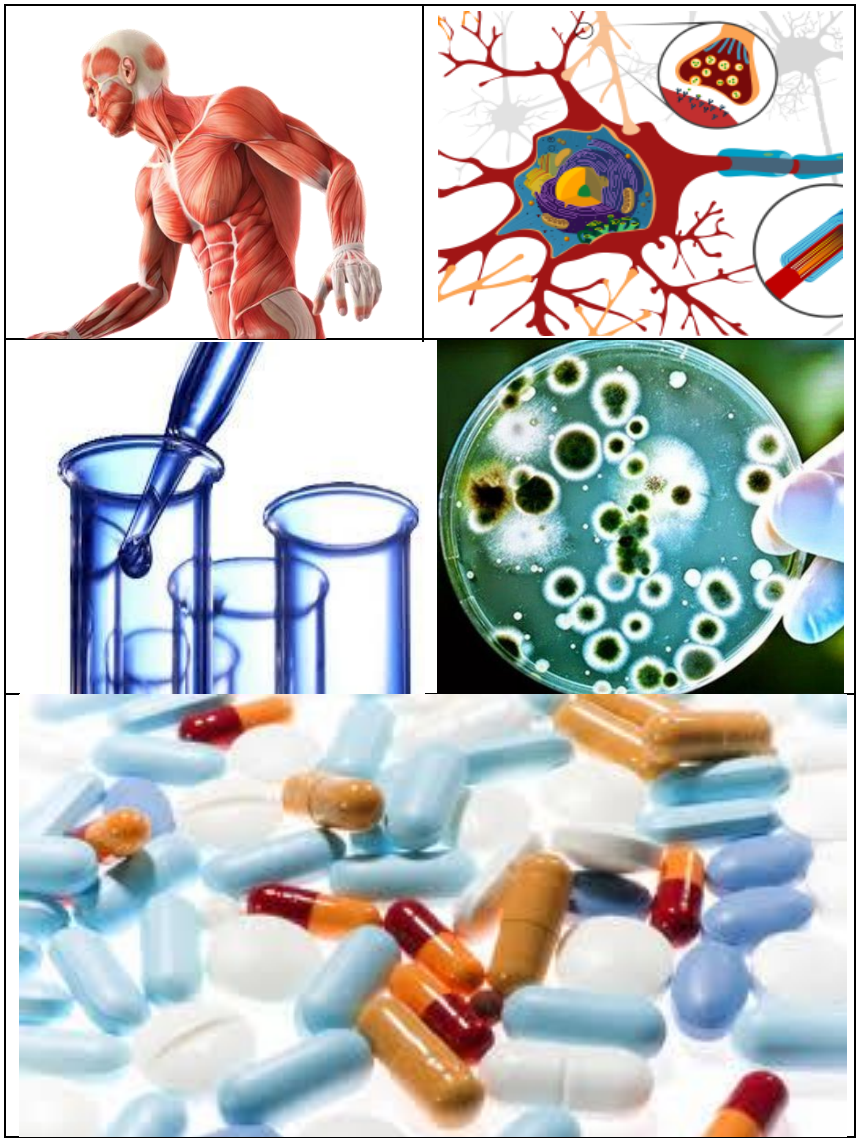
Musculoskeletal Module

First Professional Year MBBS

7 Weeks



Introduction to Module

Musculoskeletal system Module is designed to provide guidance on introduction to the basics of human musculoskeletal system. Moreover, the module is aligned to the general outcomes required at the exit level, and includes introductory sessions on preventive medicine, communication skills, professionalism, self- management, and developing scholarly skills. The module committee will facilitate the students with any issues that they have, while settling down in the new environment. You will also learn the skills required for practical implications in the field of medicine. Moreover, working within teams will enhance your co-operative and approachable working style

GENERAL LEARNING OUTCOMES

By the end of this module the students should be able to;

Knowledge

By the end of this module, students should be able to:

1. Develop an understanding of the fundamental components of the musculoskeletal system.
2. Explain the structure & function of the musculoskeletal (MSK) components of limbs and back.
3. Describe how injury and disease alter the MSK structure & function.
4. Integrate concepts relating to various metabolic processes, their disorders and relevant lab investigations in the study of human MSK system.
5. Describe the role of the limbs (upper/lower) in musculoskeletal support, stability and movements.
6. Describe the development of the limbs & correlate it with organization and gross congenital anomalies of the limbs.
7. Identify the anatomical features of bones, muscles & neurovascular components of the limbs and correlate them with their functions, injuries and clinical problems.
8. Describe the types, formation, stability, function & clinical significance of joints of the upper and lower limb.
9. Describe the basic histology of muscle fibers including its molecular structure (Sarcomere).
10. Explain the mechanism of excitation and contraction of skeletal and smooth muscles.
11. Describe the basis for the use of therapeutic agents to modulate neuromuscular transmission.
12. Describe the general principles of MSK pain management.
13. Describe ergonomics and its principles and prevention of different MSK disorders.
14. Interpret the mechanism of post-mortem rigidity. (spiral II)
15. Give an overview of pathology of bones, muscles and joints.

16. Explain the role of different minerals, hormones and specific metabolic products related to the musculoskeletal system and correlate them with their relevant clinical metabolic disorders.
17. Interpret the relevant laboratory investigations for diagnosis of common musculoskeletal disorders. (Spiral two)
18. Develop the critical thinking and analysis in the context of various case scenarios pertaining to locomotors system
19. explain the behavioral aspects of perception, emotions, motivation, human development and attitudes

20- describe basic terms related to clinical research, study types, design, and components of a research article

21- describe the basic concepts of management and leadership

Skills

By the end of this module, it is a core objective that students should have acquired the following skills:

1. Demonstrate the anatomical structures of the limbs in a dissected cadaver/Model/prosecuted specimen & X-ray.
2. Demonstrate the provision of first aid measures in case of a limb fracture.
3. Communicate effectively in a team with colleagues and teachers.

Attitude

While not necessarily taught explicitly, students are expected to develop following attitudes throughout the course:

1. Demonstrate respect and care for the cadaver and prosected parts.
2. Demonstrate humbleness and use socially acceptable language during academic and social interactions with colleagues and teachers.
3. Make ethically competent decisions when confronted with an ethical, social or moral problem related to MSKS in professional or personal life.
4. Discuss ethical issues social and preventive aspect of health care in the context of MSK system.
5. To create awareness about the ethical, social and preventive aspect of health care in the context of locomotor system.

THEMES FOR MUSCULOSKELETAL MODULE

SNO	Theme	Duration
1	Orientation and frozen shoulder	2 weeks
2	Tennis Elbow	1 week
3	Carpel Tunnel Syndrome	3 days
4	Waddling Gait	2 weeks
5	House maid's knee	1 week
6	Foot drop	3 days

Musculoskeletal MODULE THEME -I ORIENTATION AND FROZEN SHOULDER

SNO.	Topic	Learning Outcomes

ANATOMY		
1	Introduction to locomotion and upper limb	Identify the extent of the upper limb. Identify various regions of upper limb. Describe the division of the regions into compartments.
2	Pectoral Region.	Recognize the role of muscles of pectoral region in stabilizing the pectoral girdle. List the muscle of pectoral girdle. Describe &Demonstrate the attachments of muscle of pectoral girdle, nerve supply and actions. Describe the structural organization of the clavi-pectoral fascia. Describe the nerves and blood vessels of this region
3	Breast	**Describe the Extent and location of breast.** **Describe the Arterial supply and lymphatic drainage of breast.**
4	Axilla	Describe the position, shape of axilla. Describe the muscles forming the boundaries of Axilla Describe the contents of axilla Describe the formation, course and relations of axillary vessels.

		Describe arrangement and groups axillary lymph nodes
5	Brachial plexus	Mention the formation of brachial plexus (roots, trunk, division, and cords). Describe the relation of brachial plexus also in connection to clavicle (Supra, retro, infra clavicular parts). State the branches arising the different cords. Draw the brachial plexus. Describe the clinical correlates of the brachial plexus. Erbduchane palsy Klumpke's palsy Saturday night palsy
6	Muscles of the shoulder region	Recognize the extent of shoulder region. Describe the muscle of shoulder region. List the muscles of shoulder region. State the detailed structures of each muscle with respect to Origin, Insertion, Nerve supply and Action of muscles with any characteristic features.
7	Osteology of clavicle	Recognize the bone Identify the site of bone State the bony land marks of clavicle: like borders, surfaces & land mark used for bone determination Describe & demonstrate the attachments of muscles. Describe the common fractures of the bone. Describe the surface anatomy clavicle Describe the radiological anatomy clavicle Describe the applied anatomy clavicle
8	Superficial back	Muscles of the back connecting the axial skeleton to the shoulder girdle alongwith their nerve supply Anastomosis around the scapula and its clinical significance.
9	Osteology of scapula	Recognize the bone. Identify the site of bone. State the bony landmarks of scapula: like borders, surfaces & land mark used for bone determination.

		Demonstrate the attachment of muscles on scapula Describe the surface anatomy scapula Describe the radiological anatomy scapula. Describe the applied anatomy scapula.
10	The shoulder joint & its movements	Identify the type of shoulder joint. Describe the structure of shoulder joint. Name the muscles acting on the joint/rotator cuff muscles. Explain the range of mobility. Describe the movements of shoulder joint. Explain the clinical anatomy of the Joint
11	Arm	Describe the compartments of arm and how they are formed. Identify and explain the muscles and their actions found in the arm. Describe the nerve supply of arm. Describe the course of the nerves Identify the branches of the nerves Relate & integrate with the clinical correlations Describe cutaneous supply of arm. Describe the extension, relation and branches of the Brachial artery. Describe the course of the Basilic and cephalic veins
12	Osteology of humerus	Recognize the bone. Identify the site of bone. State the bony landmarks of humerus: like borders, surfaces & land mark used for bone determination. Demonstrate the attachment of muscles & ligaments. Describe the common fractures of the bone.

		Identify the attachments to humerus Describe the surface anatomy humerus Describe the radiological anatomy of humerus Describe the applied anatomy of humerus
	Embryology	
22	Somitogenesis	Define the process of gastrulation. Describe the development of mesoderm. Describe the process of somitogenesis. Describe the formation of cartilage
23	Development of cartilage	Describe the Development of cartilage(hyaline, fibrous&elastic)
	HISTOLOGY	
27	Classification & histology of cartilage	Describe the General properties of cartilage Describe the Different types of cartilage Describe the Hyaline, Elastic and Fibrocartilage Explain the growth of cartilage
28	Histology of cartilage	Identify types of cartilages on microscopy, including distinctive features of each. Describe the structural basis. Classify and distinguish three types of cartilages Describe the microscopic structure of hyaline cartilage Describe the microscopic structure of Elastic cartilage Describe the microscopic structure of fibrous cartilage Describe important functional correlates of three types of cartilages
	Physiology	
32	Skeletal vs smooth	Differentiate between skeletal muscle and smooth muscle.

	muscle	
33	Mechanism of muscle contraction	Describe the general mechanism of muscle contraction. Describe the molecular mechanism of muscle contraction
34	Energetics of muscle contraction	Describe the energetics of muscle contraction.
35	Terms related to MSK	Describe the followingterms related to MSK Excitable tissue Stimulus Threshold Depolarization Hyperpolarization Presynaptic potential Post synaptic potential Goldmann Equation Nernst Equation
Biochemistry		
36	Connective tissues	Explain in detail the biochemistry of connective tissues.
37	Glycosaminoglycan	Discus the role of glycosaminoglycan (GAG) in the formation of theconnective tissues, cartilage, skin, blood vessels and tendons
38	Collagen	Describe the chemical structures of cellular matrix of collagen and elastin
Biochemistry Practical		
39	Detection of Sulphur containing amino acids	Define Sulphur containing amino acids their structure and types Lead Sulphate test

Musculoskeletal
MODULE
THEME -11
Tennis elbow

1	Cubital fossa	Describe the boundaries, the contents and the relationship among structures of Cubital fossa. Demonstrate the surface anatomy of the Cubital fossa. Explain the clinical importance of the Cubital fossa.

2	Anterior compartment of forearm	List the muscles of forearm. State the nerve supply of these muscles. Explain actions of the muscles of anterior compartment of forearm. Describe attachment and functions of flexor retinaculum Identify/Describe muscles of the anterior compartment of the arm (origin, insertion, nerve supply, blood supply, and action)
3	Posterior compartment of forearm	Explain the organization of muscles of posterior compartment of forearm Identify/Describe muscles of the posterior compartment of the arm (origin, insertion, nerve supply, blood supply, and action) State the nerve supply of these muscles. Explain the actions of the muscles of posterior compartment of forearm. Describe the structural organization of the Extensor Retinaculum
4	Osteology of ulna.	Recognize the bone. Determine the side of bone. Identify the features of bone. Identify the muscles attached to bone. Describe the common fractures of the bone. Describe and Identify the salient features of the ulna Identify the attachments to ulna Describe the surface anatomy ulna and the radiological anatomy ulna Describe the applied anatomy ulna
5	Osteology of radius	Determine side of bones. Identify the features of bones. Identify the muscles attached to bones.

		Describe the ossification of bones Explain the clinical significance of bones. Describe the common fractures of the bone. Describe and Identify the salient features of the radius Identify the attachments to radius Describe the surface anatomy radius and the radiological anatomy radius Describe the applied anatomy radiusS
6	Elbow joint	Identify the type of the joint. State and Identify the muscles acting on the elbow joint. Describe the neurovascular supply of the joint. Describe the carrying angle and applied aspect of the joint. Describe the anastomosis and collateral circulation. Describe formation of anastomosis around elbow joint
7	Radio-ulnar joint	Recognize the details of Radio-ulnar joint. Describe and explain the movements occurring on Radio-ulnar joint. Name the muscles acting in pronation and supination. Describe the nerve supply and blood supply of Radio-ulnar joint. Describe clinical problems related to Radio-ulnar joints.
8	Blood vessels & nerves of the forearm	Describe the different vessels &nerves in forearm. Describe the location, destination, course & relations of radial and ulnararteries & their branches in forearm. Describe the deep veins of forearm and their tributaries. Describe the location, destination, course & relations of ulnar, radialand median nerves & their branch.
9	Surface anatomy of upper limb	Demonstrate the surface markings for various arteries and nerves of upper limb

EMBRYOLOGY		
1	Development of muscles	Describe the development of skeletal muscle. Describe the development of Myotomes and derivatives of epaxial divisions of myotomes and derivatives of hypaxial divisions of myotomes
2	Development of bones and joints	Describe histogenesis of Bone Describe the Intramembranous Ossification Describe the Endochondral Ossification Describe the Ossification of limb bones Describe the development of joints Describe developmental events of fibrous joints Describe developmental events of cartilaginous joint Describe developmental events of synovial joints Describe important congenital correlates
3	Development of upper limb	Describe the early stages of upper limb development Describe the development of upper limb buds Describe the final stages of upper limb development Describe and explain the anomalies of the upper limb
HISTOLOGY		
1	Classification & histology of bone	Recognize bone and its functions and composition. Differentiate between woven bone and lamellar bone. Differentiate between compact bone and spongy bone. Describe the applied aspect of bone
	Bone histology	Define and identify compact and spongy bone Describe and identify bone matrix (organic and inorganic component) Describe and identify cells of boney tissue i.e. (osteoprogenitor,

		osteoblasts, osteoclast, and osteocytes) Describe and identify periosteum and endosteum Describe and identify the microscopic structure of bone i.e. (primary bone, secondary bone and haversian system) Describe Functions of various bone cells
2	Histology of muscles	Identify three types of muscles on microscopy, including distinctive features of each muscle fiber. Describe the structural basis of muscle striations. Recognize the structural elements that produces muscle contractionand brings the movement of a body part. Recognize the function and organization of the connective tissue in muscle. Classify and distinguish three types of muscles Describe the microscopic structure of skeletal muscle Describe important functional correlates of skeletal muscle

Musculoskeletal MODULE

THEME -III

Carpal tunnel syndrome

SNO.	Topic	Learning Outcomes
	ANATOMY	
1	Hand	Recognize the bones of wrist&hand Identify the features of bones. Describe the ossification of bones Explain the clinical significance of bones. Describe the common fractures of the bone. Describe and Identify the salient features bones of hand Identify the attachments to bones of hand Describe the surface anatomy main bones of hand and the radiological anatomy of main bones • Describe the applied anatomy main bones of hand including carpal tunnel and fractures
2	Muscles of hand	Recall the structure and functions ofpalmar aponeurosis. Describe the attachments, nerve supply & actions of muscles of hand. Describe the thenar Muscles. Correlate the movements of thumb with hand anatomy. Identify the anatomical snuffbox. Relate applied with gross anatomy of few structures of hand Enumerate, describe and identify the small muscles of the hand Describe Surface anatomy of important muscles of hand Identify structures on transverse MRIhand taken at various levels Describe relevant clinical anatomy of important

		muscles Identify/Describe joints of the hand and fingers (intercarpal joints, carpometacarpal and intermetacarpaljoints, carpometacarpal joint of thethumb, and metacarpophalangealjoints Describe surface , radiological and clinical anatomy of important joints
3	Vessels & nerves of the Hand	Identify different vessels in hand. Describe the location, destination course relations of radial and ulnararteries in hand. State the branches of radial and ulnar arteries in hand. Describe the formation of superficial and deep palmar arch, veins of handand their tributaries. Describe the nervous supply of the hand.
4	Wrist joint	Recognize the details of wrist joints. Describe and explain the movements occurring on wrist joints. Name the muscles acting in pronation and supination. Describe the nerve supply and blood supply of wrist joints. Describe wrist joint, nerve supply andblood supply. Describe clinical problems related to Wrist joints.
5	Spaces of the palm	Identify the different spaces of the hand on both palmar and dorsal aspects. Describe the clinical importance of these spaces
		Physiology
10	Describe the important Terms	Describe the following Motor unit Summation Tetanization Staircase effect Skeletal muscle tone Muscle fatigue Agonist Antagonists

		Coactivation of agonist and antagonis
11	Excitation contraction coupling in skeletal muscles	Discuss the process of excitation contraction coupling in skeletal muscles. Explain Transverse tubule-sarcoplasmic reticulum system Describe Release of Calcium ions by sarcoplasmic reticulum Explain Role of Calcium pump Describe Excitatory pulse of Ca+
12	Muscle action potential	Describe the muscle action potential.
13	Excitation contraction coupling	Describe excitation contraction coupling of skeletal muscle.
	BIOCHEMISTRY	
14	Role of calcium and Phosphorus	Explain the role of calcium and phosphorous in formation of cellular matrix and bone
15	Vitamins	Vitamins and their role Define vitamins Classify vitamins Differentiate between Fats and water soluble vitamins Describe role of Vitamin A Explain the role of Vitamin D Describe the role of Vitamin E Describe the role of water soluble vitamins
16	Introduction to minerals	Define Minerals, Define major and minor minerals Describe classification of minerals
	Biochemistry Practical's	
17	Detection of Cyclic amino Acids	Define Cyclic amino Acids Understand their structure and types Xanthoproteic Test

Musculoskeletal MODULE

THEME –IV

Waddling Gait

SNO	Topic	Learning Outcome
1	Introduction to lower limb	Recognize different parts of lowerlimb. Describe regions of lower limb. List the bones of lower limb. Identify different land marks in different regions of lower limb
2	Deep fascia of thigh, iliotibialtract and saphenous vein	Describe the arrangement of deep fascia in thigh Describe how the iliotibial tract participates in walking and running Describe the location of saphenous opening and its relations Describe the great saphenous vein. Describe clinical correlates of saphenous vein
3	Anterior fascial compartment of thigh and femoral triangle.	Boundaries of femoral triangle and its contents. Describe the muscles of anterior compartment of thigh. Describe the nerve supply of anterior Compartment. Describe the blood supply and the venous drainage of anterior compartment of thigh Describe the action of these muscles.
4	The medial compartment of thigh. Adductor canal.	Describe the muscles of medial compartment of the thigh. Describe the nerve supply of these muscles. Describe the actions of the muscles of medial compartment of thigh Describe the vessels of medial compartment of the thigh Describe the boundaries and contents of Adductor canal

5	**Lumbo sacral plexus.**	**Describe the formation of lumbosacral Plexus.** **List the branches of lumbosacral plexus with their root values.** **Describe relation of the nerves with Psoas major muscle.** **List the structures supplied by lumbosacral plexus.**
6	**Gluteal region**	**Describe the boundaries of gluteal region** **Describe bones and ligaments of gluteal region** **Describe the different structures entering and leaving gluteal region** **Describe muscles of the gluteal region.** **Describe Vessels of the gluteal region.** **Describe nerves of the gluteal region.** **Describe certain clinical correlates regarding gluteal region** **Describe clinical anatomy of important muscles**
7	**Hip bone**	**Identify the different parts of the bone.** **Describe side determination.** **Describe muscle attachments.** **Describe ligamentous attachments.** **Describe the different bones articulating with the hip bone** **Describe the common fractures of the bone.** **Describe the surface anatomy of hip bone** **Describe the radiological anatomy of hip bone** **Describe the applied anatomy of hip bone.**

8	**The hip joint and movements**	**Describe the Articular surfaces of hip joint** **Identify the capsule of hip joint** **Describe the synovial membrane, cavity & fluid of hip joint** **Enumerate the ligaments of hip joint & describe their attachments** **Describe the movements possible at hip joint** **Describe the clinical correlates of the hip joint** **Describe radiological anatomy (X-rays and MRI) and clinical of hip joints**
9	**Posterior compartment of thigh**	**Describe the muscles of posterior compartment of thigh** **Describe the arterial supply of posterior compartment of thigh** **Discuss the trochanteric and cruciate anastomosis at the back of thigh** **Describe the venous drainage of this Region** **Describe the nerves of posterior compartment of thigh**
10	**Femur**	**Identify different parts of the femur** **Determine the side of the bone** **Identify the surfaces and borders of the bone** **Describe the attachments of the different muscles and ligaments on the bone** **Describe the arterial supply of the bone** **Describe the surface anatomy of femur** **Describe the radiological anatomy of Femur** **Describe the common fractures of the bone.**

		Describe the applied anatomy of femur
	Musculoskeletal MODULE **THEME -V** **House maid's Knee**	
11	Popliteal fossa	Describe the boundaries of popliteal fossa. Describe the contents of the popliteal fossa. Describe some clinical correlates regarding popliteal fossa
12	Posterior compartment of leg	Explain the muscles of posterior Compartment of leg. Describe nerve supply of these muscles. Explain the actions of the muscles of posterior compartment of leg Describe the blood vessels of the posterior compartment of leg
13	Anterior and lateral compartment of leg	Identify the boundaries of the compartments of leg State the muscles of anterior and lateral compartment of leg Describe the vessels of anterior and lateral compartment of leg

		Describe the nerves of lateral and anterior compartment of leg **Describe action of these muscles**
14	**Tibia bone**	**Describe the division of tibia bone in 3 parts** **Identify the surfaces and borders of tibia** **Describe the attachments of muscles on the tibia bone** **Describe the common fractures of the bone.** **Describe the radiological anatomy ofleg.** **Describe the applied anatomy of leg**
15	**Fibula**	**Determine the side of bone.** **Describe the bony features along with its different attachments on the fibula.**
16	**Knee joint**	**Describe the type of knee joint** **Describe the articular surfaces of this joint** **Describe the articular capsule** **Describe the synovial membrane and the synovial cavity** **Enumerate the ligaments of knee joint** **Describe the bursa around the knee joint** **Describe the blood and nerve supply of the knee joint** **Describe the mechanism of locking and unlocking of knee joint.** **Describe surface and radiological anatomy (Xrays and MRI) and clinical of knee joints**

17	Nerves of lower limb andtheir injuries	Identify the names of nerves and their main branches innervating lower limb Identify the nerves closely related to a bone or other structure of lower limb Recognize the main nerves commonly vulnerable to injury Identify the main area and loss of function if particular nerve is injured Define and understand terms neuritis, anesthesia, par aesthesia, paralysis, neuralgia, sciatica
18	**Surface anatomy of lower limb**	**Demonstrate the surface anatomy of arteries of lower limb.** **Demonstrate the surface anatomy of superficial & deep veins** lower limb. Demonstrate the surface anatomy of nerves of lower limb
	Embryology	
21	Development of lower limb	Describe the early stages of lower limb development Describe the development of lower limb buds Describe the final stages of lower limb development Describe and explain the anomalies of the lower limb
	Biochemistry	
22	Sodium, potassium and chlorine in biology	Discuss RDA, serum Levels Enlist sources of Sodium, Potassium and chlorine, Describe functions Discuss absorption excretion, Describe disorders related to increase and decrease in amount of Sodium, Potassium and chlorine
	Biochemistry Practical's	
23	Salt Saturation Test	Perform Salt Saturation Test

Musculoskeletal
MODULE
THEME -VI
Foot Drop

SN0	Topic	Learning Outcome
	ANATOMY	
1	Muscles and neurovascular supply of the foot	Describe the dorsal muscles of foot. Describe the origin and insertion of planter muscles of foot. Describe their nerve supply and actions. Describe vascular and nervous supply of sole and dorsum of foot Describe their course through foot Describe relationships.
2	bones of foot	Identify and describe the salient features of the bone of foot Identify the attachments to the bone of the foot Describe the surface anatomy of foot Describe the radiological anatomy of foot Describe the applied anatomy of foot
3	Arches of foot	Describe the arches of foot Describe the factors responsible for their maintenance of the arches of the foot Recognize the injury when it occurs and be able to evaluate plantar fasciitis. Describe about counselling regarding the rehabilitation for plantar fasciitis

Biochemistry		
3	Role of vitamin c & D	Describe the role of Vitamin C and Vitamin D in the formation of connective tissues and bones.
4	Iodine in Biology	Discuss RDA, serum Levels Iodine Enlist sources of Describe functions Discuss absorption excretion, Describe disorders related to increase and decrease in amount of Iodine
PATHOLOGY		
5	introduction to Bone pathology	Define and differentiate osteopenia, osteoporosis, osteomalacia Define osteomyelitis Enlist various forms of arthriti
Forensic Medicine		
6	Injury	Define injury on medico legal basis. Classify injury. Define mechanical injury Classify mechanical injury Describe mechanisms of injury. Interpret the nature (manner) of injury.
7	Wound	Define wound. Define hurt. Identify factors affecting appearance of wound

SN0	Topic	Learning Outcome
Biochemistry		
4	Phosphorus and Magnesium in biology	Discuss RDA, serum Levels Enlist sources of Phosphorus and Magnesium Describe functions Discuss absorption excretion, Describe disorders related to increase and decrease in amount of Phosphorus and Magnesium
5	Sulphur in biology	Discuss RDA, serum Levels Enlist sources of Sulphur Describe functions Discuss absorption excretion, Describe disorders related to increase and decrease in amount of Sulphur

6	Copper and cobalt in biology	Discuss RDA, serum Levels Copper and cobalt Enlist sources of Describe functions Discuss absorption excretion, Describe disorders related to increase and decrease in amount of Copper and cobalt
Community Medicine		
7	Back pain	Explain the causes of low back pain z Describe the prevention of low back pain z Describe the causes & prevention of msd related to child labor

SN0	Topic	Learning Outcome
	Physiology	
1	Physiologic anatomy of the skeletal muscle fiber	Explain the physiologic anatomy of the skeletal muscle fiber. Skeletal muscle fiber Sarcolemma Myofibrils I band A band Z disk M line Sarcomere Titin microfilament molecules Sarcoplasm Sarcoplasmic reticulum
2	Characteristics of whole muscle contraction	Identify the characteristics of whole muscle contraction. Compare isotonic and isometric exercises. Compare and contrast slow and fast muscle fibers. Describe the mechanics of skeletal muscle contraction. Describe muscle tone and muscle fatigue. Describe lever systems of the body and positioning of a body part. Describe remodeling of muscle to match function.
3	Neuromuscular	Describe the transmission of impulses from

	junction	nerve endings to skeletal muscle fibers. Explain the physiologic anatomy of the neuromuscular junction
4	Neuromuscular Transmission	Explain the mechanism of transmission of impulses from nerve endings to muscle fibers Explain Formation and Secretion of acetylcholine at nerve terminals Describe Action of acetylcholine at postsynaptic membrane Describe Degradation/Destruction of released acetylcholine Describe End plate potential Describe Fatigue of junction
5	Neuromuscular drugs	Describe the physiologic basis of the drugs used in the neuromuscular disorders (Drugs that enhance or block the transmission at neuromuscular junction) Enlist the excitatory and inhibitory transmitter substances secreted at the smooth muscle neuromuscular junction Drugs that stimulate the muscle fiber by acetylcholine like action Drugs that stimulate neuromuscular junction by inactivating acetylcholinesterase Drugs that block transmission at the neuromuscular junction Enlist the excitatory and inhibitory transmitter substances secreted at the smooth muscle neuromuscular junction
6	Myasthenia gravis	Describe the pathophysiology of myasthenia gravis
7	Smooth muscle	Classify smooth muscles Describe the physiologic anatomy of the smooth muscle neuromuscular junction

8	Skeletal Muscle fiber	Discuss in detail types of muscles and arrangement of skeletal muscle fibers.
9	Contraction of smooth muscle	Describe the contractile mechanisms in smooth muscles Describe excitation and contraction of smooth muscle. Identify the types of smooth muscles. Describe the chemical and physical basis for smooth muscle contraction. Compare smooth and skeletal muscle contraction. Chemical basis of smooth muscle contraction Physical basis of smooth muscle contraction Explain how the calcium ions regulate the contraction. Regulation of smooth muscle contraction by the calcium ions Enlist the excitatory and inhibitory transmitter substances secreted at the smooth muscle neuromuscular junction
10	Nervous and hormonal control of smooth muscle contraction	Describe the nervous and hormonal control of smooth muscle Contraction
11	Resting Membrane Potential	Enumerate the intracellular and extracellular concentrations of sodium, potassium, chloride and calcium ions in a resting/normal cell. Describe the characteristics of major membrane ion channels and their role in the membrane potential Describe the resting membrane potential in a cell/nerve fiber
12	Muscle Remodeling	Describe following Muscle hypertrophy Muscle atrophy Muscle hyperplasia Rigor mortis Muscle dystrophy Recovery of muscle contraction in poliomyelitis

13	Membrane potentials and action potentials in smooth muscles	Describe the membrane potentials and action potentials in smooth muscles. Describe Spike potentials Describe Action potentials with plateaus Describe Role of calcium channels in generating the smooth muscle action potential Describe Slow wave potentials Describe Excitation of visceral smooth muscle by muscle stretch Describe Depolarization of multi-unit smooth muscle without action potentials
14	Control of smooth muscle contraction	Describe the mechanism nervous, hormonal and local control of smooth muscle contraction.
15	Smooth muscle and skeletal muscle contraction	Compare the smooth muscle contraction and skeletal muscle contraction
16	Skeletal muscle contraction	Describe the three sources of energy for muscle contraction Compare isometric and isotonic contractions Compare characteristics of fast and slow muscle fibers. Sources of energy for muscle contraction Compare isometric and isotonic contractions Compare characteristics of fast and slow muscle fibers
		Biochemistry
17	Hormonal regulation	Explain the hormonal regulation of calcium and phosphorous to maintain musculoskeletal system
18	Sodium, potassium and chlorine in biology	Discuss RDA, serum Levels Enlist sources of Sodium, Potassium and chlorine, Describe functions Discuss absorption excretion, Describe disorders related to increase and decrease in amount of Sodium, Potassium and

		chlorine
19	Calcium in Biology	Discuss RDA, serum Levels Enlist sources of Calcium Describe functions Discuss absorption excretion, Describe disorders related to increase and decrease in amount of Calcium
20	Fluoride and Lithium in biology	Discuss RDA, serum Levels Fluoride Enlist sources of Describe functions Discuss absorption excretion, Describe disorders related to increase and decrease in amount of Fluoride Brief description on role of lithium in biology
21	Molybdenum, Selenium, Zinc, chromium,manganese,silicon, vanadium in biology	Enlist sources of Describe functions Discuss absorption excretion, Describe disorders related to increase and decrease of the said elements
22	Toxic element Aluminum , Arsenic, Antimony, Boron, Bromine, Cadmium, Cesium, Germanium, Lead, Mercury, Silver, Strontium	Discuss different effects of toxic Elements
Pharmacology		
23	Drug used in MSK	Define & classify NSAIDS Classify neuromuscular blocking agents. Enlist more most comomly used analgesia aspirin , iburrofen ,diclofenac, paracetamol, COX-2 Salicox Classify corticosteroids

Community Medicine		
24	MSK diseases	Explain the risk factors for different types of msd's Describe the preventive measures for different types of risk factors for msd's
25	Epidemiology and prevention of MSD	Describe work related msd's Identify risk factors of msd at workplace. Describe prevention of exposure to risk factors related to workplace. Describe the preventive strategies and safety guidelines in order to reduce the incidence of msds related to work place. Describe the burden /epidemiology of work related msd's Describe application of ergonomics in the prevention of work related msd's