations, branches, distribution, and termination of femoral nerve Tabulate the muscles of anterior compartment of thigh with their attachments, nerve supply and actions.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Muscles of Medial Compartment of Thigh	Describe Muscles of medial compartment of thigh with their proximal and distal attachments, innervation and actions. Describe the boundaries and contents of adductor canal.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Neurovascular supply of Medial Compartment of Thigh	Describe the origin, course, relations, branches/ tributaries, distribution, and termination of neurovascular structures of medial compartment of thigh. Describe the lumbar and sacral plexus and its branches supplying the lower limb.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Gluteal Region	List the structures passing through the greater and lesser sciatic foramen. Describe the muscles of gluteal region with their proximal and distal attachments, innervation, and actions. Describe the origin, course, relations, branches/ tributaries, distribution, and termination of neurovascular structures of gluteal region. Explain the anatomical basis of the consequences of wrongly placed gluteal intramuscular injections and injury to superior and inferior gluteal nerves.	Demonstration	SEQs MCQs OSPE VIVA VOICE

Muscles of Posterior Compartment of Thigh	Describe the Attachments of muscles of posterior compartment of thigh with the innervation and action. Describe the anatomical basis of signs and symptoms of Piriformis syndrome.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Blood supply of thigh	Describe the origin, course, relations, branches, distribution, and termination of Profunda femoris artery. Describe the formation and distribution of thigh chain anastomoses of thigh.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Sciatic Nerve	Describe the origin, course, relations, branches, distribution, and termination of sciatic nerve. Describe the anatomical basis of signs and symptoms of compression of injury to sciatic nerve.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Hip Joint	Describe the hip joint with its type, articulations, ligaments, and stabilizing factors. Movements and neuro-vascular supply with clinical significance.	LGIS Demonstration	SEQs MCQs OSPE VIVA VOICE
Popliteal Fossa	Describe the Boundaries, relations, and contents of popliteal fossa. Describe the origin, course, relations, branches/tributaries, distribution and termination of popliteal artery and vein.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Knee Region	Describe parts of tibia and fibula, with their attachments, important relations, ossifications, and side determination. Describe the anatomical basis for using fibula as graft. Describe features and ossification of patella; Enlist the factors responsible for stabilizing the patella.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Knee Joint	Describe the knee joint with its type, articulations, ligaments, movements, and neuro-vascular supply. Explain the mechanism of locking and unlocking of knee joint. Describe attachments and role of popliteus in locking and unlocking of the knee joint. Describe the factors responsible for stability of knee joint.	LGIS Demonstration	SEQs MCQs OSPE VIVA VOICE
Muscles of leg	Describe the Muscles of anterior, lateral, and posterior compartments of leg with their proximal & distal attachments, innervation, and actions.	Demonstration	SEQs MCQs OSPE VIVA VOICE

Neurovascular supply of Leg	Describe the origin, course, relations, branches/tributaries and termination of nerves and vessels of anterior, lateral, and posterior compartments of leg. Describe the cutaneous nerve supply of leg.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Flexor, Extensor, and peroneal Reticula	Describe the attachments, relations, and structures passing under cover of, extensor, peroneal, and flexor retinacula. Describe the formation of noncalcareous (Achilles tendon.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Tibio-fibular Joint	Describe the articulations, muscles and neurovasculature and movements at Tibiofibular joints.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Ankle Joint	Describe the ankle joint with its type, articulations, ligaments, movements, and neuro-vascular supply. Describe the factors stabilizing the ankle joint. Discuss important associated clinical conditions. Describe the formation, attachments, and clinical significance of plantar aponeurosis.	LGIS Demonstration	SEQs MCQs OSPE VIVA VOICE
Plantar Fascia	Describe the formation, attachments, and clinical significance of plantar aponeurosis. Explain the anatomical basis of the signs and symptoms of plantar fasciitis.	LGIS Demonstration	SEQs MCQs OSPE VIVA VOICE
Muscles of foot	Describe the muscles of the dorsum and sole of foot with their proximal & distal attachments, innervation and actions emphasizing the role of interossei and lumbricals.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Small joints of foot	Describe the subtalar and midtarsal and interphalangeal, joints with their types, articulation, ligaments, stabilizing factors, movements, and neurovascular supply.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Arches of foot	Describe the formation, components, stabilizing and maintaining factors of the arches of foot. Describe the clinical significance of arches of foot with respect to flat foot, claw foot.	LGIS Demonstration	SEQs MCQs OSPE VIVA VOICE
Retinacula of foot	Describe the fibrous flexor sheaths, extensor expansions and synovial flexor sheath.	Demonstration	SEQs MCQs

Psychomotor Domain			
Topic	**Learning Objective**	**Mode of information transfer**	**Assessment tool**
			OSPE VIVA VOICE
Neurovascular supply of foot	Describe the origin, course, relations, branches/tributaries, distribution, and termination of plantar vessels. Describe the cutaneous nerves and vessels of foot. Describe the palpation of dorsalis pedis artery &explain the clinical significance of dorsalis pedis artery. Describe the anatomical basis of knee jerk, ankle jek, and plantar reflex.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Human Gait	Describe the mechanism of walking. Describe the phases of gait cycle with muscles involved in each phase. Describe the propulsive and shock-absorbing mechanisms of foot. Describe the weight bearing/ line of weight transmission in lower limb.	LGIS Demonstration	SEQs MCQs OSPE VIVA VOICE
Mediastinum	Define mediastinum giving its boundaries and compartments. List the contents of its various compartments. Justify the clinical picture of superior mediastinum syndrome anatomically.	Demonstration	SEQs MCQs OSPE VIVA VOICE
	Describe the formation, tributaries, and termination of superior vena cava Human Anatomy Describe the formation, branches, and relations of ascending aorta, aortic arch and descending thoracic aorta. Discuss the distribution of ascending aorta, aortic arch and descending thoracic aorta in reference to their branches	Demonstration	SEQs MCQs OSPE VIVA VOICE
	Describe formation, course and tributaries of azygous, hemizygous and accessory hemizygous veins. Discuss the distribution of ascending aorta, aortic arch and descending thoracic aorta in reference to their branches Describe formation, course and tributaries of azygous, hemizygous and accessory hemizygous veins.	Demonstration	SEQs MCQs OSPE VIVA VOICE
Pericardium	Describe the pericardial cavity mentioning transverse and oblique sinuses. Discuss their clinical significance. Describe the surgical significance of pericardial sinus. Describe the anatomical correlates of pericardial rub, pericardial pain, pericarditis, pericardial effusion, and cardiac tamponade. Describe the anatomical basis for pericardiocentesis.	LGIS Demonstration	SEQs MCQs OSPE VIVA VOICE

Histological features of lymph node, spleen & thymus	Light microscopic structure of Spleen, Thymus, Lymph nodes, tonsils and MALT including Appendix	Practical	SEQs MCQs OSPE VIVA VOICE
Connective tissue	Identify and demonstrate the various types of connective tissue	Practical	SEQs & MCQs OSPE VIVA VOICE
Histology of Muscles	Draw and label the histology of skeletal muscle	Practical	SEQs MCQs OSPE VIVA VOICE
	Draw and label the histology of smooth muscle	Practical	SEQs MCQs OSPE VIVA VOICE
	Draw and label the histology of cardiac muscle	Practical	SEQs MCQs OSPE VIVA VOICE
Histology of bones	Draw and label the histological picture of compact bone.	Practical	SEQs MCQs OSPE VIVA VOICE
	Draw and label the histological picture of spongy bone.	Practical	SEQs MCQs OSPE VIVA VOICE
Histology of Cartilage	Draw and label the microscopic structure of hyaline cartilage	Practical	SEQs

			MCQs OSPE VIVA VOICE
	Draw and label the microscopic structure of elastic cartilage	Practical	SEQs MCQs OSPE VIVA VOICE

Physiology

Physiology of Nerve & Muscle	**Knowledge**		
Topics	**Learning Objectives**	**Mode of Info Transfer**	**Assessment Tool**
1. Diffusion / Equilibrium Potentials & Nernst potential	Explain the Physiological basis of membrane potential Explain diffusion potentials of Na & K Define Nernst potential Explain Physiological Basis of Nernst potential Write the Nernst equation. Calculate Nernst potential for Na & K Explain the effects of altering the concentration of Na+, K+, Ca on the equilibrium potential for that ion	Interactive Lectures. Tutorials/SGD Clinical Integration/ Seminars Assignments/ Presentations	MCQs SEQs Viva Voce Assignments / Presentations
2. Goldman Equation	Describe the normal distribution of Na+, K+, Ca and Cl- across the cell membrane Explain physiological basis of Goldman equation Clarify the role of Goldman equation in generation of RMP.	Interactive Lectures. Tutorials/SGD Clinical Integration/ Seminars Assignments/ Presentations	MCQs SEQs Viva Voce Assignments / Presentations

3. Resting Membrane Potential in Neurons	Describe the Physiological basis of generation of RMP. Explain the effects of hyperkalemia and Hypokalemia on the RMP Name the membrane stabilizers Explain the physiological basis of action of Local Anesthetics. **(Medical Physiology integrate with Anesthesiology)**	Interactive Lectures. Tutorials/SGD Clinical Integration/ Seminars Assignments/ Presentations	MCQs SEQs Viva Voce Assignments / Presentations
4. Neurons	Describe the Physiological anatomy of Neurons Discuss the axonal transport Enlist & give functions of Neuroglial cells Explain process of myelination in CNS & PNS	Interactive Lectures. Tutorials/SGD Clinical Integration/ Seminars Assignments/ Presentations	MCQs SEQs Viva Voce Assignments / Presentations
5. Classification of Neurons & Fibers	Classify neurons functionally. Classify nerve fibers according to Erlanger & Gasser Classification	Interactive Lectures. Tutorials/SGD Clinical Integration/ Seminars Assignments/ Presentations	MCQs SEQs Viva Voce Assignments / Presentations
6. Action Potential of Neurons	Define Action Potential Enlist the Properties of action potential Describe the ionic basis of an action potential. Explain the phases of action potential. Explain the effects of hyperkalemia and Hypokalemia on the action potential. Draw monophasic action potential. Explain absolute and relative refractory period	Interactive Lectures. Tutorials/SGD Clinical Integration/ Seminars Assignments/ Presentations	MCQs SEQs Viva Voce Assignments / Presentations
7. Role of other ions in action potential	Explain the role of other ions in action potential. Elaborate the effect of hypocalcemia on neuron excitability.	Interactive Lectures. Tutorials/SGD Clinical Integration/ Seminars Assignments/ Presentations	MCQs SEQs Viva Voce Assignments / Presentations

8. Local / Graded potentials	Explain Physiological basis& properties of Graded potential Draw & explain Physiological basis & properties of compound action potential. Contrast between action potential and graded potential Describe the ionic basis of excitatory post synaptic potential (EPSP), inhibitory post synaptic potential (IPSP), end plate potential (EPP).	Interactive Lectures. Tutorials/SGD Clinical Integration/ Seminars Assignments/ Presentations	MCQs SEQs Viva Voce Assignments / Presentations
9. Synapse	Classify and explain Physiological basis of different types of synapses Elaborate how signal transmission takes place across chemical synapse	Interactive Lectures. Tutorials/SGD Clinical Integration/ Seminars Assignments/ Presentations	MCQs SEQs Viva Voce Assignments / Presentations
10. Conduction of Nerve impulse	Explain the mechanism of conduction of Nerve impulse in myelinated and unmyelinated nerve fibers. Elaborate significance of saltatory conduction	Interactive Lectures. Tutorials/SGD Clinical Integration/ Seminars Assignments/ Presentations	MCQs SEQs Viva Voce Assignments / Presentations
11. Nerve Degeneration	Enlist the types of nerve injury Explain Wallerian degeneration. Describe the process of regeneration of nerve fiber. Describe the causes, features & pathophysiology of Multiple sclerosis, GB syndrome. **(Medical Physiology integrate with Medicine)**	Interactive Lectures. Tutorials/SGD Clinical Integration/ Seminars Assignments/ Presentations	MCQs SEQs Viva Voce Assignments / Presentations
12. Skeletal muscle	Discuss the physiological anatomy of skeletal muscles. Differentiate b/w skeletal, smooth, and cardiac muscle Describe the structure of Sarcomere	Interactive Lectures. Tutorials/SGD Clinical Integration/ Seminars Assignments/ Presentations	MCQs SEQs Viva Voce Assignments / Presentations

13. Characteristics of whole muscle contraction	Differentiate between isometric and isotonic contraction by giving examples. Compare the fast and slow muscle fibers.	Interactive Lectures. Tutorials/SGD Clinical Integration/ Seminars Assignments/ Presentations	MCQs SEQs Viva Voce Assignments / Presentations
14. Mechanics of muscle contraction	Explain the mechanism of summation and Tetanization. Describe staircase effect/Treppe phenomena Discuss the mechanism of skeletal muscle fatigue. Explain the physiological basis of rigor mortis **(Medical Physiology integrate with Forensic Medicine)**	Interactive Lectures. Tutorials/SGD Clinical Integration/ Seminars Assignments/ Presentations	MCQs SEQs Viva Voce Assignments / Presentations
15. Neuromuscular junction	Describe the physiological anatomy of NMJ Mechanism of Neuromuscular transmission & generation of End Plate Potential Explain features, pathophysiology & treatment of myasthenia Gravis **(Medical Physiology integrate with Medicine)** Discuss the steps/ events of excitation contraction coupling in skeletal muscle.	Interactive Lectures. Tutorials/SGD Clinical Integration/ Seminars Assignments/ Presentations	MCQs SEQs Viva Voce Assignments / Presentations
16. Smooth Muscle	Differentiate between types of smooth muscles. Describe mechanism of smooth muscle contraction in comparison to skeletal muscle. Explain the physiological anatomy of neuromuscular junction of smooth muscle Explain the types of action potential in smooth muscles. Explain the LATCH mechanism Describe the significance of LATCH mechanism. Explain the nervous and hormonal control of Smooth Muscle Contraction.	Interactive Lectures. Tutorials/SGD Clinical Integration/ Seminars Assignments/ Presentations	MCQs SEQs Viva Voce Assignments / Presentations
17. Muscular Disorders	Enlist various types of muscle disorders Describe the pathophysiology & features of muscular dystrophy. **(Medicine)**	Interactive Lectures. Tutorials/SGD	MCQs SEQs Viva Voce

		Clinical Integration/ Seminars Assignments/ Presentations	Assignments / Presentations
18. Myopathy	Define Myopathy Enlist various causes of myopathy Outline management of myopathy **(Medicine)**	Interactive Lectures. Tutorials/SGD Clinical Integration/ Seminars Assignments/ Presentations	MCQs SEQs Viva Voce Assignments / Presentations
19. Metabolic bone diseases: Osteoporosis	Define osteoporosis Identify risk factors for osteoporosis Outline management strategies **(Geriatrics/ Medicine)**	Interactive Lectures. Tutorials/SGD Clinical Integration/ Seminars Assignments/ Presentations	MCQs SEQs Viva Voce Assignments / Presentations
20. Metabolic bone diseases: Osteomalacia	Define osteomalacia Identify risk factors for osteomalacia Outline management strategies **(Medicine/ Rheumatology)**	Interactive Lectures. Tutorials/SGD Clinical Integration/ Seminars Assignments/ Presentations	MCQs SEQs Viva Voce Assignments / Presentations
21. Metabolic bone diseases: Rickets	Define rickets Identify risk factors for rickets Outline management strategies **(Pediatrics)**	Interactive Lectures. Tutorials/SGD Clinical Integration/ Seminars Assignments/ Presentations	MCQs SEQs Viva Voce Assignments / Presentations

(BIOCHEMISTRY)

Biochemistry Knowledge			
Topics **Block –II**	**Learning Objectives**	**Mode of Info Transfer**	**Assessment Tool**
1. HL-B001 Hemoglobin and its types/ RBCs	Discuss the biochemical role and types of hemoglobin a) Differentiate Hemoglobin and myoglobin b) Explain oxygen dissociation curve of hemoglobin and myoglobin and factors regulating them c) Interpret CO toxicity on basis of sign and symptoms d) Explain the role of 2,3 BPG in fetal circulation.	Power point, interactive lectures	Seq, Mcq, Ospe, Viva
2. HL-B002 Hemoglobinopathies/ RBCs/ Homeostasis	Discuss haemoglobinopathies and their biochemical and genetic basis with special emphasis on sickle cell anemia, Thalassemia and methemoglobinemia a) Discuss the	Power point, interactive lectures	Seq, Mcq, Ospe, Viva

	following types of anemia on the basis of signs and symptoms and laboratory data: a) Hypochromic microcytic b) Normochromic microcytic c) Normochromic normocytic d) Macrocytic (megaloblastic) Medical Biochemistry.		
3. HL-B003 Iron Metabolism/ RBCs	Explain the iron metabolism with mechanism of absorption and factors affecting it.	Power point, interactive lectures	Seq, Mcq, Ospe, Viva
4. HL-B004 Heme Degradation/ RBCs	Discuss the degradation of heme in macrophages of reticuloendothelial system a) Describe the formation of bile pigments, their types and transport b) Discuss the fate of bilirubin.	Power point, interactive lectures	Seq, Mcq, Ospe, Viva
5. HL-B005 Hyperbilirubinemias / RBCs/ Blood Groups	Discuss hyperbilirubinemias and their biochemical basis a) Differentiate types of jaundice on basis of sign/symptoms and data b) Evaluate the genetic basis of jaundice on the basis of lab investigations	Power point, interactive lectures	Seq, Mcq, Ospe, Viva
6. HL-B006 Plasma Proteins/ Homeostasis	Classify and Explain the biomedical importance of each class of plasma proteins	Power point, interactive lectures	Seq, Mcq, Ospe, Viva
7. HL-B007 Immunoglobulins/ WBCs/ Immunity	Explain the structure and biochemical role of immunoglobulins b) Describe the production, structure and functions of B cells, plasma cells, and antibodies (IgA, IgD, IgE, IgG, and IgM). c) Discuss the functions of the cytokines (ILs, TNFs, IFs, PDGF, and PAF). d) Interpret multiple myeloma on basis of given data	Power point, interactive lectures	Seq, Mcq, Ospe, Viva
8. HL-B008 Genetics	Explain and interpret pedigree of single gene defect i.e. sickle cell anemia (Autosomal recessive) and Beta Thalassemia (x linked recessive)	Power point, interactive lectures	Seq, Mcq, Ospe, Viva

Block-II			
MS-B001 Classification of Amino acids	Classify amino acids based on polarity, nutritional importance, and glucogenic/Ketogenic properties	Power point, interactive lectures	Seq, Mcq, Ospe, Viva
MS-B002 Amino Acids	Explain the structure, physical, chemical properties of amino acids and their biomedical importance.	Power point, interactive lectures	Seq, Mcq, Ospe, Viva
MS-B003 Classification of Proteins	Classify proteins based on functions and physicochemical properties. Explain its biomedical importance. Distinguish between class A and B proteins. Discuss structure and functions of Fibrous proteins (collagen and Elastin) Interpret diseases associated with them on basis of sign/symptoms and data	Power point, interactive lectures	Seq, Mcq, Ospe, Viva
MS-B004 Structure of proteins	Explain the structural levels of proteins Differentiate between alpha helix and beta pleated protein structures, Identify bondings at different levels of proteins	Power point, interactive lectures	Seq, Mcq, Ospe, Viva
MS-B005 Protein misfolding	Describe the role of chaperons in protein folding. Interpret disorders related to protein misfolding on basis of given data. Integrate with pathology & Medicine disease/ prion disease.	Power point, interactive lectures	Seq, Mcq, Ospe, Viva
MS-B006 Carbohydrates Chemistry	Describe biomedical importance of Mono-, Oligo and Polysaccharides. Discuss isomerization of carbohydrates Explain physical and chemical properties of carbohydrates Differentiate proteoglycan and glycoprotein and explain their functions	Power point, interactive lectures	Seq, Mcq, Ospe, Viva
MS-B007 ECM and collagen synthesis	Describe the components of extracellular matrix. Describe the sources, metabolism, and biochemical functions of vitamin C Describe structure, functions, and clinical	Power point, interactive lectures	Seq, Mcq, Ospe, Viva

	significance of glycosaminoglycans. Interpret the importance of vitamin C in collagen synthesis.		
MS-B008 Vitamin D metabolism	Identify the defects in collagen synthesis based on given data. (Osteogenesis Imperfecta) Integrate with Medicine Explain dietary sources, metabolism and biochemical functions of vitamin D Interpret Rickets and osteomalacia on basis of sign. Symptoms and clinical data Explain dietary sources, metabolism and biochemical functions of calcium and phosphate	Power point, interactive lectures	Seq, Mcq, Ospe, Viva
MS-B009 Calcium and Phosphate metabolism	Discuss regulation of calcium metabolism in bone metabolism and role of parathyroid and calcitriol in it Interpret hyper and hypocalcemic conditions on basis of sign/symptoms and clinical data.	Power point, interactive lectures	Seq, Mcq, Ospe, Viva
MS-B010 Genetic basis of disease	Interpret genetic basis of Duchene muscular dystrophy.	Power point, interactive lectures	Seq, Mcq, Ospe, Viva

Psychomotor Domain			
Topic **Block –II**	**Learning Objective**	**Mode of information transfer**	**Assessment tool**
HL-B009 Jaundice & Anemias/ RBCs/ Homeostasis	Interpret jaundice on the basis of estimation of bilirubin	Power point, interactive lectures	Seq, Mcq, Ospe, Viva
HL-B009 Jaundice & Anemias/ RBCs/ Homeostasis	Perform estimation of ALT and interpret the findings	Power point, interactive lectures	Seq, Mcq, Ospe, Viva
HL-B009 Jaundice & Anemias/ RBCs/ Homeostasis	Perform estimation of AST and interpret the findings	Power point, interactive lectures	Seq, Mcq, Ospe, Viva
HL-B009 Jaundice & Anemias/ RBCs/ Homeostasis	Perform estimation of ALP and interpret the findings	Power point, interactive lectures	Seq, Mcq, Ospe, Viva
HL-B009 Jaundice & Anemias/ RBCs/ Homeostasis	Interpret graph based on oxy HB curve and 23 BPGInterpret different types of anemias & porphyrias on basis of s/s and data	Power point, interactive lectures	Seq, Mcq, Ospe, Viva
Block -II			
MS-B011 Chromatography	Detection of amino acids by paper chromatography.	Power point, interactive lectures	Seq, Mcq, Ospe, Viva
MS-B012 Total proteins	Estimation of total proteins by kit method/dipstick methods.	Power point, interactive lectures	Seq, Mcq, Ospe, Viva

MS-B013 Albumin/ globulin	Estimation of albumin and globulin	Power point, interactive lectures	Seq, Mcq, Ospe, Viva
MS-B014. Calcium	Detection of calcium by micro lab	Power point, interactive lectures	Seq, Mcq, Ospe, Viva
MS-B015. Solutions	Prepare different types of solution Molar, Molal, Normal and percentages	Power point, interactive lectures	Seq, Mcq, Ospe, Viva

Pathology

BLOCK II (MUSCULOSKELETAL & LOCOMOTION)			
1. Muscle remodeling	• Describe the hyperplasia, hypertrophy, and atrophy of muscle fiber • Explain the histopathological basis of leiomyoma	Power point, interactive lectures	MCQs
2. Diseases of Muscle	• Describe the histological basis of Duchenne Muscular Dystrophy • Describe the histopathological basis and clinical presentation of Alzheimer`s Disease, Multiple Sclerosis and Astrocytoma	Power point, interactive lectures	MCQs
3. Diseases of Bone	• Describe the clinical presentation and histological justification for osteoporosis, osteopetrosis • Describe the histological basis for bone repair after fractures	Power point, interactive lectures	MCQs
4. Disease of Cartilage	• Describe the histological basis for cartilage growth and repair	Power point, interactive lectures	MCQs

Pharmacology

Block – II			

Drugs acting on Neuromuscular Junction (NMJ)	Explain the mechanism by which drugs can stimulate NMJ Explain the mechanism by which drugs can Block NMJ.	Power point, interactive lectures	Seq, Mcq , Ospe, Viva
Drugs in Myasthenia Gravis	Outline the pharmacological concepts of drugs used in Myasthenia gravis	Power point, interactive lectures	Seq, Mcq , Ospe, Viva
Local Anesthetics	Outline the pharmacological concepts of drugs used as local anesthetics.	Power point, interactive lectures	Seq, Mcq , Ospe, Viva

	Block 2 Modules			
	DISEASE PREVENTION AND CONTROL			
MS-CM-001	Back Pain	▪ Explain causes of low back pain ▪ Describe prevention of low back pain	Interactive lecture/ tutorial/TBL / SGD/ PBL	MCQs, SEQs, Viva Voce

MS-CM-002	MSD related tochild labour	▪ Describe causes and prevention of musculoskeletal disorders (MSD)related to child labour	Interactive lecture/ tutorial/TBL / SGD/ PBL	MCQs, SEQs, Viva Voce
MS-CM-003	Describe prevention of exposure to risk factors related to workplace	▪ Describe work related musculoskeletal disorders addition with its burden/epidemiology ▪ Identify risk factors of MSD at workplace ▪ Describe prevention of exposure to risk factors related to workplace	Interactive lecture/ tutorial/TBL / SGD/ PBL	MCQs, SEQs, Viva Voce
MS-CM-004	MSD related to mobile usage	▪ Describe MSD related to mobile addition with its burden/epidemiology ▪ Identify risk factors relates to MSD due to excessive mobile usage ▪ Describe the preventive strategies for mobile addiction related MSD	Interactive lecture/ tutorial/TBL / SGD/ PBL	MCQs, SEQs, Viva Voce
MS-CM-005	Ergonomics	▪ Describe application of ergonomics in MSD related to above disorders	Interactive lecture/ tutorial/TBL / SGD/ PBL	MCQs, SEQs, Viva Voce
MS-CM-006	Non- communicable disease	▪ Describe the concept of non-communicable diseases	Integrated lecture/ tutorial/TBL / SGD/ PBL	MCQs, SEQs, Viva Voce
MS-CM-007	Risk factor assessment of Musculoskeletal diseases	▪ Identify the risk factors in the community for Osteoporosis ▪ Learn and apply interventions to prevent the risk factors for various musculoskeletal diseases in community	Interactive lecture/ tutorial/TBL / SGD/ PBL	MCQs, SEQs, Viva Voce