Dr. Chandramma Dayananda Sagar Institute of Medical Education and Research (CDSIMER)

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GENERAL ANATOMY (8 hours)

ANATOMICAL TERMINOLOGY (AN1.1)

- Demonstration of normal anatomical position
- Various planes of the body
- Terminology used for various relations and comparison
- Terminology used for various movements of the body

GENERAL FEATURES OF BONES AND JOINTS (AN1.2 , AN2.1 ,AN2.6)

- Bone: definition with its composition and formation of bone marrow
- Bone: parts, blood supply and nerve supply
- Enumerate laws of ossification
- Enumerate special features of sesamoid bone
- Various types of cartilages with its structure and distribution in body
- Joint: definition, types and examples
- Concept of nerve supply of joints and Hiltons law

GENERAL FEATURES OF MUSCLE (AN3.1 to AN3.3)

- Muscle tissue: classification, structure and action
- Enumerate parts of skeletal muscle
- Differentiate between different types of muscles
- Differentiate between tendons and aponeurosis with examples

- Concept of shunt and spurt muscles

GENERAL FEATURES OF SKIN AND FASCIA (AN4.1 to AN4.5)

- Skin: types, structure and function
- Illustrate dermatomes in human body
- Demonstration of superficial fascia with fat distribution in body
- Deep fascia: modifications and its functions
- Explain principles of skin incisions.

GENERAL FEATURES OF CARDIOVASCULAR SYSTEM (AN5.1 to AN5.8)

- Points of differentiation between blood vascular and lymphatic system
- Points of differentiation between pulmonary and systemic circulation
- Points of differentiation between arteries and veins
- Points of differentiation between elastic, muscular arteries with arterioles
- Demonstrate portal system with examples
- Illustrate anastomosis and collateral circulation with significance of end arteries
- Importance of meta arterioles, precapillary sphincters and arterio venous anastomoses.
- Concept of thrombosis, infarction and aneurysm

GENERAL FEATURES OF LYMPHATIC SYSTEM (AN6.1 to AN6.3)

- Lymphatic system: composition and functions
- Lymph capillaries and their structure.
- Mechanism of circulation of lymph
- Anatomical basis of lymphedema and metastasis of tumors via lymphatics and venous system

INTRODUCTION TO NERVOUS SYSTEM (AN7.1 to AN7.8)

- Nervous system: types and components of central, peripheral and autonomic nervous system

- Nervous tissue: components and function
- Neuron with its parts
- Structural and functional classification of neuron
- Illustrate typical spinal nerve
- Concept of sensory and motor innervation of muscles with its applied anatomy
- Different types of Synapse with examples
- Demonstrate sympathetic and spinal ganglia with its difference.

GENERAL HISTOLOGY (33 hours)

EPITHELIUM (AN65.1 to AN65.20)

- Histological features of various epithelia
- Histological correlation and function of epithelia
- Electron microscopic picture of epithelium

CONNECTIVE TISSUE HISTOLOGY (AN666.1 to AN66.2)

- Connective tissue: types and functional correlation
- Electron microscopic picture of connective tissue

MUSCLE HISTOLOGY (AN67.1 to AN67.3)

- Muscle tissue: classification, structure and functional correlation
- Electron microscopic picture of muscle tissue

NERVOUS TISSUE HISTOLOGY (AN68.1 to AN68.3)

- Neuron: structure, functional correlation, description and identification of various neurons
- Electron microscopic picture of nervous tissue

BLOOD VESSELS HISTOLOGY (AN69.1 to AN69.3)

- Blood vessels: types and microscopic features
- Histological structure of capillaries
- Electron microscopic picture of blood vessel

GLANDS AND LYMPHOID TISSUE (AN70.1 to AN70.2)

- Histological features of exocrine glands
- Differentiate between serous, mucous and mixed acini
- Histological features of lymphoid tissue
- Histological features of lymph node, spleen, thymus, tonsil with structural and functional correlation

BONE AND CARTILAGE (AN71.1 to AN71.2)

- Bone: types, structure, histological features and functional correlation
- Cartilage: types, structure ,histological features and functional correlation

INTEGUMENTARY SYSTEM (AN72.1)

- Skin: Identification, histological features, structure and functional correlation.

GENETICS (4 hours)

CHROMOSOMES (AN73.1 to AN73.3)

- Chromosomes: structure and classification
- Karyotyping: procedure with application
- Concept of lyon's hypothesis

PATTERNS OF INHERITANCE (AN74.1 to AN74.4)

- Inheritance: modes, examples, pedigree charts and clinical correlation.
- Concept of multifactorial inheritance with examples
- Genetic involvement with characteristic features of various diseases like Achondroplasia ,cystic fibrosis, vitamin D resistant rickets, Haemophilia, Duchenne's muscular dystrophy and sickle cell anaemia.

PRINCIPLE OF GENETICS ,CHROMOSOMAL ABERRATIONS AND CLINICAL GENETICS (AN75.1 to 75.5)

- Chromosomal aberration: structural and numerical
- Concept of mosaics and chimers with examples
- Genetic involvement and clinical picture of Prader willi syndrome, Edward syndrome, Patau syndrome.
- Concept of polymorphism and mutation
- Principles of genetic counseling.

UPPER LIMB (86 hours)

FEATURES OF INDIVIDUAL BONES (UPPER LIMB) (AN8.1 TO AN8.6)

- Clavicle, scapula, humerus, radius, ulna – side determination, anatomical position and important features and Joints formed by them.
- Peculiarities of clavicle
- Muscle group attachments on above bones
- Identification of bones in articulated hand
- Parts of metacarpals and phalanges
- Peculiarities of pisiform

- Scaphoid fracture and basis of avascular necrosis

PECTORAL REGION (AN9.1 TO AN 9.3)

- Pectoralis major, pectoralis minor - attachment, nerve supply and action
- Clavipectoral fascia- extent, attachment and structures piercing it.
- Breast - location, extent, deep relations, structure, age changes, blood supply,
- lymphatic drainage, microanatomy and applied anatomy
- Development of breast

AXILLA, SHOULDER AND SCAPULAR REGION (AN 10.1 TO AN10.13)

- Axilla - boundaries and contents
- Axillary artery and - origin, extent, course, parts, relations and branches
- Axillary vein tributaries
- Brachial plexus - formation, branches, relations, area of Supply of branches,
- Cour se and relations of terminal branches
- Axillary lymph nodes - anatomical groups and areas of drainage
- Variations in formation of brachial plexus
- Erb's palsy and Klumpke's paralysis - anatomical basis and clinical features
- Latissimus dorsi and trapezius- location, attachment, nerve supply and actions
- Arterial anastomosis around the scapula
- Boundaries of triangle of auscultation with its clinical significance
- Deltoid and rotator cuff muscles
- Serratus anterior - attachment and actions, nerve supply and applied aspect
- Shoulder joint - type, articular surfaces, capsule, synovial Membrane, ligaments, relations, movements, muscles involved, blood supply, nerve supply and applied anatomy
- Anatomical basis of injury to axillary nerve during intramuscular injections

ARM AND CUBITAL FOSSA (AN11.1 TO AN11.6)

- Muscle groups of upper arm
- Biceps and triceps brachii
- Important nerves and vessels in arm - origin, course, relations, branches (or tributaries), termination
- Venepuncture of cubital veins - anatomical basis
- Saturday night paralysis - anatomical basis
- Cubital fossa - boundaries and contents
- Anastomosis around elbow joint

FOREARM AND HAND (AN12.1 TO AN12.15)

- Ventral forearm - muscle groups with attachments, nerve supply and actions
- Nerves and vessels of forearm - origin, course, relations, branches (or tributaries),termination
- Flexor retinaculum - identification and attachments and structures related
- Anatomical basis of carpal tunnel syndrome
- Small muscles of hand
- Movements of thumb and muscles involved
- Blood vessels and nerves in hand - course and branches
- Anatomical basis of claw hand
- Fibrous flexor sheaths, ulnar bursa, radial bursa and digital synovial sheaths
- Fascial spaces of palm and its applied aspect
- Dorsal forearm - muscle groups, attachments, nerve supply, actions
- Origin, course, relations, branches (or tributaries), termination of important nerves and vessels of back of forearm

- Anatomical basis of Wrist drop
- Compartments deep to extensor retinaculum
- Extensor expansion - identification and formation

GENERAL FEATURES, JOINTS, RADIOGRAPHS AND SURFACE MARKING (AN13.1 TO AN13.8)

- Fascia of upper limb and compartments
- Veins of upper limb
- Lymphatic drainage of upper limb
- Dermatomes of upper limb
- Elbow joint, proximal and distal radio-ulnar joints, wrist joint and first carpometacarpal joint - type, articular surfaces, capsule, synovial membrane,ligaments, relations, movements, blood and nerve supply
- Sternoclavicular joint, acromioclavicular joint, carpometacarpal joints and metacarpophalangeal joints
- Bones and joints of upper limb seen in anteroposterior and lateral view radiographsof shoulder region, arm, elbow, forearm and hand
- Bony landmarks - jugular notch, sternal angle, acromial angle, spine of the scapula vertebral level of the medial end, inferior angle of the scapula
- Surface projection of cephalic and basilic vein
- Palpation of brachial artery and radial artery
- Testing of muscles: trapezius, pectoralis major, serratus anterior, latissimus dorsi, deltoid,biceps brachi, brachioradialis
- Development of upper limb

THORAX (64 hours)

THORACIC CAGE (AN21.1 TO AN21.10)

- Salient features of sternum
- Features of typical and atypical rib
- Features of typical and atypical vertebrae
- Thoracic inlet & outlet - boundaries, structures passing through, clinical aspects
- Intercostal muscles-extent, attachments, direction of fibers, nerve supply, action
- Intercostal nerve-course, relation & branches
- Internal thoracic vessels & intercostal vessels – origin, course, branches/tributaries
- Atypical intercostal nerve, superior intercostal artery, subcostal artery- origin, course, relation & branches
- Type, articular surface & movements of manubriosternal, costovertebral, costotransverse & xiphisternal joint.
- Types and mechanism of respiration.
- Joint- costochondral & interchondral joint.

MEDIASTINUM (AN21.11, AN23.1 TO AN23.7)

- Boundaries & contents of superior, anterior, middle & posterior mediastinum
- Oesophagus- external appearance, relation, blood supply, lymphatic drainage & applied aspects.
- Thoracic duct- extent, relations, tributaries & applied anatomy.
- Origin, course, relations, tributaries and termination of superior vena cava, azygos, hemiazygos & accessory hemiazygos veins.
- Arch of aorta & descending thoracic aorta- branches and relations

- Thoracic sympathetic chain-location & its extent
- Right lymphatic duct- extent, relations & applied anatomy.

HEART AND PERICARDIUM (AN22.1 TO AN22.7)

- Pericardium- subdivisions, sinuses, blood supply and nerve supply.
- Chambers of heart- position, external and internal features.
- Coronary arteries- origin, course & branches and applied aspect
- Anatomical basis of ischemic heart disease.
- Coronary sinus- formation, course, tributaries and termination.
- Fibrous skeleton of heart.
- Conducting system of heart- position & arterial supply.

LUNGS AND TRACHEA (AN24.1 TO AN24.6, AN25.1 TO AN25.6)

- Pleura- extent, recesses, blood supply, nerve supply, lymphatic drainage & applied anatomy
- Lungs- side determination, external features including root, relations and clinical correlations.
- Blood supply, lymphatic drainage and nerve supply of lungs.
- Broncho pulmonary segments- definition and features
- Phrenic nerve-formation & distribution
- Trachea- extent, length, relations, blood supply, lymphatic drainage & nerve supply.

HISTOLOGY OF THORAX (AN25.1)

- Trachea & lungs- identification, drawing and labelling of a slide.

EMBRYOLOGY OF THORAX (AN25.2 TO AN25.6)

- Development of pleura, lung and heart.
- Fetal circulations and changes occurring at birth.
- Embryological basis of- 1. Atrial septal defect, 2. Ventricular septal defect, 3. Fallot's tetralogy 4.Tracheo-oesophageal fistula.
- Developmental basis of common cardiac congenital anomalies, transposition of great vessels, dextrocardia, patent ductus arteriosus and coarctation of aorta.
- Development of aortic arch arteries, superior vena cava and coronary sinus.

RADIOLOGICAL ANATOMY OF THORAX (AN25.7 AND AN25.8)

- Identification of structures seen on a plain x-ray chest (PA view)
- Identification and description of barium swallow.

SURFACE MARKING OF THORAX (AN25.9)

- Surface marking of pleural reflection, lung borders and fissures, trachea, heart borders, apex beat and surface projection of valves of heart.

LOWER LIMB (58 hours)

FEATURES OF INDIVIDUAL BONES (AN14.1 – AN14.4)

- Hip bone, patella, femur, tibia, fibula- side determination, anatomical position, important features, joint formed, attachments of muscle, ossification of given bones.
- Identification & naming of bones in articulated foot with muscle attachments.

FRONT OF THIGH (AN15.1 – AN15.4)

- Cutaneous nerves and vessels – origin, course, relation, branches/tributaries & termination.
- Muscles of front of thigh with attachments.
- Femoral triangle- boundaries and contents.
- Anatomical basis of psoas abscess and femoral hernia.

MEDIAL SIDE OF THIGH (AN15.5 – AN15.6)

- Muscles of adductor compartment of thigh with attachments.
- Adductor/hunters/sub sartorial canal – boundaries and contents.

GLUTEAL REGION (AN16.1 – AN16.3)

- Cutaneous nerves and vessels – origin, course, relation, branches/tributaries & termination.
- Muscles- origin, insertion, nerve supply & action.
- Structures undercover of gluteus maximus, medius, minimus muscle
- Anatomical basis of trendelenburg's sign.
- Nerves of gluteal region.
- Anatomical basis of sciatic nerve injury during gluteal intramuscular injection.

BACK OF THIGH (AN16.4 – AN16.6)

- Hamstring group of muscles- attachments, nerve supply and actions

- Important nerves and vessels of back of thigh-origin, course, relation, branches/tributaries & termination.
- Popliteal fossa- boundaries, contents and relations.

HIP JOINT (AN17.1 – AN17.3)

- Type, articular surface, capsule, synovial membrane, ligaments, relations, muscles and the movements involved, blood supply, nerve supply, bursae around the hip joint.
- Anatomical basis of complications of fracture in neck of femur
- Dislocation of hip joint and its replacement.

ANTERO-LATERAL COMPARTMENT OF LEG & DORSUM OF FOOT (AN18.1 – AN18.3)

- Muscles of anterolateral compartment of leg with their attachments, nerve supply and actions.
- Nerves and vessels of anterolateral compartment of leg- origin, course, relations, branches/tributaries, termination
- Flexor and extensor retinaculum- attachments & structures beneath
- Dorsum of foot-muscles and dorsalis pedis artery in detail.
- Anatomical basis of foot drop.

KNEE JOINT (AN18.4 – AN18.7)

- Type, articular surfaces, capsule, synovial membrane, ligaments, relations, muscles and movements involved, blood supply, nerve supply, bursae around knee joint
- Locking and unlocking of knee joint.
- Anatomical basis of knee joint injuries and osteoarthritis.

BACK OF LEG (AN19.1 – AN19.3)

- Muscles of back of leg-attachments, nerve supply & actions.
- Nerves and vessels of back of leg-origin, course, relations, branches/tributaries, termination.

- Concept of peripheral heart.

SOLE OF FOOT (AN19.4)

- Layers, muscles, vessels and nerves of sole
- Anatomical basis of rupture of calcanean tendon

TIBIOFIBULARJOINT, ANKLE JOINT & ARCHES OF FOOT (AN20.1, AN19.5 – AN19.7)

- Type, articular surface, capsule, synovial membrane, ligaments, relations, movements, blood supply, nerve supply of ankle joint & tibiofibular joint.
- Medial & lateral longitudinal arches, transverse arch- factors maintaining and functions.
- Anatomical basis of flat foot & club foot.
- Anatomical basis of metatarsalgia and plantar fasciitis.

VENOUS & LYMPHATIC DRAINAGE OF LOWER LIMB (AN20.3- AN20.5)

- Long, short saphenous & perforating vein- factors helping venous return, formation, course, tributaries & termination.
- Anatomical basis of varicose veins and deep vein thrombosis.
- Lymphatic drainage of lower limb- classification, superficial & deep lymphatics
- Anatomical basis of enlarged inguinal lymph nodes

RADIOGRAPHS & SURFACE MARKINGS (AN20.6 – AN20.10)

- Bones & joints of lower limb seen in anteroposterior and lateral view radiographs of various regions of lower limb.
- Important bony landmarks of lower limb- vertebral level of highest point on iliac crest, anterior and posterior superior iliac spines, iliac tuberosity, pubic tubercle, ischial tuberosity, adductor tubercle, tibial tuberosity, head of fibula, medial and lateral malleoli, condyles of

femur and tibia, sustentaculum tali, tuberosity of fifth metatarsal bone, prominent tuberosity of the navicular bone.

- Palpation of arterial pulses in – femoral, popliteal, anterior tibial, posterior tibial, dorsalis pedis artery.
- Surface marking- mid-inguinal point, saphenous opening, great & small saphenous veins, femoral, sciatic, tibial, common peroneal and deep peroneal nerve.

HEAD AND NECK (141 hours)

SKULL OSTEOLOGY (AN 26.1 -26.7)

- Parts, bones and joints of the skull.
- Anatomical position of the skull.
- Norma Verticalis, Norma Occipitalis, Norma Frontalis, Norma Lateralis, Norma Basalis.
- Difference between male and female skull.
- Newborn skull, fontanelles and its clinical correlation.
- Cranial cavity and structures passing through various foramina, canals and fissures of the skull.
- Mandible – Anatomical position, features and clinical correlation.
- Difference between male and female mandible.
- Features of Typical, atypical cervical vertebra.
- Bones which are ossified in membrane.
- Features of 7^{th} cervical vertebra.

SCALP (AN 27.1-27.2)

- Extent, Layers, nerve supply, blood supply, lymphatic drainage and surgical importance.
- Clinical correlation of each layers of scalp.
- Dangerous area of scalp and importance of emissary veins in the spread of infection.

FACE AND PAROTID REGION (AN 28.1-28.10)

- Muscles of facial expression- Location, nerve supply and action.
- Sensory nerve supply of face.
- Facial vessels – formation, course and distribution.
- Clinical importance of deep facial vein.
- Facial nerve – Branches and distribution.
- Anatomical basis of facial nerve palsy.
- Cervical lymph nodes and lymphatic drainage of head, neck and face.
- Parotid gland – Parts, borders, surfaces, contents, relations, nerve supply and applied anatomy.
- Frey's syndrome – its anatomical basis.
- Anatomical basis of drainage of parotid abscess.

POSTERIOR TRIANGLE OF NECK (AN29.1-29.4)

- Boundaries, subdivisions, contents of posterior triangle of neck.
- Sternocleidomastoid muscle- Attachment, nerve supply, action with applied anatomy.
- Inferior belly of omohyoid, scalenus anterior, scalenus medius, levator scapulae – attachment along with nerve supply.
- Erb's and Klumpke's palsy.
- Anatomical basis of Wry neck.

CRANIAL CAVITY (AN 30.1-30.5)

- Cranial fossae and related structures.
- Major foramina and structures passing through them.

- Dural folds and venous sinuses.
- Applied anatomy of Dural venous sinuses.
- Anatomical basis of effect of pituitary tumor on visual pathway.

ORBIT (AN 31.1-31.5)

- Extraocular muscles of eye ball – Attachment, Action, nerve supply with clinical correlation.
- Nerves and vessels in the orbit.
- Anatomical basis of involvement of oculomotor, trochlear, abducent nerve in strabismus.
- Lacrimal apparatus – Structure, components and clinical correlation.
- Ciliary ganglion.

ANTERIOR TRIANGLE OF NECK (AN 32.1-32.2)

- Boundaries and subdivisions of anterior triangle
- Boundaries and contents of carotid, digastric, muscular and submental triangles.
- Supra and infrahyoid muscles of neck- attachment, nerve supply and action.

TEMPORAL AND INFRATEMPORAL REGION (AN 33.1-33.5)

- Temporal and infratemporal fossa – Extent, boundaries and contents.
- Muscles of mastication – attachment, action, nerve supply.
- Maxillary artery – Branches.
- Mandibular nerve- course and distribution.
- Temporomandibular joint- Ligaments, relations, movements, muscles producing movements, nerve supply and features of joint dislocation.
- Clinical importance of pterygoid venous plexus.
- Otic ganglion.
- Chordae tympani nerve.

- Pterygopalatine fossa - Boundaries and contents.
- Maxillary nerve- Course, branches and distribution.
- Pterygopalatine ganglion.

SUBMANDIBULAR REGION (AN34.1-34.2)

- Submandibular salivary gland – parts, coverings, relations, blood supply, nerve supply, lymphatic drainage.
- Submandibular stones – anatomical basis.
- Submandibular duct.
- Submandibular ganglion.

DEEP STRUCTURES IN THE NECK (AN 35.1-35.10)

- Deep cervical fascia – Parts, extent, attachment and modifications.
- Subclavian artery – origin, parts, course and branches.
- Internal jugular and brachiocephalic veins- Origin, course, relations and tributaries and termination.
- Cervical lymph nodes and their clinical implication.
- Thyroid gland – Location, parts, borders and surfaces, relations, blood supply, nerve supply with the surgical anatomy.
- Features of clinically relevant thyroid swellings.
- Cervical sympathetic chain- extent, formation, relations and branches.
- IX, X, XI and XII cranial nerves- course, distribution with applied anatomy.
- Clinical features of cervical rib syndrome.
- Clinical importance of facial spaces of neck.

MOUTH, PHARYNX AND PALATE (AN 36.1-36.5)

- Soft palate – external features, muscles, blood supply, nerve supply, lymphatic drainage and applied anatomy.
- Waldeyers's lymphatic ring – Components and functions.
- Pyriform fossa – Boundaries and clinical importance.
- Palatine tonsil- Boundaries of tonsillar fossa, tonsillar bed, External features, blood supply, nerve supply with surgical anatomy.
- Anatomical importance of tonsillectomy, tonsillitis, adenoids and peritonsillar abscess.
- Muscles of pharynx – Attachment, nerve supply and action.
- Anatomical basis of killian's dehiscence.

CAVITY OF NOSE (AN 37.1-37.3)

- Nasal septum and Lateral wall of nose- Features, Blood supply, nerve supply with clinical correlation.
- Paranasal air sinuses – classification, location and clinical correlation.
- Maxillary sinusitis and carcinoma of maxillary sinus- their anatomical significance.
- Anatomical basis of drainage of maxillary air sinus.

LARYNX (AN 38.1-38.3)

- Larynx – Extent, skeletal frame work, laryngeal cartilages, joints, ligaments and membranes, muscles along with blood supply, nerve supply and action.
- Cavity of larynx – subdivisions and importance of Rima glottidis in phonation.
- Anatomical aspects of recurrent and internal laryngeal nerve palsy.
- Anatomical basis of Heimlich maneuver and laryngitis.

TONGUE (AN39.1-39.2)

- Tongue – Morphology, Muscles and actions of extrinsic and intrinsic muscles, blood supply, nerve supply, lymphatic drainage with applied anatomy.
- Hypoglossal nerve palsy – anatomical significance.

ORGANS OF HEARING AND EQUILIBRIUM (AN 40.1-40.5)

- External ear – Parts, blood supply, nerve supply and anatomical basis of otitis externa.
- Middle ear – boundaries, contents, relations, blood supply, nerve supply with applied anatomy.
- Anatomical basis of otitis media and myringotomy.
- Features of internal ear.
- Auditory tube – parts, extent, functions and clinical correlation.

EYE BALL (AN41.1-41.3)

- Eye ball – parts and layers
- Anatomical basis of cataract, glaucoma, retinal detachment and central retinal artery occlusion.
- Intraocular muscles – position, action and nerve supply.

BACK REGION. (AN 42.1-42.3)

- Contents of vertebral canal.
- Suboccipital triangle – Boundaries, contents with Clinical significance of cisternal puncture.
- Paravertebral muscles – position, directions of fibres, nerve supply and action Splenius capitis and Semispinalis capitis.

HEAD AND NECK JOINTS, HISTOLOGY, DEVELOPMENT, RADIOGRAPHY AND SURFACE ANATOMY (AN 43.1-43.9)

- Atlantooccipital and atlantoaxial joints – Movements and muscles producing movements.
- Microscopic anatomy of pituitary gland, thyroid gland, parathyroid gland, tongue, salivary glands, tonsil, epiglottis, cornea and retina)
- Microscopic anatomy of olfactory epithelium, eyelid, sclero-corneal junction, optic nerve, organ of corti and pineal gland.
- Development of face, palate, tongue, branchial apparatus, pituitary gland, thyroid gland and eye along with anatomical basis of their congenital anomalies.
- Radiography - Plain x-ray skull (AP and lateral view), Plain x-ray Cervical spine (AP and lateral view), Plain x-ray of paranasal air sinuses (Caldwells view and waters view)
- Anatomical structures in carotid and vertebral angiogram.
- Anatomical route used for carotid and vertebral angiogram.
- Testing of muscles of facial expression, extraocular muscles, muscles of mastication.
- Palpation of carotid, facial and superficial temporal artery.

NEUROANATOMY (42 hours)

MENINGES AND CSF (AN56.1 AND AN56.2)

- Meninges - layers with their extent and modifications
- CSF- formation, circulation, absorption and functions of CSF with its applied anatomy

SPINAL CORD (AN57.1 TO AN57.5)

- Spinal cord - external features, internal structure, extent in child and adult with its clinical implications.
- Transverse section of spinal cord at mid-cervical and mid-thoracic Level
- Ascending and descending tracts at mid thoracic level of spinal cord

- Reticular formation
- Anatomical ba sis of hemisection and complete transection of spinal cord, syringomyelia

MEDULLA OBLONGATA (AN58.1 TO AN58.4)

- Medulla oblongata - external features
- Transverse section of medulla oblongata at the level of
  1) Pyramidal decussation; 2) sensory decussation; 3) inferior olivary nucleus
- Cranial nerve nuclei in medulla oblongata with their functional components
- Anatomical basis and effects of medial and lateral medullary syndrome

PONS (AN59.1 TO AN59.3)

- Pons - external features
- Transverse section of pons at the upper and lower level
- Cranial nerve nuclei in pons with their functional components

CEREBELLUM (AN60.1 TO AN60.3)

- Cerebellum - external and internal features
- Connections of cerebellar cortex and intracerebellar nuclei
- Anatomical basis of cerebellar dysfunction

MIDBRAIN (AN61.1 TO AN61.3)

- Midbrain - external and internal features
- Internal features of midbrain at the level of superior and inferior colliculus
- Anatomical basis and effects of Benedikt's and Weber's syndrome

CRANIAL NERVE NUCLEI AND CEREBRAL HEMISPHERES (AN62.1 TO AN62.6)

- Cranial nerve nuclei with their functional components and applied aspects.

- Cerebral hemispheres - poles, surfaces, sulci, gyri and functional areas
- White matter of cerebrum- subdivisions, corpus callosum, internal capsule
- Basal ganglia and limbic lobe - parts and major connections
- Dorsal thalamus, hypothalamus, epithalamus, metathalamus and subthalamus – boundaries, parts, gross relations, major nuclei and connections
- Circle of Willis - formation, branches and major areas of distribution

VENTRICULAR SYSTEM (AN63.1 AND AN63.2)

- Lateral, 3rd and 4th and ventricles - parts, boundaries and features
- Anatomical basis of hydrocephalus

HISTOLOGY AND EMBRYOLOGY (AN64.1 TO AN64.3)

- Microanatomical features of spinal cord, cerebellum and cerebrum
- Development of neural tube, spinal cord, medulla oblongata, pons, midbrain, cerebral hemispheres and cerebellum
- Various types of open neural tube defects with their embryological basis

ABDOMEN (74 hours)

ANTERIOR ABDOMINAL WALL (AN44.1 TO AN44.7)

- Different quadrants and regions of the anterior abdominal wall.
- Planes – transpyloric, transtubercular, subcostal, lateral, vertical
- Anterior abdominal wall – fascia, blood supply, nerve supply
- Muscles of anterior abdominal wall – attachments, actions& nerve supply.
- Linea alba
- Linea semilunaris

- Formation and contents of rectus sheath
- Boundaries, contents of inguinal hernia
- Factors preventing inguinal hernia
- Boundaries and contents of hesselbach's triangle
- Umbilicus
- Common abdominal inscisions.

POSTERIOR ABDOMINAL WALL (AN45.1 TTO AN45.3)

- Muscles of the back – attachments, nerve supply and action.
- Thoracolumbar fascia
- Lumbar plexus

MALE EXTERNAL GENITALIA (AN46.1 TO AN46.5)

- Penis – components, parts, blood supply and lymphatic drainage
- Testes – coverings, internal structure, side determination, blood supply, nerve supply lymphatic drainage and applied anatomy.
- Descent of testes and its applied aspects
- Epididymis
- Spermatic cord and its contents
- Anatomical basis of varicocele
- Anatomical basis of phimosis and circumcision

ABDOMINAL CAVITY (AN47.1 TO AN 47.14)

- Oesophagus – abdominal part – extent, blood supply, nerve supply, lymphatic drainage and applied aspects.

- Peritoneum – horizontal & vertical tracings, peritoneal folds & pouches
- Greater sac- boundaries & contents
- Lesser sac – boundaries & contents
- Anatomical basis of ascites, peritonitis, and subphrenic abscess.
- Describe anatomical position, various parts, peritoneal relations, visceral relations, blood supply, nerve supply, lymphatic drainage and applied aspects 0f – spleen, stomach, liver, pancreas, duodenum.
- Anatomical basis of lymphatic spread of carcinoma stomach.
- Enumerate various types of vagotomy.
- Anatomical basis of splenic notch, accessory spleen and kehr's sign.
- Extra hepatic biliary apparatus – parts, anatomical position, gross features, peritoneal and visceral relations, blood supply, nerve supply, lymphatic drainage and applied aspects.
- Calot's triangle – boundaries, contents & applied aspects.
- Mesentery – attachments, contents, relations and applied aspects.
- Small intestine – parts, features, nerve supply, blood supply & lymphatic drainage, gross and microscopic differences between jejunum & ileum.
- Large intestine – parts, extent, peritoneal & visceral relations, blood supply, nerve supply and applied aspects.
- Anatomical basis of volvulus and intussusception
- Caecum – shape, anatomical position, different types, gross features, peritoneal and visceral relations, interior, blood supply, nerve supply, lymphatic drainage and applied aspects.
- Vermiform appendix – parts, various positions, blood supply, nerve supply and lymphatic drainage.
- Anatomical basis of appendicitis.
- Superior mesenteric artery and vein – origin, course, branches and tributaries, relations, applied anatomy.

- Inferior mesenteric artery and vein - origin, course, branches and tributaries, relations, applied anatomy.
- Portal vein – features, formation, course, parts, and tributaries.
- Portocaval anastomoses - Different sites, and clinical importance.
- Anatomical basis of portal hypertension.
- Kidneys – anatomical position, side determination, coverings, gross features, relations, vascular segments, blood supply, nerve supply, lymphatic drainage and applied anatomy.
- Ureter – extent, parts, course, relations, constrictions, blood supply, nerve supply, and applied aspects.
- Suprarenal gland – anatomical position, coverings, external features, relations, blood supply, nerve supply, lymphatic drainage and applied anatomy.
- Thoraco abdominal diaphragm- attachments, major and minor openings, nerve supply, actions, abnormal openings and diaphragmatic hernia.
- Abdominal aorta – origin, extent, course, relations, branches.
- Inferior vena cava – formation, course, relations and tributaries.

VERTEBRAL COLUMN (AN50.1 TO AN50.4)

- Vertebral column – curvatures
- Intervertebral joints, sacroiliac joints, pubic symphysis.
- Anatomical basis of lumbar puncture
- Anatomical basis of scoliosis, lordosis, prolapsed disc.

SECTIONAL ANATOMY OF ABDOMEN & PELVIS (AN51.1,AN51.2)

- Sagittal section of male and female pelvis.
- Cross section at T8, T10 and transpyloric planes.

HISTOLOGY AND EMBRYOLOGY (AN52.1 TO AN52.8)

- Histology of oesophagus.
- Histology of stomach – fundus, pylorus.
- Histology of duodenum, jejunum, ileum.
- Histology of colon & appendix
- Histology of liver, gall bladder, pancreas
- Histology of kidney, ureter, urinary bladder
- Histology of suprarenal gland
- Histology of testes, epididymis, vas deferens, penis, prostate
- Histology of ovary, uterus, uterine tube, cervix, placenta, umbilical cord
- Development and congenital anomalies of diaphragm
- Development and congenital anomalies of foregut
- Development and congenital anomalies of midgut
- Development and congenital anomalies of hindgut
- Development of male and female genitourinary system.

OSTEOLOGY (AN53.1 TO 53.4)

- Lumbar vertebrae, sacrum and coccyx – anatomical position, salient features, articulations and attachments.
- Bony pelvis – anatomical position, pelvic inlet, pelvic cavity, pelvic outlet, true pelvis and false pelvis.
- Differentiation between male and female pelvis.
- Types of bony pelvis.

RADIOLOGICAL ANATOMY

- Plain x ray abdomen – features
- Barium swallow, barium enema, barium meal
- Intravenous pyelography
- Hysterosalpingogram
- ERCP
- Cholecystography
- CT abdomen
- MRI abdomen and pelvis

GENERAL PHYSIOLOGY (PY 1.1-1.9) (8 hrs.)

Mammalian cell Physiology- structure, function, molecular motors, intercellular connection and communication

Milieu interieur, its constancy and regulatory mechanisms.

Cell suicide- mechanism and significance of programmed cell death.

Membrane Transport- basic mechanism, modes of transport- passive transport, active transport.

Body fluid compartments- composition, regulation, measurement, osmolarity, osmolality, pH and buffer system, and disorders of fluid volume.

Membrane potentials- genesis of resting membrane potential and action potential of excitable tissue.

Evaluation of functions of the cell and its products in clinical care and research.

BLOOD (PY 2.1-2.13) (16 hrs.)

Introduction of blood- composition, formation of blood cells, functions of blood.

Plasma proteins- origin, classification, functions and changes in health and disease; Plasmapheresis.

Erythrocytes- functional morphology, erythropoiesis- factors affecting, PCV and ESR.

Hemoglobin – structure, functions, synthesis, variants, fate of hemoglobin. Jaundice- types, treatment and tests.

Blood indices- Definitions and normal values of MCV, MCH, MCHC and Color Index (CI); clinical significance.

Erythrocyte disorders: Anemia- Definition, morphological, etiological classifications, Polycythemia,Thalassemia.

Leukocytes- functional morphology of WBCs, Leucopoiesis- factors affecting, physiology of phagocytic mechanism.

Leukocyte disorders.

Thrombocytes- functional morphology, thrombopoiesis.

Disorders of thrombocytes.

Hemostasis- Definition, stages, mechanism, regulation,bleeding and clotting disorders, tests of hemostasis; DIC and thrombosis.

Fibrinolysis- Definition, mechanism, factors affecting fibrinolysis and its physiological significance.

Anticoagulants- Definition, classification and mechanism of action and clinical application.

Blood groups- classification, grouping, inheritance, indications, clinical implication.

Blood banking and transfusion.

Lymphoid tissues& Lymph - composition, circulation and functions.

Immunity-architecture, classification, development of immune response, regulation and immune disorders.

NERVE-MUSCLE PHYSIOLOGY (PY 3.1-3.18) (10 hrs.)

Neuron- functional anatomy, classification, electrical properties,impulse conduction, degeneration and regeneration; neuroglia, neurotropins.

Muscle- functional anatomy and organization, classification, properties, strength duration curve.

Neuromuscular junction- Definition, structure, neuromuscular transmission, drugs influencing NMJ, Myasthenia gravis, Lambert–Eaton syndrome.

Excitation-contraction coupling- molecular basis of contraction in different muscle types, characteristics- motor unit, types of contractile response (isotonic & isometric), source of energy and muscle metabolism, oxygen debt.

Gradation of muscular activity.

Muscle disorders.

GASTROINTESTINAL PHYSIOLOGY (PY 4.1 -4.10) (10hrs.)

Functional organization of the gastrointestinal system

General principles of gastrointestinal functions, secretions, movements and regulation.

Innervation of GIT and Enteric Nervous System.

GI Secretions: Volume, composition, Mechanism of formation, Regulation, functions of Saliva, Gastric juice, Exocrine Pancreatic secretion; Succus entericus and Bile.

GI Movements: Electrophysiology of GI smooth muscle and basic patterns of GI motility; mastication and deglutition reflex; esophageal peristalsis; Electrophysiology of gastric emptying and regulation; types of intestinal motility; intestino- intestinal reflex and gastro-ileal reflex; colonic reflexes; Defecation Reflex.

Digestion and Absorption of Carbohydrates, Proteins, Lipids and Vitamins;

Role of Dietary fibers.

Physiology of GI hormones.

Gut brain axis: Components, Physiological importance, Clinical relevance

Structure and functions of liver and gall bladder, Hepatobiliary system, Enterohepatic circulation.

Gastric, Pancreatic(exocrine)and Liver function tests.

Pathophysiology and clinical features of: Sjogren's syndrome, paralytic secretion, emesis, reflux esophagitis, dumping syndrome, gastritis, peptic ulcer, gastro esophageal reflux disorder, achalasia cardia, cholelithiasis, pancreatitis, cystic fibrosis, diarrhea, constipation, adynamic ileus, irritable bowel syndrome, Hirschsprung's disease.

CARDIOVASCULAR PHYSIOLOGY: (PY 5.1 - 5.16) (25hrs.)

Anatomical and functional overview of heart.

Properties of Cardiac muscle, Pacemaker tissue & Conducting system

Electrophysiology of heart: cardiac action potential- its generation & transmission across the cardiac tissue

Recording, features and uses of normal ECG.

Cardiac axis & vector.

Abnormal ECG in arrhythmias, cardiac hypertrophy, electrolyte disturbances & Coronary artery disease.

Heart as a pump; cardiac output: Heart rate- factors affecting, regulation.

Dynamics of circulation: structural & functional organization of vascular system; hemodynamic principles and regulatory mechanisms.

Blood pressure- its components, determinants, factors affecting arterial BP, Regulation (short term, intermediate, long term) and pathophysiology of hypertension, hypotension.

Regional circulation- autoregulation, microcirculation, lymphatic, coronary, cerebral, capillary, skin, fetal, pulmonary and splanchnic circulation.

Clinical applications- Shock, Syncope, Heart failure.

RESPIRATORY PHYSIOLOGY: (PY 6.1-6.10) (12hrs.)

Respiratory tract: Structural and Functional organization. Pulmonary ventilation- Mechanics of respiration, pressure volume changes during ventilation, normal lung volumes and capacities.

Alveolar surface tension and lung compliance.

Pulmonary gas exchange, alveolar ventilation and V/P ratio.

Transport of oxygen and carbon dioxide across pulmonary capillaries.

Regulation of respiration- Neural and Chemical.

Physiological changes and hazards of high altitude and deep-sea diving

Principles of artificial respiration and oxygen therapy.

Pathophysiology of dyspnoea, hypoxia, cyanosis, asphyxia, drowning, periodic breathing.

Pulmonary function tests and its clinical importance.

RENAL PHYSIOLOGY (PY 7.1 - 7.9) (10hrs.)

Physiological anatomy of the kidney, renal circulation and its regulation, peculiarities and autoregulation of renal blood flow.

Nephron- structure, types.

JG Apparatus- components and functions: Emphasis on renin angiotensin system.

Mechanism of urine formation – Mechanism, factors affecting, regulation and measurement of GFR, renal clearance.

Mechanism of tubular reabsorption and secretion, countercurrent mechanism, acidification of urine.

Renal regulation of acid base balance, fluid-electrolyte balance and its clinical implication.

Functional anatomy of urinary bladder, innervations, micturition reflex, abnormalities of micturition. Normal and abnormal cystometry.

Artificial kidney, renal transplantation.

Renal function tests.

ENDOCRINOLOGY PHYSIOLOGY (PY 8.1-8.6) (16 hrs.)

Hormones –definition, chemistry and characteristics, mechanism of action, regulation of secretion, hormonal assays, Hormone function tests, Stress response

Pituitary gland- physiological anatomy, anterior and posterior pituitary hormone

Actions and regulation, conditions caused by hyper and hypo secretion of Growth hormone, Prolactin, MSH, ADH and Oxytocin

Actions and regulation, conditions caused by hyper and hypo secretion of Thyroid gland, Thyroid function tests and antithyroid drugs.

Physiology of thymus and pineal gland

Physiology of Parathyroid hormone, Calcitonin and Vitamin D; Calcium and phosphate metabolism, calcium homeostasis, physiology of bone, Rickets, Osteomalacia, Tetany, Hypo and Hyperparathyroidism

Adrenal Cortex and Adrenal Medulla - Physiological anatomy, synthesis, secretion, transport, metabolism, actions and regulation of secretion of glucocorticoids and mineralocorticoids, catecholamines, Cushing's syndrome, Conn's syndrome, Addison's disease, adrenal virilism and pheochromocytoma.

Pancreas- Physiological anatomy, synthesis, secretion, transport, metabolism, actions and regulation of secretion of glucagon and insulin, pathophysiology of Diabetes Mellitus, Oral Glucose Tolerance Test, hypoglycemia, hyperglycemic vs hypoglycemic coma.

Obesity and metabolic syndrome.

REPRODUCTIVE PHYSIOLOGY (PY 9.1-9.12) (10 hrs.)

Physiology and pathophysiology of sex determination and sex differentiation.

Puberty –stages, onset, delayed and precocious puberty

Male reproductive system- Testes-structure and function, spermatogenesis and its regulation, sperm structure, semen analysis, endocrine function of testes, functions of prostate and seminal vesicles, cryptorchidism

Female reproductive system- Structure and functions of ovary, ovarian hormones, menstrual cycle, ovulation and tests for ovulation, menstrual disorders, menopause.

Physiological actions of sex hormones, various contraceptive methods for male and female.

Physiology of pregnancy, parturition and lactation, pregnancy tests, fetoplacental unit.

Infertility: Causes and principles of management of infertility

Psychological and psychiatric aspects of reproductive physiology.

NEUROPHYSIOLOGY (PY 10.1 - 10.20) (37 hrs.)

Embryological development,Divisions and Integrated functions of nervous system.

Neurocytology and supporting cells in the CNS

Structure, classification and properties of synapse, receptors and reflexes

Subdivisions and functions of spinal cord and spinal cord lesions.

Somatic sensation, sensory transduction, Ascending tracts and somatosensory cortex.

Physiology of pain, theories of referred pain, components of pain suppression systems.

Descending motor pathways: maintenance of tone, posture and body movements, vestibular apparatus and equilibrium

Organization and functions of ANS-tests and insufficiency.

Reticular formation, Sleep and EEG

CSF, blood brain barrier and circumventricular organs.

Physiological structure, connections, functions and disorders of cerebral cortex, basal ganglia, thalamus, hypothalamus, cerebellum and limbic system.

Neurotransmitters, Neuromediators and neuromodulators.

Higher mental functions and its disorders.

SPECIAL SENSES

Eye –

Physiological anatomy, optics of the eye and refractive errors,

Phototransduction, visual pathway and its lesions, visual perception.

Field of vision and binocular vision

Control of eye movements, strabismus, nystagmus

Pupillary reflexes and abnormalities of pupillary reactions

Ear –

Functional anatomy, auditory pathway.

Physiology of hearing, hearing loss, deafness, tinnitus, tests for hearing

Visual and auditory evoked potentials

Chemical senses

Sense of Smell- olfactory receptors, pathway, transduction, pathophysiology of altered smell.

Sense of Taste- taste buds, taste pathway, transduction of gustatory stimuli, abnormalities of taste sensations, taste blindness.

INTEGRATED PHYSIOLOGY (PY 11 .1 -11.14) (6hrs)

Body temperature: factors influencing, principles of heat generation, heat transfer, heat preservation and heat dissipation; Regulation of body temperature: thermoreceptors, hypothalamic centers, heat and cold acclimatization.

Pathogenesis of fever, pyrogens, heat stress, heat syncope, heat exhaustion, heat stroke and hypothermia.

Exercise: types and degrees of exercise, factors affecting skeletal muscle work, energy sources during exercise; physiological changes in exercise- cardiovascular and respiratory changes; endurance training- effects and advantages; therapeutic benefits of regular exercise.

Physiology of space and high altitude.

Modernization leading to sedentary life style and its consequences and life style modifications.

Brain death: clinical and EEG findings, diagnosis, and implications

Growth curve, regulation of growth, factors playing a role in growth, developmental deficiencies

Theories of aging; physiologic changes in geriatric age groups; Free radicals –effects and clinical significance; Oxidative stress and role of antioxidants.

Meditation: health benefits; effect on attention and cognition; role on autonomic functions; role in management of various disorders.

PRACTICAL

The experiments in subject of physiology have been categorized as core proceedures, demonstrations only, analytical experiments and virtual classes on amphibian experiments. The core experiments will be essentially learnt by the students and performed mandatorily in both formative and summative assessment

I. LIST OF EXPERIMENTS TO BE ESSENTIALLY PERFORMED. (PY 2.11)

1. Estimation of Haemoglobin by Sahli's Method
2. Determination of Red Blood Cell Count

3. Determination of Blood Indices
4. Determination of Total Leucocyte Count
5. Determination of Differential Leucocyte Count
6. Determination of Blood Group
7. Determination of Bleeding Time and Clotting Time

II. LIST OF EXPERIMENTS TO BE DEMONSTRATED ONLY (PY 2.12 AND PY2.13)

1. Determination of Hematocrit.
2. Determination of Erythrocyte Sedimentation Rate
3. Determination of Osmotic Fragility of Red Blood Cells
4. Determination of Reticulocyte Count
5. Determination of Platelet Count

III. CLINICAL EXPERIMENTS TO BE PERFORMED PY11.3,PY5.12,C PY5.13, PY5.15, PY6.9 (C), PY3.15, PY4.10, PY10.11 (C), PY10.20 (C)

1. History taking and General Physical Examination
2. Examination of Radial pulse.
3. Measurement of Arterial Blood Pressure
4. Effect of Exercise and Posture on Pulse and Blood Pressure
5. Examination of Cardiovascular System
6. Examination of Respiratory System
7. Effect of Mild, Moderate and Severe Exercise on Cardio-respiratory Parameters
8. Examination of Abdomen

9. Examination of Sensory System
10. Examination of Motor System

    Examination of Reflexes

11. Examination of Cranial Nerves 1-6
12. Examination of Cranial Nerves 7-12
13. Demonstrate
    a. Testing of Visual Acuity, Colour and Field of Vision (Perimetry)
    b. Hearing
    c. Smell
    d. Taste
14. Examination of Higher Functions

IV. HUMAN EXPERIMENTS TO BE DEMONSTRATED (PY5.14, PY5.16,PY10.12,PY11.14)

1. Testing Cardiovascular Autonomic Functions using heart rate variability
2. Arterial Pulse Tracing Using Finger Plethysmography.
3. EEG
4. Basic Life Support and additional emergencies
5. Galvanic skin resistance **(N C)**
6. Nerve conduction studies **(N C)**
7. Moulage for handling accidental and poisoning emergencies **(N C)**
8. EMG**(N C)**
9. EOG**(N C)**
10. Intraoccular pressure measurement**(N C)**

V. INTERPREATTION OF AMPHIBIAN NERVE MUSCLE AND CARDIAC GRAPHS USING VIRTUAL CLASSES (PY3.18)

VI. INTERPRETATIVE GRAPHS ,CHARTS AND CASE VIGNETTES

BIOCHEMISTRY

1. Relevance of Biochemistry in Medicine Core:

Importance of Biochemistry in health and disease - Examples of normal biochemical process

- Examples of biochemical derangements involved in disease development

- Examples of application of laboratory medicine in screening, diagnosisand prognosis of diseases

2 Cell and organelles, Cell membrane, Transport across cell membranes (BI1.1)

Core:

Prerequisite: Concept of prokaryotic and eukaryotic cell

Cell organelles – Structure, Biochemical functions, Marker enzymes and related disorders Cell Membrane - Fluid mosaic model, composition, Fluidity of membrane

Transport across cell membranes with examples

- Passive transport – Diffusion and facilitated transport (ion channels) Active transport – Primary and Secondary
- Endocytosis and Exocytosis Aquaporins

Separation of cell organelles ABC family of transporters

Non core:

Cytoskeleton –

Structure and functions of microtubules, actin filaments, intermediate filaments Intercellular communication

Separation of cell organelles

3 Enzymes (BI2.1, BI2.3, BI2.4, BI2.5, BI2.6, BI2.7)

Core:

Enzymes- Definition, General properties, IUBMB Classification. Coenzymes and Cofactors

Mechanism of Enzyme action - Concept of activation energy transition state, binding energy, active site; Substrate binding to active site - Koshlands Induced fit theory

Factors affecting enzyme activity

Effect of substrate concentration - Michaelis -Menton theory, Km value, Vmax and its significance (derivation not required)

Enzyme specificity

Enzyme inhibition - Competitive and Non-competitive inhibition with examples of clinical importance Suicide inhibition

Enzymes as toxins – Eg. Snake venom phospholipase

Enzyme regulation by- Short term (Covalent modification, Zymogen activation,

Allosteric regulation, Feedback regulation) and long term regulation (

Clinical Enzymology – Concept of plasma functional and non-functional enzymes Diagnostic Importance of enzymes – LDH, CK, AST, ALT, ALP, GGT, Amylase, Lipase, G6PD, Cholinesterase, ACP, 5‟nucleotidase

Isoenzymes – Definition, Diagnostic Importance of isoenzymes with

examples. Enzymes as Therapeutic agents

Enzymes as tumour markers Enzymesused in diagnostic assays RibozymesImmobile enzymes

Non core:

Mechanisms of enzyme catalysis (List)

4. Chemistry ofCarbohydrates (BI3.1) 3 hrs

Core: Definition, Biomedical importance and significance of carbohydrates asan energy source, storage and structural element.

Classification with examples

Monosaccharide derivatives – Uronic acids, aminosugars, Glycosides, Sorbitol, Mannitol andtheir Clinical significance

Disaccharides, oligosaccharides -composition, importance

Polysaccharides –Homopolysaccharides – Composition and Importance of starch, glycogen,Dextran, Cellulose and Inulin.

Heteopolysaccharides – Mucopolysaccharides (Compositionand importance)

Non core:

Galactose and Fructose metabolism

Details of Pyruvate dehydrogenase (PDH) reactionEssential pentosuria

Advanced glycation end products.

Concept of glycation and glycosylation, Importance of Glycoproteins and glycolipids

Non-core: Sialic acid – importancecarbohydrates in blood group substances

5.Carbohydrate metabolism (BI3.2, BI3.3, BI3.4,BI3.5, BI3.6, BI3.7, BI3.9)

14hrs

Core: Digestion and absorptionMechanism of absorptionLactose intolerance Glucose transporters

Insulin dependent and Insulin independent uptake of glucose by tissues

PATHWAYS – Significance, Site, reactions, key steps, energetics, regulation, inhibitors and associated disorders of -

- Glycolysis, Rapaport Leubering cycle and its significance
- Significance and sites of Substrate level phosphorylation
- Pyruvate dehydrogenase reaction, cofactors in PDH reaction
- Gluconeogenesis, Cori‟s cycle and glucose alanine cycle
- Role of adipose tissue in gluconeogenesis in prolonged fasting
- Glycogenesis, Glycogenolysis,

Glycogenstorage disorders Significance of HMP
shunt pathway and significance of uronic acid
pathway

- Glucose-6-Phosphate dehydrogenase deficiency
- Concept of TCA cycle as an amphibolic pathway, steps, energetics, regulation, inhibitors, anapleuroticreactions, role of vitamins in the pathway along with function andsignificance

Galactosemia, Essential Fructosuria, Hereditary fructose intolerance

Regulation of blood glucose levels in well fed condition and fasting/starvation andexercise. Insulin Diabetes Mellitus- type, metabolic changes, complications, diagnostic guidelines, GTT, glycated haemoglobin, glycosuria, microalbuminuria and reducing substancesin urine.

6.Chemistry of lipids(BI4.1, BI11.24) 3 hrs

Core: Definition, Modified Bloor‟s classification with examples.Biomedical importance of lipids

Fatty acids - Definition, examples and importance of Essential fatty acids, Mono andPolyunsaturated fatty acids, n3 and n6 fatty acids, Trans-fatty acids.

Triacylglycerol – composition and importance Phospholipids -Types, functions with clinical importance Respiratory distress syndrome

Glycolipids – Types and importance Cholesterol -structure, functions and biological importance , compounds derived from cholesterol and significance

Lipoproteins - Types and functions, separationtechniques of various lipoprotein fractions.

Amphipathic lipids - Definition, examples and importance, Liposomes

Non core: Fatty acids – nomenclature and different types of classification Synthesis of lung surfactant

7. **Lipid metabolism (BI4.2, BI4.3, BI4.4, BI4.6)** 12 hrs

Core: Digestion and Absorption Steatorrhea Biosynthesis and breakdown of triacylglycerol

Various lipases and their physiological and pathological significance PATHWAYS – Significance, Site, reactions, key steps, energetics, regulation, and associated disorders ofBeta oxidation and other types of oxidation of fatty acid Ketogenesis, ketolysis, types of ketone bodies,ketoacidosis Cholesterol biosynthesis upto mevalonate,Lipid lowering drugs Fatty acid synthase multienzyme complex, significance of fatty acid elongation Why fatty acid

synthesis is not done in the body.

Other types of Oxidation of fatty acids and associated disorders

Lipoprotein metabolism Structure, Composition, Types, Functions, metabolism of Chylomicrons, VLDL, LDL, HDL, associated disorders, interrelations, relationship with atherosclerosis.

Formation and functions of bile acids and bile salts Fatty liver and lipotropic factors

Alcoholic fatty liver and NASH Hyperlipoproteinemias and hypolipoproteinemias.

Biochemical basis of use of hypolipidemic drugs Prostaglandins – types and biomedical importance inhibitors of eicosanoid synthesis

Adipose tissue metabolism and adipose tissue as an endocrine organ.

Interpretation of lab results of analytes associated metabolism of lipids. Atherosclerosis

Non core:

Outline of Fatty acid biosynthesis
Lipid storage disorders

8. **Chemistry of amino acids and Proteins (BI5.1, BI5.2)** 3 hrs

Core:

Prerequisite: Amino acids – Classification based on side chain properties, nutritional requirement and properties of amino acids

Classification of Amino acids based on metabolic fate 21 st and 22nd amino acid

Standard and non-standard amino acids Biologically important peptide

Proteins – Definition, Classification based on chemical nature and solubility, functions, nutritional value

Structural organisation of proteins (primary wit example of insulin, secondary, supersecondary structures/ motifs, domains, tertiary and quaternary structures) Bonds stabilizing protein structure

Structure function relationship of proteins - haemoglobin, myoglobin, collagenand Insulin

Denaturation - definition, causes, properties of a denatured protein, significance.

Non core:

Non-protein amino acids, Non-alpha amino acids, D-amino acidsMethods to determine the structural organization of proteins

9.Protein and amino acid metabolism (BI5.3, BI5.4, BI5.5, BI11.17) 13 hrs

Core:

Digestion and absorption and associated disorders dietary sources of complete protein, dietarysources of complete proteins

Amino acid pool ,Generalreactions – Transamination, Transmethylation, Transdeamination, Deamination -Oxidative and nonoxidative and their significance.

Biogenic amines

Sources and fate of ammonia **-** Trapping, Transport and Disposal of ammonia, ammoniatoxicity, normal levels of plasma ammonia.

Urea cycle and its disorders

Amino acid metabolism

Glycine – specialized products and their importance, metabolism of glycine and associated disorders Phenylalanine, Tyrosine – metabolic pathway, synthesis of catecholamines, important products derived from and associated disorders

Other specialized products formed from tyrosine and the importance Tryptophan-synthesis of serotonin and melatonin and their importance Carcinoid syndrome, metabolism and hartnups disease.

Sulphur containing amino acids – functions of cysteine, methionine synthesis of SAM, SAH, Homocysteineand associated disorders.

Formation of Nitric oxide and its importanceOne carbon metabolism and its importance Polyamines - Examples and importance

Inborn errors of metabolism – enzyme defects, clinical features, laboratory diagnosis and biochemical basis of management of – PKU, Tyrosinosis, Alkaptonuria, Albinism, Homocystinuria, Maple syrup urine disease (MSUD) Important functions/products from histidine, serine, Aspartate, Asparagine, glutamate, glutamine, serine, branched chain amino acids

Non core:

Techniques to separate and identify amino acids.
Pheochromocytoma

10.Plasma proteins (BI5.2) 3 hrs

Core:

Functions and clinical significance and separation of plasma proteins - Albumin, α, β and γglobulins.

Acute phase reactants - Positive and Negative (clinical significance)

Biological Reference range of serum total protein, albumin, total globulin, C reactive protein Multiple Myeloma

Non core:

Separation and identification of plasma proteins by electrophoresis and

precipitation reactions Interpretation of lab results associated with disorders of protein metabolism

11.Metabolism and homeostasis (BI6.1, BI3.8, BI4.5, BI4.7, BI3.10, BI11.17) 6 hrs

Core:

Metabolic processes taking place in specific organs in the body in fed, fasting and exercise states.

Metabolic changes during starvation Integration of metabolism

12.Biological Oxidatio (BI6.6)

Core:

Prerequisite: Bioenergetics – Laws of thermodynamics, Free energy, Exergonic and endergonic reactions, Chemical Coupling Redox pair, Redox potential.

High Energy Compounds – Definition, Classification, biological significance. Transport ofreducing equivalents across mitochondria

Electron Transport Chain – Organization, components, flow of electrons. Oxidative Phosphorylation – Sites, mechanism (Chemiosmotic theory). Binding change mechanism of ATP synthesis by ATP synthase, P:O ratio

Inhibitors of Electron Transport Chain and oxidative phosphorylation. Uncouplers and theirsignificance.

Brown adipose tissue metabolism.

Non core:

ATP-ADP cycle.Structure and organization of ATP synthase complex.Mitochondrial myopathies

13.Heme metabolism (BI6.11, BI6.12, BI5.2, BI11.17) 7 hrs

Core:

Heme –Outline of functions, Synthesis, regulation and porphyrias
Degradation of Heme, Bilirubin metabolism – synthesis, transport, conjugation, excretion, normal levels of bilirubin

Jaundice – definition, types, causes, lab diagnosisCongenital hyperbilirubinemias

Hemoglobin – Adult, fetal and embryonic typesAbnormal hemoglobins– carboxy, sulph, metHb.

Hemoglobinopathies – molecular defects, pathophysiological changes in thalassemias and sickle cell anemia

Gas transport of bilirubin

Non core:

Hb Electrophoresis

14. Extracellular matrix(BI9.1, BI9.2) 4 hrs

Core:

Composition of ECM – Proteins (Composition and functions of Collagen, elastin, fibrillin,fibronectin, laminin) and Proteoglycans.

Involvement of ECM components in health and disease**.** Eg.Osteogenesis Imperfecta, Ehler-Danlos syndrome etc

Non core:

Bone tissue– Concept of Bone turnover, factors affecting bone turnover, Peak bone mass, Listof markers of bone formation and bone resorption.

15. Vitamins (BI6.5) 12 hrs

Core:

Prerequisite: Definition, difference between water and fat soluble vitamins

RDA, Sources, Metabolism, Biochemical functions, Deficiency manifestations,coenzyme forms

Hypervitaminoses of Fat soluble vitamins (A,D,E,K), Water soluble vitamins - Vitamin C, Folic acid, Vitamin B12, Thiamine, riboflavin, Niacin, Pyridoxine, Biotin,Pantothenic acid Antivitamins

Non core:

Vitamers, Lipoic acid

16. Minerals (BI6.9, BI6.10) 8 hrs

Core:

Major elements and trace elements

Sources, RDA, absorption and transport, Homeostasis, Functions, Biological reference range, disorders associated with – Calcium, phosphorus, Iron

,sodium,potassium chloride.

Functions and disorders associated with - Copper, Zinc, Selenium, Fluoride, Iodine,Magnesium, Molybdenum.

17. Chemistry of Nucleicacids (BI7.1) 2 hrs

Core:

Prerequisite: Nitrogenous bases: Purines and Pyrimidines (Major, Minor, Free Bases);Nucleosides and Nucleotides – Structure, examples, Importance

Nucleoside derivatives: NMP, NDP, NTP cAMP, SAM, PAPS, UDP sugars etcSynthetic Nucleotide Analogues and their application

Structure and function of DNA (B-DNA)

Structural organization of DNA to form chromatin (Primary and Secondary) Typesof RNA (hnRNA, mRNA, rRNA, tRNA, snRNA) with structure and functions

microRNA (miRNA) and small interfering RNA (siRNA) and their applications in medicine

Non core:

Different types of DNA

18. **Nucleotide metabolism (BI6.2,BI6.3, BI6.4)** 4 hrs

Core:

Prerequisite: Sources of atoms of Purine and pyrimidine ring Salvage pathways of Purine and pyrimidine synthesis Catabolism of Purines, Uric acid and its importance

Etiology, manifestations and biochemical basis of clinical manifestations of – Gout, Lesch Nyhan syndrome,

Non core:

SCID, Oroticaciduria

Diagnostic importance of Adenosine deaminase

19. **Molecular Biology (BI7.1, BI7.2, BI7.3, BI9.3)** 11 hrs

Core:

Concept of Genomics, proteomics and metabolomics

DNA Metabolism

Cell cycle

DNA replication - prokaryotic and eukaryotic replication, requirements, process, inhibitors Mitochondrial DNA

Telomere, Telomerase and its importanceDNA repair mechanisms

Diseases associated with DNA repair – Eg. Xeroderma PigmentosumMutations.

RNA Metabolism

Transcription process

Transcriptional units, promoter regions, RNA polymerases in prokaryotes and eukaryotes Differences between prokaryotic and Eukaryotic transcription Inhibitors of transcription process

Post transcriptional modifications of all types of RNA

Protein Biosynthesis

Genetic Code and its characteristics Requirements and activation of amino acids Translation in Eukaryotes

Inhibitors of Translation Post translational modifications

Regulation of Gene expression

Gene, introns, exons, cistron

Regulation of gene expression in prokaryotes with illustration of Lac Operon Regulation of gene expression in eukaryotes – Role of enhancers, repressors, DNA regulatory elements, gene amplification, gene rearrangement, RNA processing, RNA editing, mRNA stability.

Gene silencing

Non core:

Role of transcriptional activators and coregulators

Protein folding – Role of Chaperones and Heat shock proteins, Alzheimers disease, Prion diseases

Protein targeting and sorting with associated disorders Eg, I cell disease Protein motifs in DNA regulatory proteins

Chromatin remodeling in regulationEpigenetics

20. Molecular biology techniques and Gene therapy (BI7.4) 4 hrs

Core:

Recombinant DNA technology, DNA cloning - process and applicationPCR technique and its application, DNA fingerprinting

Blotting techniques :Concept, types and application of gene therapy.DNA Polymorphism, SNP, VNTR, RFLP DNA genomic and cDNA libraries

DNA Probes DNA Microarrays

Overview of Human Genome Project HGPRole of gene therapy in cancer

21.Biochemistry of Cancer(BI10.1, BI10.2) 5 hrs

Core:

Cell cycle, regulation, abnormal cell growth, programmed cell death (apoptosis) Cell signaling (action of hormones and growth factors) – Cell surface receptors - G proteincoupled signaling, catalytic receptor signaling, steroid receptor signaling. Mutagens and carcinogens: Definitions, examples and their actions in carcinogenesis Protooncogenes and their activation, oncogenes, tumour suppressor genes and their role in development of cancer

Oncogenic viruses (HPV and cervical cancer)Growth factors and their receptors

Tumour markers and their importance in diagnosis and prognosis of cancer Biochemical basis of cancer therapy – alkylating agents, antimetabolites, topoisomerase inhibitors, antibiotics, hormones, receptor blockers, radiotherapy etc Monoclonal antibodies and theirapplication

Non core:

Hybridoma technology

Estrogen and progesterone receptors and their clinical importance in breast cancer

22. Immunology (BI10.3, BI10.4, BI10.5) 1 hr

Core:

Cellular and humoral components of immune system Immunoglobulins

– Classes, structure function relationship Innate andadaptive immune responses, self/non-self-recognition Role of T-helper cells in immune responses

Ig class switching

Concept of Immune tolerance and Autoimmunity

Antigens and concepts in vaccine development – types of vaccines, immunological basis ofvaccine development, recombinant DNA technology in vaccine development. **Non core:** Hypersensitivityreactions

Concept of graft rejectionvaccine development.

23. **Nutrition and dietetics (BI8.1, BI8.2, BI8.3, BI8.4, BI8.5, BI11.17, BI11.23, BI11.24)** 7 hrs

Core:

Energy content of food items

BMR – Definition, Normal values, Factors affecting and biomedical importance SDA –Definition and significance (Thermogenic effect offood)

Nitrogen balance

Balanced diet – definition, composition

Dietary fibers – definition, examples, importance Glycemicindex – definition, calculation, importance

Nutritional importance of Carbohydrates, Lipids, Proteins, Vitamins and minerals, commonly used food items including fruits and vegetables.

Nutritional indices

Calculation of calorie requirement

Dietary advice for optimal health in childhood and adults, special conditions like diabetes mellitus , coronary artery disease, pregnancy.

Types, causes and effects of Protein energy malnutrition

Obesity – Definition, BMI, types, causes, role of GI peptides and adipokines in obesity,associated health risks (eg., metabolic syndrome)

24.Organ function tests (BI6.13, BI6.14, BI6.15, BI11.17) 11 hrs

Core:

Functions of Liver, Kidney, Thyroid and adrenals.

Liver Function Tests: Tests based on Synthetic, Excretory, and Role of enzymes in hepaticdysfunction

Renal Function tests – Tests to assess glomerular and tubular functions Mechanism ofaction of Group I and Group IIhormones

Thyroid function tests Adrenal function tests

Non core:

Lab tests for evaluation of Infertility

25. Acid base balance (BI6.7, BI6.8, BI11.17) 4 hrs

Core:

Prerequisite: Concept of Acids, Basesand buffers, HH Equation andits application Regulation of pH of blood by buffers, respiratory and renalmechanisms Anion gap and its significance

Acidosis and alkalosis (metabolic and respiratory) – causes, compensatory mechanisms and labfindings

ABG Analysis

Water and electrolytebalance (BI6.7) 3 hrs

Core:

Distribution of water and electrolytes in ICF and ECFOsmolality of ECF

Regulation of water and electrolyte balance

Disorders of electrolyte imbalance – causes and clinical features of Hyperkalemia, Hypokalemia,Hypernatremia, Hyponatremia

Dehydration

26. Free Radicals and Antioxidants (BI7.6, BI7.7) 3 hrs

Core:

Free radicals, Reactive oxygen species (ROS), Reactive nitrogen species

(RNS) Damaging effects of ROS on biomolecules, lipid peroxidation

Anti-oxidant defence system of our body – enzymes, vitamins, metabolites as antioxidants Role ofoxidative stress in atherosclerosis, diabetes mellitus and cancer

Non core:

Fenton and Haber Weiss reactions

27. Xenobiotics and Detoxification (BI7.5) 2 hrs

Core:

Alcohol metabolism

Xenobiotics and disease caused. Biotransformation

Phase –I reactions Oxidation Hydroxylation Cytochrome P450

Phase-II reactions

Conjugation reactions-Glucuronic acid, Glutathione, Glycine

Non core:

Other detoxification reactions reduction, hydrolysis, Acetylation, Methylation and reduction

28. Clinical chemistry (BI11.16) 2 hrs

Core:

Basic concepts of clinical chemistry
laboratory Techniques:
electrophoresis, Chromatography,
ELISA, RIA

Automation - advantages

Quality control concepts (Internal and external quality control, precision, accuracy) Specimen collection and Common Preanalytical errors

Biological reference intervalsCritical alerts

Ethics in Laboratory Medicine

Non Core:

ISE, DNA isolation, pH meter

Case based learning Sessions with lab data interpretation - 20 X2=40 hrs

Sl.No	Topic	Suggested Cases fordiscussion	No. of sessions (2hrs each)	Domain / Level	Assessment Tool
1	Diagnostic enzymologyBI2.7, BI11.17	Myocardial infarctionAcute pancreatitis	1	K/KH	Case chart discussion /OSPE
2	Carbohydrate metabolismBI3.8, BI3.10, BI11.17	Diabetes MellitusGTT charts/GST Galactosemia Von Gierke disease	2	K/KH	Case chart discussion /OSPE
3	Lipid metabolism BI3.10, BI4.7, BI11.17	Dyslipidemi a Ketoacidosi sFamilial hypercholesterolemia	1	K/KH	Case chart discussion /OSPE
4	Protein metabolism Inborn errors of metabolism BI5.5, BI11.17	PKU Alkaptonuria Homocystinuria MSUD Albinism	2	K/KH	Case chart discussion /OSPE
5	Plasma proteins BI5.5,BI11.16, BI11.17	Multiple myeloma	1	K/KH	Case chart discussion /OSPE

6	Nucleotide metabolismBI6.4, BI11.17	Gout	1	K/KH	Case chart discussion /OSPE
7	Liver Function tests and Hemoglobinopathies BI6.2, BI6.14, BI11.17	Hemolytic Jaundice Hepatic jaundice Obstructive jaundice Neonatal jaundice Alcoholic cirrhosis Non alcoholic steatohepatitis Sickle cell anaemia Thalassemia	2	K/KH	Case chart discussion /OSPE

8	Renal function tests BI6.14, BI11.17	Normal renal function Renal failure Nephrotic syndrome Acute glomerulonephritis	2	K/KH	Case chart discussion /OSPE
9	Thyroid function testsBI6.14, BI11.17	Hypothyroidism Hyperthyroidis m	1	K/KH	Case chart discussion /OSPE
10	Vitamin deficiency disorders BI6.5	Vitamin A deficiency Rickets/Osteomala cia Scurvy Beri Beri Pellagra Megaloblastic anemia	3	K/KH	Case chart discussion /OSPE
11	Minerals BI6.10	Iron deficiency anaemia Tetany Wilson‟s disease Goitre Fluorosis	1	K/KH	Case chart discussion /OSPE
12	Nutritional disorders BI8.2	Kwashiorko rMarasmus Metabolic syndrome	1	K/KH	Case chart discussio n /OSPE
13	Cancer BI10.2	Prostate carcinomaBreast carcinoma	1	K/KH	Case chart discussio n /OSPE
14	Disturbances in acid-base balance BI6.8, BI11.17	Metabolic acidosis	1	K/KH	Case chart

i. PRACTICAL: 35X2 = 70 hours

Part 1: Qualitative Experiments – 9X2=18hrs Part2:

Quantitative Experiments – 14X2=28hrs

Part 3: Demonstration Experiments – 12X2=24hrs

Sl. No	Type of Experiment	Suggested Teaching learning method - Practical tests to be performed	No. of practical classes	Domain/ Level	Assessment method
Part 1: Qualitative Experiments - 9 Classes					
1	Analysis of Normal constituents of urine BI11.3, BI11.4	DOAP sessions – Examine Physical properties, Inorganic constituents (Calcium, Phosphorus) and Organic constituents (Urea, Uric acid and Creatinine)	3	S/P	Qualitative analysis
2	Analysis of Pathological Constituents of Urine BI11.4, BI11.20	DOAP sessions - Physical examination, chemical tests for Glucose, Ketone Bodies, Blood, Proteins, Bile salts and Bile Pigments Demonstration by using Dip sticks	4	S/P	Qualitative analysis
3	Urine screening tests for Inborn errors of metabolism BI11.5, BI5.5	Newborn screening tests- Interpretation of laboratory reports	1	K/KH	OSPE/ Viva

4	Calculate the energy content of food items and calculation of Glycaemic index. Ennumeration of advantages, disadvantages and useof unsaturated , saturated and trans fatsin food 11.23, 11.24	Small group discussion – Calculate	1	K/KH	OSPE/ Viva
Part 2: Quantitative Experiments - 14 Classes					
1	Estimation of plasma glucose by Enzymatic method and Glucometer as point of care testing BI11.21, BI3.10	DOAP sessions - Performand Interpret	2	S/P	Quantitative analysis/ OSPE/Case Chart interpretation
2	Estimation of serum and urine creatinine by Jaffe‟s method, Creatinine Clearance BI11.7, BI11.21	DOAP sessions - Performand Interpret	2	S/P	Quantitative analysis/ OSPE/Case Chart interpretation

3	Estimation of blood urea BI11.21	DOAP sessions - Performand Interpret	2	S/P	Quantitative analysis/ OSPE/Case Chart interpretation
4	Estimation of Total Protein and Albumin in serum by Biuret and BCG method, A:G ratio BI11.8, BI11.21	DOAP sessions - Performand Interpret	2	S/P	Quantitative analysis/ OSPE/Case chart interpretation
5	Estimation of Total cholesterol and High density lipoprotein(HDL) cholesterol BI11.9	Practical - Perform and Interpret	1	S/P	Quantitative analysis/ OSPE/Case chart interpretation
6	Estimation of Triacylglycerols BI11.10	Practical - Perform and Interpret	1	S/P	Quantitativeanalysis/ OSPE/Case chart interpretation

7	Estimation of Calcium and Phosphorous BI11.11	Practical - Perform and Interpret	1	S/P	Quantitativ eanalysis/ OSPE/Case chart interpretati o n

8	Estimation of Serum Bilirubin BI11.12	Practical - Perform and Interpret	1	S/P	Quantitativ eanalysis/ OSPE/Case chart interpretati o n
9	Estimation of AST, ALT activity BI11.13	Practical - Perform and Interpret	1	S/P	Quantitativ eanalysis/ OSPE/Case chart interpretati o n
10	Estimation of ALP activity BI11.14	Practical - Perform and Interpret	1	S/P	Quantitativ eanalysis/ OSPE/Case chart

Part 3: Demonstrations -12 Classes					
1	Lab safety and Biomedical waste disposal, Commonly used lab equipment, glassware and reagents BI11.1	Small group discussion, lab visit	1	K/KH	Viva
2	Preparation of buffers and estimation of pH using pH meter BI11.2, 11.16, 11.19	Demonstration -Observe	1	K/KH	Viva
3	Colorimetry, SpectrophotometryBI11.6, BI11.18,	Demonstration -Observe	1	K/KH	Viva
4	Clinical chemistry autoanalyser and quality control (Internal and External quality control, Precision, Accuracy, QC rules), Biological reference intervals BI11.16, BI11.19	Demonstration -Observe and interpret	1	K/KH	OSPE/ Viva
5	Specimen collection and preanalytical errors in clinical Biochemistry lab	Collection centreand lab visit	1	K/KH	Viva
6	Serum protein electrophoresis, types and applications BI11.16, BI11.19	Demonstration - Observe and interpret	1	K/KH	OSPE/ Viva
7	Paper chromatography/TLC of	Demonstration - Observe and	1	K/KH	OSPE/ Viva

	amino acids/sugars, types and applications BI11.5, BI5.5, BI11.16, BI11.19	Interpret			
8	Analysis of CSF BI11.15	Small group discussion - Interpret	1	K/KH	OSPE/ Viva

9	Estimation of serum electrolytes by ISEBI11.16, BI11.19	Demonstration - Observe and Interpret	1	K/KH	OSPE/ Viva
10	Blood gas analysis usingABG analyser BI11.16, BI11.19	Demonstration- Observe and Interpret	1	K/KH	OSPE/ Viva
11	Principle, procedure and applications of ELISA, protein extraction, Blotting techniques, PAGE BI11.16, BI11.19	Demonstration- Observe	1	K/KH	Viva
12	Principle, procedure and applications of PCR, DNA isolation BI11.16, BI11.19	Demonstration- Observe	1	K/KH	Viva
13.	Basis, rationale and interpretation of biochemical tests done in common clinical disorders.	Small group discussion	1	K/KH	Written/viv a voce

	BI 11.17				

PRACTICAL: 35X2 = 70 hours

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Part 3: Demonstration Experiments – 12X2=24hrs

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2	Analysis of Pathological Constituents of Urine BI11.4, BI11.20	DOAP sessions - Physical examination, chemical tests for Glucose, Ketone Bodies, Blood, Proteins, Bile salts and Bile Pigments Demonstration	4	S/P	Qualitative analysis

		by using Dip sticks			
3	Urine screening tests for Inborn errors of metabolism BI11.5, BI5.5	Newborn screening tests- Interpretation of laboratory reports	1	K/KH	OSPE/ Viva
4	Calculate the energy content of food items and calculation of Glycaemic index.ennumeration of advantages, disadvantages and use of unsaturated , saturated and trans fats in food 11.23, 11.24	Small group discussion – Calculate	1	K/KH	OSPE/ Viva
Part 2: Quantitative Experiments - 14 Classes					
1	Estimation of plasma glucose by Enzymatic method and Glucometer as point of care testing BI11.21, BI3.10	DOAP sessions - Perform and Interpret	2	S/P	Quantitative analysis/ OSPE/Case Chart interpretation

2	Estimation of serum and urine creatinine by Jaffe‟s method, Creatinine Clearance BI11.7, BI11.21	DOAP sessions - Perform and Interpret	2	S/P	Quantitative analysis/ OSPE/Case Chart interpretation

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4	Estimation of Total Protein and Albumin inserum by Biuretand BCG method, A:G ratio BI11.8, BI11.21	DOAP sessions - Perform and Interpret	2	S/P	Quantitative analysis/ OSPE/Case chart interpretation
5	Estimation ofTotal cholesterol and High density lipoprotein(HDL) cholesterol BI11.9	Practical - Perform andInterpret	1	S/P	Quantitative analysis/ OSPE/Case chart interpretation
6	Estimat i on of Triacyl gl ycerols BI11.1 0	Practical - Performand Interpret	1	S/P	Quantitative analysis/ OSPE/Case chart interpretatio n

7	Estimation ofCalcium and Phosphoro us BI11.11	Practical - Performand Interpret	1	S/P	Quantitative analysis/ OSPE/Case chart interpretatio n

CERTIFICATION OF SKILL ACQUISITION

To be certified using checklists

Suggested Checklist format for Certification of Skills (refer logbook

Sl No	Competency to be certified with Competency number	No. required to
1	Perform urine analysis to estimate and determine normal constituents (BI11.4)	1
2	Perform urine analysis to estimate and determine abnormal constituents (BI11.4)	1
3	Identify abnormal constituents in urine, interpret the findings and correlate these with pathological states (BI11.20)	1
4	Demonstrate estimation of glucose in serum (BI11.21)	1
5	Demonstrate the estimation of serum Creatinine and Creatinine clearance (BI11.7, BI11.21)	1
6	Demonstrate estimation of urea in serum (BI11.21)	1
7	Demonstrate estimation of serum protein, albumin and A:G ratio (BI11.7, BI11.21)	1

Note: In Theory, Practicals and Certification of Skill sections, topics with corresponding competency numbers as mentioned in Volume 1 of Competency based Undergraduate Curriculum for Indian Medical graduate (2018), prescribed by Medical Council of India , have been mentioned.

i. SUGGESTED AREAS FOR INTEGRATION:

As per the "Competency based Undergraduate Curriculum for the Indian Medical Graduate 2018: Medical Council of India"

ii. EARLY CLINCAL EXPOSURE (ECE): Needs to be entered in Log book

CLINICAL SKILLS - 12 hours Suggested cases for hospital visit

- Anemia , Jaundice
- Renal failure

Diabetes Mellitus

BASIC SCIENCE CORRELATION - 18 hours Suggested topics -

- Biochemical basis of myocardial infarction (dyslipidemia, atherosclerosis, diagnostic tests)
- Biochemical basis of acute complications of diabetes mellitus
- Biochemical alterations in diarrhea (acid base and electrolyte and ORS management
- Biochemical basis of Metabolic syndrome
- Critical alerts in Biochemistry lab test results.
- Evidence based laboratory medicine

iii. SELF DIRECTED LEARNING (SDL):

Suggested topics for log book entry in the form of concept mapping

- RBC membrane composition and Biochemical basis of Hereditary spherocytosis
- Respiratory distress syndrome
- Advanced glycation end products and complications of Diabetes Mellitus
- Hormonal basis of osteoporosis
- Cardiovascular risk assessment score
- Biochemical basis of Alzheimer disease

CDSIMER
Dr. Chandramma Dayananda Sagar
Institute of Medical Education and Research
(Unit of Dayananda Sagar University)

Curriculum and Assessment Methodology of Phase – II MBBS

PHARMACOLOGY

TEACHINGHOURS

LECTURES:93 HRS

Theoryclasses: 87 hours

Revisionclasses: 6 hours

Total:93hours

SGD/ Practical's:156 hours

DOAP sessions: 96 hour

SGD:54hours

Revision:6hours

Self-directedlearning:13hours

Total:261 hours

THEORY:

Slno	Topic	Competency	Theory
1	GeneralPharmacology Toxicology ClinicalPharmacologyandrationaldruguse	PH1.1toPH1.12 PH1.64	17
2	AutonomicNervousSystem	PH1.13to PH 1.14	7
3	Autacoids	PH1.16	6
4	Drugsin anestheticpractice:	PH 1.15, PH1.17 to PH1.18	4
5	CentralNervousSystem	PH1.19to PH 1.23	7
6	Diuretics	PH1.24	2
7	Drugsaffectingbloodandbloodformation	PH1.25, PH 1.35	3
8	CardiovascularSystem	PH1.26to PH 1.31	8
9	RespiratorySystem:	PH1.32toPH 1.33	2
10	GastrointestinalSystem	PH1.34	1
11	EndocrineSystem	PH1.36to PH 1.41	11
13	Miscellaneous	PH1.50to PH 1.64	6
14	RevisionMiscellaneous	-	6
	Total		**93 hours**

PRACTICAL:DOAP/ SGD

Topic	Competency	Description	Practicalhours
ClinicalPharmacy	PH1.12	Calculate the dosage of drugs appropriate formulae for an individualpatient,includingchildren,elderlyandpatientwithrenaldysfunction	**DOAP** 18hours
	PH2.1(A-F)	Demonstrateunderstandingoftheuseofvariousdosageforms **(oral/local/parenteral;solid/liquid)**	
	PH2.2	PrepareoralrehydrationsolutionfromORSpacketandexplainits use	
	PH2.3	Demonstratetheappropriatesettingupofanintravenousdripinasimulatedenvironment.	
	PH2.4	Demonstratethecorrectmethodofcalculation ofdrugdosagein patientsincludingthose usedinspecialsituations	
Clinical Pharmacology	PH1.1B	Defineanddescribeprinciplesofpharmacologyandpharmacotherapeutics	
	PH1.13	Describe mechanism of action, types, doses, side effects,indications,contraindicationofadrenergicandantiadrenergic	
	PH1.17B	Describethemechanismofaction,types,doses,sideeffects,indicationsandcontraindicationsoflocalanesthetics	
	PH1.20	Describetheeffectsofacuteandchronicethanolintake	
	PH1.21	Describethesymptomsandmanagementofmethanolandethanolpoisoning	
	PH1.22	Describedrugsofabuse(dependence,addiction,stimulants,depressants,psychedelics,drugsusedforcriminaloffences)	
	PH1.23	Describetheprocess andmechanismofdrugde-addiction	
	PH1.24(C)	Describethemechanism/sofaction,types,doses,sideeffects,indicationsandcontraindicationsofthedrugsaffectingrenal systemsincludingdiuretics,antidiuretics- vasopressinandanalogues)	
	PH1.25(C)	Describe the mechanism/ s of action, types, doses, side effects,indicationsandcontraindicationsofthe drugsactingonblood,likeanticoagulants,antiplatelets	
	PH1.25(D)	Describe the mechanism/ s of action, types, doses, side effects,indicationsandcontraindicationsofthedrugsactingonblood,likefibrinolytics,antifibrinolytics	
	PH1.26B	Describe mechanism of action, types, doses, side effects,indicationsandcontraindicationsofthedrugsmodulatingthe renin-angiotensinand aldosteronesystem	
	PH1.27B	Describe mechanism of action, types, doses, side effects,indicationsandcontraindicationsofthedrugsmodulatingthe renin-angiotensinandaldosteronesystem	
	PH1.27(C)	Describe the mechanism/s of action, types, doses, side effects,indicationsandcontraindicationsofantihypertensivedrugsanddrugsusedinshock	
	PH1.28C	Describe the mechanisms of action, types, doses, side effects,indicationsandcontraindicationsofthedrugsusedinischemic heartdisease(stable,unstableanginaandmyocardialinfarction),peripheralvasculardisease	
	PH1.33	Describethemechanismofaction,types, doses,sideeffects, indicationsandcontraindicationsofthedrugsusedincough(antitussives,expectorants/mucolytics)	
	PH1.34(B)	Describe the mechanism/s of action, types, doses, side effects,indicationsandcontraindicationsofthedrugsused asbelow:1. Acid-pepticdiseaseandGERD2.Antiemeticsandprokinetics3.Anti diarrhoeals4.Laxatives5.InflammatoryBowelDisease	

	PH1.35	Describethemechanism/sofaction,types,doses, sideeffects, indicationsandcontraindicationsofdrugsusedinhematological	
		Disorderslike:1.Drugsusedinanemias2.ColonyStimulating factor	
	PH1.36D	Describe the mechanism of action, types, doses, side effectsindications and contraindications of drugs used in endocrinedisorders(diabetesmellitus,thyroiddisordersandosteoporosis)	
	PH1.37C	Describethemechanismsofaction,types,doses,sideeffects,	
		indicationsandcontraindicationsofthedrugsused assex hormones,theiranaloguesandanteriorPituitaryhormones	
	PH1.39	Describe mechanism of action, types, doses, side effects,indicationsandcontraindicationsthedrugsusedforcontraception	
	PH1.41	Describethemechanismsofaction,types,doses,sideeffects,indications and contraindications of uterine stimulants andrelaxants	
	PH1.53 PH1.54	Describeheavymetalpoisoningand chelatingagentsDescribevaccines andtheir us	
	PH1.42F	Describegeneralprinciplesofchemotherapy–	
	PH1.42G	Describegeneralprinciplesofchemotherapy–II	
	PH1.43A	Describeanddiscusstherationaluseofantimicrobials includingantibioticstewardshipprogram	
	PH1.48C	Describethemechanisms ofaction,types,doses,sideeffects,	
		indicationsandcontraindicationsofthedrugsusedinUTI/STD and viraldiseasesincludingHIVandantifungaldrugs	
	PH1.55A	Describeanddiscussthe followingNationalHealthProgramme	
		includingImmunization,Tuberculosis,Leprosy,Malaria,HIV,	
		Filaria,KalaAzar,Diarrhoealdiseases,Anaemia&nutritional disorders,Blindness,Non-communicablediseases,cancerandIodinedeficiency–I	
	PH1.55 B	Describeanddiscussthe followingNationalHealthProgramme	
		includingImmunization,Tuberculosis,Leprosy,Malaria,HIV,	
		Filaria,KalaAzar,Diarrhoealdiseases,Anaemia&nutritional	
		disorders,Blindness,Non-communicablediseases,cancerand Iodinedeficiency–II	
	PH1.58	DescribedrugsusedinOculardisorders	
	PH1.60	DescribeanddiscussPharmacogenomicsandPharmaco economics	
	PH1.59	Describeanddiscussthefollowing:Essentialmedicines,Fixeddosecombinations,Overthecounterdrugs,Herbalmedicines	
	PH3.1(A-H)	Writearational,correctandlegiblegenericprescriptionforagivencondition andcommunicate thesametothepatient	
	PH3.2*	Performandinterpretacriticalappraisal(audit)ofagivenPrescription	
	PH3.3*	Performacriticalevaluationofthedrugpromotionalliterature	
	PH 3.4*	Torecogniseandreport anadversedrugreaction	

	(A-B)		
	PH3.5*	Toprepareandexplaina listofP-drugsforagivencase/condition	
	PH3.6*	Demonstratehowtooptimizeinteractionwithpharmaceuticalrepresentativetogetauthenticinformationondrugs	
	PH3.7*	Preparealistofessentialmedicines forahealthcarefacility	
	PH3.8	Communicateeffectivelywith apatienton theproperuseof prescribedmedication	
	PH4.1(A-H) IMandIV*	Administerdrugsthroughvariousroutesinasimulatedenvironmentusingmannequins	
	PH4.2(A-C)	Demonstratetheeffectsofdrugsonbloodpressure (vasopressorandvaso-depressorswithappropriateblockers)usingCAL	
	PH4.2D	Demonstratetheeffectsofcholinergicagonistandantagonist onciliarymovementin frogesophagus usingCAL	
	PH 4.2E	Demonstratetheeffectsofcholinergicagonistandantagonist onrabbiteyeusingCAL	
	PH 4.2F	Demonstrate the effects of cholinergic and anticholinergic,histaminicsandantihistaminicdrugsonguineapigileumusingCAL	
Communication	PH5.1	Communicatewiththepatientwithempathyandethicsonallaspectsofdruguse	DOAP16 hours
	PH5.2 (A-B)	Communicatewiththepatientregardingoptimaluseofa)drugtherapy,b)devicesandc)storageofmedicines	
	PH5.3	Motivate patients with chronic diseases to adhere to the prescribed management bythe healthcareprovider	
	PH5.4	Explaintothepatienttherelationshipbetweencostoftreatmentandpatientcompliance	
	PH5.5	Demonstratean understandingofthe cautionin prescribingdrugslikelytoproducedependenceandrecommendthelineof management	
	PH5.6	Demonstrateabilitytoeducatepublic&patientsaboutvariousaspectsofdruguseincludingdrugdependence andOTC drugs	
	PH5.7	Demonstrate anunderstandingofthelegalandethicalaspectsofprescribingdrugs	
Revision			6 Hours

Dr.Chandramma Dayananda Sagar Institute of Medical Education and Research

Competency Based Undergraduate Medical Education (CBME) Curriculum Specific Learning Objectives in Pharmacology

SpecificLearningObjectivesinPharmacology(Theory: Competency no-1.1 to 1.64)

NO	COMPETENCY The studentshouldbeableto	Domain K/S/A/C	Level K/KH/SH/P	Core(Y/N)	SpecificLearningObjectiveSLO	SuggestedTeachingLearningmethod	TimeDurationinHours	SuggestedAssessmentmethod

PH 1.1	Define anddescribe theprinciples ofpharmacologya ndpharmacother apeutics	K	K	Y	At the end of this session, thestudentshouldbeableto: 1.Define a drug 2. Explain theterms Pharmacology, clinicalpharmacology&therapeutics 3.Enlistandexplainaboutvariousbranches ofPharmacology 4.List out sources of drugs withexamples 5.Listoutsourcesofdrug information &Explaineachsourcebriefly 6.Recognize the importance ofClinical pharmacology towardsrationalapproachtoprescribingm edicine 7.Explain theevolution of Pharmacologyfrom medieval to contemporarytimes.	1.1A Lecture 1.1BSGD 1.1C SDL Visit to themuseum	1hr 2hr 2hr	Written/ Vivavoce

PH 1.2	Describe the basis of Evidence based medicine and Therapeutic drug monitoring	K	KH	Y	At the end of this session, thestudentshouldbeable to: 1.Identify reliable sources forresearch evidence 2. Understandresearch study designs and thehierarchyforresearchevidence 3.Ascertainstrengthofevidencefortreatments and understandguidelines in different therapeuticareas 4.Explaintheimportanceofkeepingprescribingpracticeupto date with advances in medicalknowledge	Lecture	1hr	Written/ Vivavoce
PH1.3	Enumerate andidentify drugformulationsand drugdeliverysystems	K/S	SH	Y	Enumerate and identify drugformulations and drug deliverysystemsAt the end of this session thephaseIIMBBSstudentshouldbeableto 1. Define dosage form,formulationandexcipient 2. Enumerate the various drugformulationswithanexampleforeach 3. Describetheadvantages and disadvantages of various drugformulation 4. Chooseappropriateformulationbasedonclinicalneed Understandthemodeofactionsanddifferences	1.2ALecture 1.2BLecture 1.2DSDL 1.3SGD	1hr 1hr 2hr 2hr	Written/ Vivavoce

PH 1.4	Describeabsorption,distribution, metabolism &excretion ofdrugs	K	KH	Y	At the end of the sessionthe student should be ableto: 1. Explain theprinciplesinvolvedindrugabsorption acrossbiologicalmembrane 2.Explain the concept ofbioavailabilityanddescribe the factorsaffecting bioavailability 3.Describetheimportanceofbioequivalence 4. Explainthe distribution of drugsacrossbodycompartments 5.Defineapparentvolumeof distribution 6. Explainthe clinical significance ofdrug distribution 7.Explain the clinicalsignificance of plasmaproteinbindingofdrugs 8. Describe redistributionof drugs with clinicalapplication 9. Definebiotransformation 10.Describefirstpassmetabolism and itsimportance 11. Describephase1 and phase2Reactions 2. ExplainfactorsaffectingBiotransformation 3.Explain the clinicalsignificance of enzymeinductionand inhibition 14. Describe the variousroutesof	1.4ALecture 1.4BLecture 1.4CLecture 1.4DLecture	1hr 1hr 1hr 1hr	Written/ Vivavoce

					excretion ofdrugs 15.Explainfactorsaffectingrenalexcretion 16. Explain the differentkineticsofeliminationandtheirclinicalsignificance 17. Explain plasma half-life and its clinicalsignificance 18. Explainsteady state concentrationand its significance 19. Apply the knowledge ofclearance,loadingdoseand maintenance dose incalculating the dose for apatient 20. Explainvarious methods ofprolonging drug action 21. ExplainthePKfactorsthatdetermine the choiceof Dose,route,andfrequencyofDrugadministration.			
		K	KH	Y				
		K	KH	Y				
PH 1.5		K	KH	Y	Attheendofthesessionstudentshould be able to: Describe theconceptofPharmacodynamics 1.Statedifferentmechanisms by whicha drug acts giving anexampleofeach	1.5Lecture 1.5A Lecture 1.5B Lecture	1hr 1hr	Written/ Vivavoce

					2.Enlistdifferenttypesofreceptorsgivingexamplesofdrugs actingthroughthem 3.Explaintheterms–‘upregulation’and‘downregulation’ofreceptors 4.DescribetheconceptofPharmacodynamics 5. Explaintheterms–affinity,efficacy,intrinsic activity & potency 6.Definetheterms–agonist,antagonist,partialagonist&inverse agonist. Give examplesof drugs for each 7. Describedose-response relationship andinterpretdose-responsecurves 8.Explaindrugsynergismwithexamples 9.Describethedifferenttypesofdrugantagonismwithexamples 10.Describe factors modifyingdrugactionanditsclinicalimplications 11.Explaintherapeutic index and therapeutic range with clinicalsignificance	1.5C Lecture 1.5DLecture	1hr 1hr 1hr	
PH 1.6	DescribeprinciplesofPharmacovigilance &ADRreportingsystems	K	KH	Y	Attheendofthesessionthestudentshouldbeableto 1. Define the basicterminologies (ADR,SeriousADR,AE,Toxicity,Pharmacovigilance andCausality assessment) 2.Explain the history,	1.6Lecture	1hr	Written/ Vivavoce

					needandprinciples of Pharmacovigilance 3.Discussvarious Methods/systems of ADRreporting 4. DiscussPharmacovigilance programof India 5. Report ADRs toa Pharmacovigilance Centreby fillingtheADRreporting form 6. Discusstheimportanceof prescriber's responsibilityinPharmacovigilance			
PH 1.8	Identify anddescribe themanagement tof druginteractions	K/S	KH	Y	At the end of the session,studentshouldbeableto 1.Define Drug interactions. 2.Describe the types of Druginteractions as In vivo, In vitro& PK and PD with suitableexamples 3.Describetheuseful and harmful druginteractions with suitableexamples 4. Describe Drug–drug; drug-food; Drug-alcohol;drug–tobacco;Drugcomplementary/alternative medicine interactions withexamples 5. Explain how topredict and avoid harmful druginteractionsinclinicalpractice 6. Management of DI. 7.Identify the sources	1.8Lecture	1 hr describe themanagement of druginteractions	Written/ Viva voce

					ofinformationaboutDItoinformprescribing			
PH 1.9	Describenomenclatureof drugs i.e.generic,brandeddrugs	K/S	KH	Y	At the end of the session,studentshouldbeable toDescribenomenclatureofdrugsi.e.generic,brandeddrugs	DOAP	1 hr	Written/ Vivavoce
PH1 .10	Describe partsof a correct,complete andlegible genericprescription.Identifyerrorsinprescription and correctappropriately	K/S	KH	Y	Attheendofthesession,studentshould be able toDescribe partsof a correct, complete and legiblegeneric prescription. Identify errorsin prescription and correctAppropriately		1 hr	Written/ Vivavoce

PH1.11	Describevarious routesof drugadministration,eg: oral, SC,IV,IM,SL	K/S	KH	Y	At the end of thesession,studentshouldbeable to 1. List thevarious routes of drugadministration- oral,parenteral and topicalwithexamples 2.Describethemeritsanddemerits ofeachroute 3. Choose the correctrouteof drug administrationinagivenclinicalscenario		1 hr	Written/ Vivavoce
PH1.12	Calculate thedosage ofdrugs usingappropriateformulae foran individualpatient,includingchildren,elderly andpatientwithrenaldysfunction	K/S	KH	Y	Attheendofthesession,studentshould be able to. 1. Calculateappropriate doses for individualpatientsbased onage,bodyweight,andsurfacearea. 2.Calculatethedoseofdrugusingappropriate formulae in a givenclinicalcaseinchildren 3.Calculate the dose of drug usingappropriate formulae in a givenclinicalcasein elderly 4. Calculatethe dose of drug using appropriateformulaeinagiven clinicalcaseinpatientswithrenaldysfunctionandother pathological conditions likeCCF,Liverdisease.	1.12DOAP	2hrs	Written/ Vivavoce
PH1.	Describemechanism ofaction, types,doses, sideeffects,indic					**1.13SGD**	2 hr	

13	ations andcontraindications ofadrenergicand	K/S	KH	Y		1.13 ALecture 1.13 BLecture	1hr 1hr	Written/ Vivavoce
	anti-adrenergicdrugs					1.13C Lecture 1.13 DLecture 1.13 ELecture 1.13FDOAP/SGD	1hr 1hr 1 hr 2hr	anti-adrenergicdrugs
					At the end of the session,student should be able to 1.Describe the organization ofautonomicnervoussystem 2.Describe the steps involvedinneurotransmission 3.Describe the synthesis,storage,releaseandfateofadrenergic transmitters 4.Classify adrenergic receptorswithrespecttotheirstructure, localization andsecond messenger system 5.Classify adrenergic agonistsbased on their therapeuticuses and actions. 6. Describethe pharmacological effectsofadrenalineandcorrelatetheeffects of their relating thesame with their therapeuticuse 7. State the salientPharmacokinetic features ofadrenaline			

					8. Differentiatebetweenadrenaline,nor-adrenaline, isoprenaline anddopamine with respect topharmacological effects,adverse effects andtherapeuticuses.(Enumerate the Adverse effects,therapeuticusesand Contraindication of mostcommonlyusedAdrenergicDrugsintherapy.) 9.Compareandcontrastdirectly and indirectly actingsympathomimetic withexamples 10. State thetherapeutic uses and ADRs ofindirectly actingsympathomimetics 11. Statethe precautions andcontraindications ofsympathomimetics 12.Classifyalpha-adrenergicreceptor antagonists, andcompare and contrastselective alpha1 antagonistswith nonselective alphaantagonists 13. Describe thepharmacological effects andapplied pharmacokinetics,ADRs, precautions and 14.Statetheadvantagesof other selective alpha1antagonistsoverprazosin,co 15. Classify beta-adrenergic			

					receptorantagonistswithexamples 16. Describe thepharmacological effects,pharmacokinetics,ADRs,precautions andcontraindicationsofbeta-adrenergic receptorantagonists 17.Statethe therapeutic uses of beta-blockers givingpharmacological basis fortheir use. 18. State theadvantages of selective beta1antagonistsovernonselective beta antagonistscorrelatingthesamewiththeirtherapeuticusesandADRs 19. Mention the betablockers with(ISA)intrinsicsympathomimeticactivity giving their advantages andindications 20. Mention the betablocker of choice with rationalefor the following clinicalconditions Glaucoma,CHF,angina, hypertension,thyrotoxicosis,pheochromocytoma,arrhythmias 21.Listthevariouspreparations of beta blockerswith theirroutes ofadministration. (State the beta-blockersthatcanbegivenbyIVroute) therapeutic uses and adverseeffects therapeuticuses ofprazosin			
	Describe mechanism ofaction,							

PH1.14	types,doses, sideeffects,indications andcontraindications ofcholinergican danticholinergic drugs	K	KH	Y		1.14 Lecture 1.14FLecture	1hr 1hr	Written/ Vivavoce
PH1.15	Describemechanism/ sof action,types, doses,side effects,indications andcontraindications ofskeletalmuscl erelaxants	K	KH	Y		1.15Lecture	1hr	Written/ Vivavoce
	Describemechanism/ sof action,types, doses,side effects,indications andcontraindications of the drugswhichactby modulatingautac					1.16SDL 1.16A Lecture1.16B Lecture1.16 C Lecture1.16D Lecture1.16E	1hr 1hr 1hr 1hr 1hr	Written/ Vivavoce

PH1.16	oids,including: anti-histaminic, 5-HTmodulatingdrugs,NSAIDs, drugsforgout,anti-rheumaticdrugs, drugsformigraine	K	KH	Y		Lecture1.16F Lecture	1hr	
PH1.17	Describe themechanism/ sof action,types, doses,side effects,indications andcontraindications of localanesthetics	K	KH	Y		1.17 Lecture 1.17BSGD	1hr	Written/ Vivavoce
PH1.18	Describe themechanism/ sof action,types, doses,side effects,indications andcontraindications of generalanesthetics,andpre-anestheticmedications	K	KH	Y		1.18Lecture	1hr	Written/ Vivavoce
	Describe themechanism/ sof					1.19 ALecture 1.19 BLecture	1hr 1hr	

PH1.19	action,types, doses,side effects,indications andcontraindications of the drugswhich act onCNS, (includinganxiolytics,sedatives &hypnotics,anti-psychotic,anti-depressantdrugs,anti-manic, opioidagonists andantagonists,drugsusedfor neurodegenerativetivedisorders, anti-epilepticsdrugs)	K	KH	Y		1.19 CLecture 1.19 DLecture 1.19 ELecture 1.19 FLecture 1.19 GLecture	1hr 1hr 1hr 1hr 1hr	Written/ Vivavoce
PH1.20	Describe theeffectsofacutea nd chronicethanol intakedrugs used forcriminaloffence s)	K	KH	Y		1.20SGD	**2 hrs**	Written/ Vivavoce
PH1	Describe thesymptoms							

.21	andmanagement ofmethanol andethanolpoiso nings	K	KH	Y		1.21SGD	**2 hr**	Written/ Vivavoce
PH1 .22	Describe drugsof abuse (dependence,a ddiction,stimul ants,depressant s, psychedelics,de addiction)	K	KH	Y		1.22SGD	**2 hr**	Written/ Vivavoce
PH 1.23	Describethepro cess and mechanism ofdrug	K/S	KH	Y		1.23SGD	**2 hr**	Written/ Vivavoce
PH 1.24	Describe themechanism / sof action,types, doses,side effects,indicati ons andcontraindic ations of the drugsaffecting renalsystemsin cluding diuretics,antidi uretic-	K	KH	Y		1.24SDL 1.24 ALecture 1.24 B Lecture 1.24CDOAP	1hr 1hr 1hr 2hr	Written/ Vivavoce

	vasopressinand analogues							
PH 1.25	Describe themechanism/ sof action,types, doses,side effects,indicatio ns andcontraindica tions of the drugsacting onblood,likeanti coagulants,anti platelets,fibrinol ytics,plasmaexp anders	K	KH	Y		**1.25**SDL 1.25 ALecture 1.25BLecture 1.25C SGD 1.25 DLecture 1.25DSGD	1 hr 1hr 1hr 4hr 4 hrs 4hrs	Written/ Vivavoce
PH 1.26	Describemechan ismsofaction, types,doses, sideeffects,indic ations andcontraindicat ions of the drugsmodulating therenin-angiotensinand aldosterone system	K	KH	Y		1.26SDL 1.26ALecture+SDL 1.26BSGD	2 hr 1 hr 2 hrs	Written/ Vivavoce

PH1.27	Describe themechanismsof action, types, doses,side effects,indications andcontraindications ofantihypertensive drugs anddrugs used inshock	K	KH	Y		1.27 ALecture 1.27BSGD 1.27BLecture+ SDL 1.27CSGD	1 hr 2hrs 1hr 4hr	Written/ Vivavoce
							1 hr	Written/ Vivavoce
PH1.28	Describe themechanisms ofaction, types,doses, sideeffects,indications and contraindications of the drugsusedinischemic heartdisease (stable,unstable anginaand myocardialinfarction),peripheral vasculardisease	K	KH	Y		1.28A Lecture 1.28BSDL+Lecture 1.28CSGD	1hr 1hr 4hrs	Written/ Vivavoce

PH1.29	Describe themechanismsofaction, types,doses, sideeffects,indications andcontraindications of the drugsusedin congestive heartfailure	K	KH	Y		1.29Lecture	1hr	Written/ Vivavoce
PH1.30	Describe themechanismsofaction, types,doses, sideeffects,indications andcontraindications of theantiarrhythmics **NONCORE**	K	KH	Y		1.30SDL	1 hr	Written/ Vivavoce
PH 1.31	Describe themechanismsofaction, types,doses, sideeffects,indications	K	KH	Y		1.31 Lecture 1.31SDL students will be given an assignment to collect one case of ischemic heart disease or diabetes mellitus	1hr 2hrs	Written/ Vivavoce

	andcontraindications of the drugsused in themanagement tofdyslipidemias					with hyperlipidemia from the wards or laboratory for discussion during SDL		
PH1.32	Describe themechanism/sofaction,types,doses, sideeffects,indications andcontraindicationsofdrugsusedinbronchial asthma andCOPD	K	KH	Y		1.32ALecture 1.32BLecture	1hr 1hr	Written/ Vivavoce
PH1.33	Describe themechanism ofaction, types,doses, sideeffects,indications andcontraindicationns of the drugsused in cough(antitussives,expectorants / mucolytics)	K	KH	Y		1.33SGD	4hrs	Written/ Vivavoce

PH1.34	Describe themechanism/sof action,types, doses,side effects,indications andcontraindications ofthedrugsusedasbelow: 1. Acid-pepticdiseaseand GERD 2. Antiemetic and Prokinetics 3.Antidiarrhoeals 4.Laxatives 5.InflammatoryBowelDisease 6. IrritableBowel Disorders,biliaryand	K	KH	Y		1.34SDL 1.34ALecture 1.34BSGD	1hr 1hr 4hrs	Written/ Vivavoce
	Describe themechanism/sofaction, types,doses,							

PH1.35	sideeffects,indications andcontraindicationsofdrugsusedinhematologicaldisorderslike: 1. Drugs usedinanemia's 2. ColonyStimulating factors	K	KH	Y		Anemia's SGD Colony stimulating factor SDL	2hr 1hr	Written/ Vivavoce
PH1.36	Describe themechanismofaction, types,doses, sideeffectsindications andcontraindications of drugsusedinendocrinedisorders (diabetesmellitus,thyroid disorders andosteoporosi)	K	KH	Y		1.36A Lecture1.36B Lecture1.36C Lecture 1.36D SGD1.36 F lecture	1 hr 1hr 1 hr 2 hrs 1hr	Written/ Vivavoce
								Written Long essay,Short Essay,MCQs,Viva voce

PH1.37	Describe themechanisms of action,types, doses,side effects,indications andcontraindications of the drugsused as sexhormones,their analoguesand anteriorPituitary Hormones					1.37 ALecture 1.37 BLecture 1.37CSGD	1hr 1hr 2hrs	Written-Longessay, ShortEssay,MCQs, Vivavoce
PH1.38	Describe themechanism ofaction, types,doses, sideeffects, indications andcontraindications ofcorticosteroids	K	KH	Y		1.38A Lecture 1.38B Lecture	1hr 1hr	Written/ Vivavoce
PH1	Describemechanism ofaction, types,doses, sideeffects,indic							

.39	ations andcontraindications thedrugs used forcontraception	K	KH	Y		1.39SGD	1hr	Written/ Vivavoce
PH1.40	Describemechanism ofaction, types,doses, sideeffects,indications andcontraindications of 1. Drugs used Inthe treatment ofinfertility,and 2. Drugs usedin erectiledysfunction	K	KH	Y		1.40A Lecture 1.40B Lecture	1hr 1hr	Written/ Vivavoce
PH1.41	Describe themechanisms ofaction, types,doses, sideeffects,indications andcontraindications of uterine	K	KH	Y		1.41SGD	2 hrs	Written/ Vivavoce

	relaxants andstimulants							
PH1 .42	Describegeneral principles ofchemotherapy	K	KH	Y	**Aminoglycosides**	1.42A Lecture 1.42 BLecture 1.42 CLecture 1.42 DLecture 1.42 ELecture 1.42FSGD 1.42 GSGD	1hr 1 hr 1 hr 1 hr 1 hr 2 hr 2 hr	Written/ Vivavoce
PH 1.43	Describe anddiscuss therationaluseo fantimicrobialsi ncludingantibio tic stewardshippro gram	K	KH	Y		1.43ASGD	2 hrs	Written/ Vivavoce
PH1. 44	Describe thefirstlineanti-tuberculardugs,t heirmechanisms ofaction,side effects anddoses	K	KH	Y		1.44Lecture	1hr	Written/ Vivavoce
PH1 .45	Describe thedrugsusedin MDR andXDR Tuberculosis	K	KH	Y		1.45 Lecture	1hr	Written/ Vivavoce
PH1	Describe themechanisms ofaction,							

.46	types,doses, sideeffects,indications andcontraindications of antileproticdrugs	K	KH	Y		1.46 Lecture	1hr	Written/ Vivavoce
PH1.47	Describe themechanisms ofaction, types,doses, sideeffects,indications andcontraindications of the drugsusedinmalaria,KALA-AZAR, amebiasis andintestinal helminthiasis	K	KH	Y		1.47 A Lecture 1.47 B Lecture	1hr 1hr	Written/ Vivavoce
PH1.48	Describe themechanisms ction,types,doses ideeffects,indicat nsandcontraindic tions of thedrugs sedin UTI/STD ndviraldiseasesin udingHIV& Antifungaldru	K	KH	Y		1.48 A Lecture 1.48CSGD	2 hrs 2 hrs	Written/ Vivavoce

	gs							
PH1.49	Describemechanism ofaction, classes,side effects,indications andcontraindications of Anticancerdrug.	K	KH	Y		1.49A Lecture 1.49BLecture	1hr 1hr	Written/ Vivavoce
PH1.50	Describemechanismsofaction, types,doses, sideeffects, indications andcontraindications ofimmunomodlators andmanagementof organtransplant rejection	K	KH	Y		1.50 Lecture	1 hr	Written/ Vivavoce
PH1.51	Describeoccupationalandenvironmentalpesticides,foodadulterants, pollutantsand insectrepellents	K	KH	Y		1.51SDL	2 hr	Written/ Vivavoce

PH1.52	Describemanagementof commonpoisoning,insecticides,commonstingandbites	K	KH	Y		1.52 Lecture	1hr	Written/ Vivavoce
PH 1.53	Describeheavy metalpoisoningandchelatingagents	K	KH	N		1.53SGD	1 hrs	Written/ Vivavoce
PH1.54	Describevaccines andtheiruses	K	KH	Y		1.54SGD	1 hrs	Written/ Vivavoce
PH 1.55	Describe anddiscuss thefollowingNationalHealthProgrammeincludingImmunization,Tuberculosis, Leprosy,Malaria, HIV,Filaria,Kala Azar,Diarrhoeal diseases,Anaemia&nutritional disorders,Blindness,Non-communicablediseases,cancerand	K	KH	Y		1.55 SDL	2 hrs	Written/ Vivavoce

PH 1.56	Iodinedeficiency Describe basicaspects ofGeriatric andPediatricpharmacology	K	KH	Y		1.56 Lecture	1hr	Written/ Vivavoce
PH1 .57	Describe drugsused in skindisorders	K	KH	Y		1.57SDL 1.57Lecture	1hr 1hr	Written/ Vivavoce
PH1 .58	Describe drugsused in Oculardisorders	K	KH	Y		1.58SGD	1 hr	Written/ Vivavoce
PH1 .59	Describe anddiscuss thefollowing:Essentialmedicines,Fixed dosecombinations,Over thecounterdrugs, Herbalmedicines	K	KH	Y		1.59SGD	2 hrs	Written/ Vivavoce
PH1 .60	Describe anddiscussPharmacogenomics andPharmacoecnomics	K	KH	N		1.60SGD	1 hr	Written/ Vivavoce

PH1.61	Describe anddiscuss dietarysupplements andnutraceuticals	K	KH	N		1.61SDL	2 hrs	Written/ Vivavoce
PH1.62	Describe anddiscussantiseptics anddisinfectants	K	KH	Y		1.62SGD	2 hrs	Written/ Vivavoce
PH 1.63	Describe DrugRegulations, actsandotherlegalaspects	K	KH	Y		1.63Lecture	1hrs	Written/ Vivavoce
PH1.64	Describeoverview ofdrugdevelopment,Phases ofclinical trialsand GoodClinical Practice	K	KH	Y		1.64 A Lecture 1.64 B SGD 1.64 E Lecture	1 hr 2 hrs 1hr	Written/ Vivavoce

PRACTICAL-SpecificLearningObjectivesinPharmacology (Skillsandcommunication:Competencyno-2.1to5.7)

No	COMPETENCY The Student Should be able to		Domain K/S/A/ C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method by MCI	No of Hours	Suggested Assessment method by MCI	Number required to certify P	Vertical Integration	Horizontal Integration
PH 2.1	Demonstrate understanding of the use of various dosage forms (oral/local/parenteral; solid/liquid)		S/C	SH	Y	2.1A DOAP Sessions 2.1B DOAP Sessions 2.1C DOAP Sessions 2.1D DOAP Sessions 2.1E DOAP Sessions 2.1F DOAP Sessions	2 hrs 2 hrs 2 hrs 2 hrs 2 hrs 2 hrs	Skills assessments			
PH 2.2	Prepare oral rehydration solution from ORS packet and explain its use		S/C	SH	Y	2.2 DOAP sessions	2 hrs	Skills assessment			

PH 2.3	Demonstrate the appropriate setting up of an intravenous drip in a simulated environment		S	SH	Y	2.3 DOAP sessions	2 hrs	Skills assessment			
PH 2.4	Demonstrate the correct method of calculation of drug dosage in patients including those used in special situations		S	SH	Y	2.4 DOAP sessions	2 hrs	Skills assessments		Paediatrics, General medicine	

PH 3.1	Write a rational, correct and legible generic prescription for a given condition and communicate the same to the patient		S/C	P	Y	3.1 Revision/practical 3.1A(Practical/SGD) SGD3.1A SGD3.1B SGD3.1C SGD3.1D SGD3.1E SGD3.1F SGD3.1G SGD3.1H	4 hrs 2 hrs 2 hrs 2 hrs 2 hrs 2 hrs 2 hrs 2 hrs 2 hrs 2 hrs	Skill station	**Examples of 5 Exercises** 1. Iron deficiency anemia due to hook worminfestation 2. Acute attack of Migraine 3. Newly diagnosed obesetype 2 DM with Hypertension 4. UTI in pregnancy 5. Typhoid fever in a child	General medicine	

PH 3.2	Perform and interpret a critical appraisal (audit) of a given prescription		S	P	Y	3.2 DOAP	2 hrs	Maintenance of Log book	3 hrs		
PH 3.3	Perform a critical evaluation of the drug promotional Literature		S	P	Y		2 hrs	Maintenance of Log book/ Skill station	3 hrs		
PH 3.4	To recognise and report an adverse drug reaction		S	SH	Y	3.4A SGD 3.4B SGD	4 hrs	Maintenance of Log book/ Skill station	3 cases 1. Warfarin induced bleeding 2. Aspirin (NSAID) induced peptic		
PH 3.5	To prepare and explain a list of P-drugs for a given case/condition		S of cal	P	Y	3.5 DOAP + SGD	2 hrs	Maintenance of Log book		General Medicine	

PH 3.6	Demonstrate how to optimize interaction with pharmaceutical representative to get authentic information on drugs		S	SH	N	3.6 DOAP Use of video demonstration and role play	2 hrs	Maintenance of Log book			
PH 3.7	Prepare a list of essential medicine for a health care facility		S	SH	Y	3.7 SGD	2 hrs	Maintenance of Log book			

PH 3.8	Communicate effectively with a patient on proper use of prescribe medication (i) Insulins, (ii)Proton pump inhibitors, (iii)statins,(iv) ferrous sulphate tablets,(v) (v) co- amoxiclav or cotrimoxazole		C/A	SH	Y	3.8 DOAP	2 hrs	Skill station			
PH 4.1	Administer drugs through various routes in a simulated environment using mannequins		S	SH	Y	4.1 A DOAP 4.1 B DOAP 4.1 C DOAP 4.1 D DOAP 4.1 E DOAP 4.1 F DOAP 4.1 G DOAP 4.1 H DOAP	2 hrs 2 hrs 2 hrs 2 hrs 2 hrs 2 hrs 2 hrs 2 hrs	Skills assessment			

PH 4.2	Demonstrate the effects of drugs on blood pressure (vasopressor and vasodepressors with appropriate blockers) using computer aided learning		S	SH	Y	4.2 A DOAP 4.2 B DOAP 4.2 C DOAP 4.2 D DOAP 4.2 E DOAP 4.2 F DOAP	2 hrs 2 hrs 2 hrs 2 hrs 2 hrs 2 hrs	Skills assessment			
PH 5.1	Communicate with the patient with empathy and ethics on all aspects of drug use		A/C	SH	Y	5.1 SGD	2 hrs	Skill station		General Medicine	

PH 5.2	Communicate with the patient regarding optimal use of a) drug therapy, b) devices and c) storage of medicines		A/C	SH	Y	5.2 A DOAP 5.2B SGD	2 hrs 2 hrs	Skill station			
PH 5.3	Motivate patients with chronic diseases to adhere to the prescribed management by health care provider		A/C	SH	Y	5.3A SGD 5.3B SGD	2 hrs 2 hrs	Skill station/ short note			
PH 5.4	Explain to the patient the relationship between cost of treatment and patient compliance		A/C	SH	Y	5.4 DOAP	2 hrs	Short note/ Viva voce		General Medicine	

PH 5.5	Demonstrate an understanding of the caution in prescribing drugs likely to produce dependence and recommend the line of management		K	KH	Y	Small group discussi on	2 hrs	Shortnote/ Viva voce		Psychiatry	
PH 5.6	Demonstrate ability to educate public & patients about various aspects of drug use including drug dependence and OTC drugs		A/C	SH	Y	5.6 DOAP schedule H to be included	2 hrs	Skill station		Psychiatry	

PH 5.7	Demonstrate an understanding of the legal and ethical aspects ofprescribing drugs		K	SH	Y	5.7 DOAP	2 hrs	Short note/ Viva voce			Forensic Medicine

CERTIFIABLE SKILLS

PH3.2*Perform and interpret a critical appraisal(audit)of a given Prescription PHPH

3.3*Performa critical evaluation of the drugpromotionalliterature

PH3.4*(A-B)To recognize and report an adverse drug reaction

PH3.5*To prepare and explain a list of P-drugsforagivencase/condition

PH3.6*Demonstratehowtooptimizeinteractionwithpharmaceuticalrepresentativetogetauthenticinformation drugs

PH3.7*Prepare a list of essential medicines for a healthcarefacility

PH4.1*AdministerdrugsthroughintramuscularroutesinasimulatedenvironmentusingMannequins

PH4.1*AdministerdrugsthroughintravenousroutesinasimulatedenvironmentusingMannequins.

TOPICS FOR HORIZONTAL INTEGRATION

TOPICS	DEPARTMENTS
Anemiaandanticoagulants	PathologyandMicrobiology
Shock	Pathology
Drugofabuse	Forensicmedicine

TOPICS FOR VERTICAL INTEGRATION

	COMPETENCY	
Number	**The student should be able to**	**Vertical Integration**
PH1.15	Describemechanism/sofaction,types,doses,sideeffects,indications andcontraindications ofskeletal musclerelaxants	Anesthesiology,Physiology
PH1.16	Describemechanism/sofaction,types,doses,sideeffects,indicationsandcontraindications ofthedrugsforgout,anti-rheumaticdrugs.	GeneralMedicine
PH1.18	Describe the mechanism/s of action, types, doses, side effects,indicationsandcontraindicationsofgeneralanesthetics,andpre-anestheticmedications	Anesthesiology
PH1.19	Describethemechanism/sofaction,types,doses, sideeffects, indicationsandcontraindicationsofthedrugswhichactonCNS,(including,anti-depressantdrugs, anti-manicdrugs)	Psychiatry,Physiology
PH1.20	Describetheeffectsofacute andchronicethanolintake	Psychiatry,forensic
PH1.22	Describedrugs ofabuse(dependence, addiction,stimulants,depressants,psychedelics,drugsusedforcriminaloffences)	Psychiatry
PH1.23	Describetheprocessandmechanism ofdrugdeaddiction	Psychiatry
PH1.25	Describethemechanism/sofaction,types,doses, sideeffects, Indicationsandcontraindicationsofthedrugsactingonblood, likeanticoagulants,antiplatelet,fibrinolytics.	Physiology, GeneralMedicine,Pathology,biochemistry

PH1.26	Describe mechanisms of action, types, doses, side effects, indications andcontraindicationsofthedrugsmodulatingtherenin-angiotensinandaldosteronesystem	Physiology, GeneralMedicine
PH1.28	Describe the mechanisms of action, types, doses, side effects,indicationsandcontraindicationsofthedrugsused inischemic heartdisease(stable,unstableanginaandmyocardial infarction),peripheralvasculardisease	GeneralMedicine
PH1.35	Describe the mechanism/s of action, types, doses, side effects,indicationsandcontraindicationsofdrugsusedin hematologicaldisorderslike: 1. Drugsusedinanemia's 2. ColonyStimulatingfactors	General Medicine,Physiology , OBG
PH1.36	Describe the mechanism of action, types, doses, side effects, indications and contraindications of drugs used in endocrinedisorders(diabetesmellitus,thyroiddisordersand osteoporosis)	GeneralMedicine
PH1.39	Describe mechanism of action, types, doses, side effects, indications andcontraindicationsthedrugsusedforcontraception	Obstetrics &Gynecology,Communit ymedicine
PH1.40	Describe mechanism of action, types, doses, side effects, indications andcontraindicationsof1.Drugsusedinthetreatmentofinfertility ,and2.Drugs usedin erectiledysfunction	Obstetrics &Gynecology
PH1.41	Describethemechanismsofaction,types,doses,sideeffects,i ndications and contraindications of uterine relaxants andstimulants	Obstetrics &Gynecology

PH1.43	Describeanddiscusstherationaluseofantimicrobialsincludinga ntibioticstewardship program	General Medicine,Pediatrics Microbiology

PH1.44	Describethefirstlineantituberculardugs,theirmechanisms ofaction,sideeffects and doses.	Respiratory Medicine
PH1.45	Describethe drugs usedin MDRand XDRTuberculosis	RespiratoryMedicine

PH1.46	Describethemechanismsofaction,types,doses,sideeffec ts,indicationsand contraindications ofantileproticdrugs	Dermatology,Venereology &Leprosy
PH1.47	Describethemechanismsofaction,types,doses,sideeffects,indicatio nsand contraindications of the drugs usedin malaria, KALA-AZAR,amebiasis and intestinal helminthiasis	General MedicineCommunityMedicine Micro
PH1.52	Describemanagementofcommonpoisoning,insecticides,com monstingand bites	General MedicineForensicmedicine
PH1.56	Describebasicaspectsof GeriatricandPediatricpharmacology	Pediatrics
PH1.57	Describedrugs usedinskindisorders	Dermatology,Venereology &Leprosy
PH1.58	DescribedrugsusedinOculardisorders	Ophthalmology
PH2.4	Demonstratethecorrectmethodofcalculationofdrugdosage inpatientsincludingthoseused in specialsituations	Pediatrics, General Medicine
PH3.1	Writearational, correctandlegible genericprescriptionfora givenconditionand communicate thesameto thepatient	GeneralMedicine
PH3.3	Performacriticalevaluation ofthedrugpromotional literature	GeneralMedicine
PH3.5	Topreparеandexplainalist ofP-drugsfora givencase/condition	GeneralMedicine
PH5.1	Communicatewith thepatient with empathyandethics on all aspectsofdruguse	GeneralMedicine
PH5.4	Explaintothepatienttherelationshipbetweencostoftreatmentan dpatientcompliance	GeneralMedicine

PH5.5	Demonstrate an understanding of the caution in prescribing drugs likelytoproducedependenceand recommendthe line ofmanagement	Psychiatry
PH5.6	Demonstrate abilityto educatepublic&patientsaboutvarious aspectsofdruguseincludingdrugdependenceandOTC drugs	Psychiatry

CDSIMER
Dr. Chandramma Dayananda Sagar
Institute of Medical Education and Research
(Unit of Dayananda Sagar University)

Curriculum and Assessment Methodology of Phase – II MBBS

PATHOLOGY

Dr Chandramma Dayananda Sagar Instit ute of Medical Education & Research

CompetencyBasedUndergraduateMedicalEducation(CBME)Curricul umSpecificLearningObjectives in Pathology

Knowledge:

SpecificLearningObjectivesinPathology(Theory:Competencyno-1.1to36.1)

Number	COMPETENCY Thestudentshouldbeableto	Domain K/S/A/ C	Level K/KH/ S H/P	Core Y/N	SuggestedTeaching Learning methods	SuggestedAssessment methods	Number requiredto certify P	Verticalintegration	Horizontal Integration
PATHOLOGY									
Topic:IntroductiontoPathology		**Numberof competencies:(03)**				**Numberofproceduresthatrequirecertification:(NIL)**			
PA1.1	Describetheroleofapathologistindiagnosisand management of disease	K	K	Y	Departmental orientation	Written/Vivavoce			
PA1.2	EnumeratecommondefinitionsandtermsusedinPathology	K	K	Y	Lecture,Smallgroup discussion	Written/Vivavoce			
PA1.3	DescribethehistoryandevolutionofPathology	K	K	N	Lecture,Smallgroup discussion	Written/Vivavoce			
Topic:CellInjuryandAdaptation		**Numberofcompetencies:(08)**				**Numberofproceduresthatrequirecertification:(NIL)**			

PA2.1	Demonstrateknowledgeofthecauses,mechanisms,types and effects of cell injury and their clinical significance	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			
PA2.2	Describe the etiology of cell injury. Distinguish between reversible-irreversibleinjury:mechanisms;morphologyofcell injury	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			
PA2.3	Intracellularaccumulationoffats,proteins,carbohydrates, pigments	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			
PA2.4	DescribeanddiscussCelldeath-types,mechanisms,necrosis, apoptosis (basic as contrasted with necrosis), autolysis	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			
PA2.5	Describeanddiscusspathologiccalcifications,gangrene	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			
PA2.6	Describeanddiscusscellularadaptations:atrophy, hypertrophy, hyperplasia, metaplasia, dysplasia	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			

Number	COMPETENCY Thestudentshouldbeableto	Domain K/S/A/ C	Level K/KH/ S H/P	Core Y/N	SuggestedTeaching Learning methods	SuggestedAssessment methods	Number requiredto certify P	Verticalintegration	Horizontal Integration
PA2.7	Describeanddiscussthemechanismsofcellularagingand apoptosis	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce			
PA2.8	Identify and describe various forms of cell injuries, their manifestationsandconsequencesingrossandmicroscopic specimens	S	SH	Y	DOAPsession	Skillassessment			
Topic:Amyloidosis		**Numberofcompetencies:(02)**				**Numberofproceduresthatrequirecertification:(NIL)**			
PA3.1	Describethepathogenesisandpathologyofamyloidosis	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			
PA3.2	Identifyanddescribeamyloidosisinapathologyspecimen	S	SH	N	DOAPsession	Skillassessment			

Topic:Inflammation		**Numberofcompetencies:(04)**				**Numberofproceduresthatrequirecertification:(NIL)**			
PA4.1	Defineanddescribethegeneralfeaturesofacuteandchronic inflammation including stimuli, vascular and cellular events	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralSurgery	
PA4.2	Enumerateanddescribethemediatorsofacuteinflammation	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralSurgery	
PA4.3	Defineanddescribechronicinflammationincludingcauses, types, non-specific and granulomatous; and enumerate examples of each	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			
PA4.4	Identifyanddescribeacuteandchronicinflammationingross and microscopic specimens	S	SH	Y	DOAPsession	Skillassessment			
Topic:Healingandrepair		**Numberofcompetencies:(01)**				**Numberofproceduresthatrequirecertification:(NIL)**			

Number	**COMPETENCY Thestudentshouldbeableto**	**Domain K/S/A/ C**	**Level K/KH/ S H/P**	**Core Y/N**	**SuggestedTeaching Learning methods**	**SuggestedAssessment methods**	**Number requiredto certify P**	**Verticalintegration**	**Horizontal Integration**
PA5.1	Defineanddescribetheprocessofrepairandregeneration including wound healing and its types	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralSurgery	
Topic:Hemodynamicdisorders		**Numberofcompetencies:(07)**				**Numberofproceduresthatrequirecertification:(NIL)**			
PA6.1	Defineanddescribeedema,itstypes,pathogenesisand clinical correlations	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA6.2	Defineanddescribehyperemia,congestion,hemorrhage	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			

PA6.3	Defineanddescribeshock,itspathogenesisanditsstages	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralSurgery	
PA6.4	Define and describe normal haemostasis and the etiopathogenesisandconsequencesofthrombosis	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			
PA6.5	Defineanddescribeembolismanditscausesandcommon types	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			
PA6.6	DefineanddescribeIschaemia/infarctionitstypes,etiology, morphologic changes and clinical effects	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			
PA6.7	Identifyanddescribethegrossandmicroscopicfeaturesof infarction in a pathologic specimen	S	SH	Y	DOAPsession	SkillAssessment			
Topic:Neoplasticdisorders		**Numberofcompetencies:(05)**				**Numberofproceduresthatrequirecertification:(NIL)**			
PA7.1	Define and classify neoplasia. Describe the characteristics of neoplasiaincludinggross,microscopy,biologic,behaviourand spread.Differentiatebetweenbenignfrommalignantneoplams	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			
PA7.2	Describethemolecularbasisofcancer	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			

Number	COMPETENCY Thestudentshouldbeableto	Domain K/S/A/ C	Level K/KH/ S H/P	Core Y/N	SuggestedTeaching Learning methods	SuggestedAssessment methods	Number requiredto certify P	Verticalintegration	Horizontal Integration
PA7.3	Enumeratecarcinogensanddescribetheprocessof carcinogenesis	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			
PA7.4	Describetheeffectsoftumoronthehostincluding paraneoplastic syndrome	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			

PA7.5	Describeimmunologyandtheimmuneresponsetocancer	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce			Microbiology
Topic:Basicdiagnosticcytology		**Numberofcompetencies:(03)**				**Numberofproceduresthatrequirecertification:(NIL)**			
PA8.1	Describethediagnosticroleofcytologyanditsapplicationin clinical care	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralSurgery	
PA8.2	Describethebasisofexfoliativecytologyincludingthe technique & stains used	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce/Skill assessment		GeneralSurgery	
PA8.3	Observeadiagnosticcytologyanditsstainingandinterpretthe specimen	S	KH	Y	DOAPsession	Skillassessment			
Topic:ImmunopathologyandAIDS		**Numberofcompetencies:(07)**				**Numberofproceduresthatrequirecertification:(NIL)**			
PA9.1	Describetheprinciplesandmechanismsinvolvedinimmunity	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		Pediatrics	Microbiology
PA9.2	Describethemechanismofhypersensitivityreactions	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			Microbiology
PA9.3	DescribetheHLAsystemandtheimmuneprinciplesinvolved in transplant and mechanism of transplant rejection	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			Microbiology
PA9.4	Defineautoimmunity.Enumerateautoimmunedisorders	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA9.5	DefineanddescribethepathogenesisofsystemicLupus Erythematosus	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	

Number	**COMPETENCY Thestudentshouldbeableto**	**Domain K/S/A/ C**	**Level K/KH/ S H/P**	**Core Y/N**	**SuggestedTeaching Learning methods**	**SuggestedAssessment methods**	**Number requiredto certify P**	**Verticalintegration**	**Horizontal Integration**

PA9.6	Defineanddescribethepathogenesisandpathologyof HIV and AIDS	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	Microbiology
PA9.7	Defineanddescribethepathogenesisofothercommon autoimmune diseases	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
Topic:InfectionsandInfestations		**Numberofcompetencies:(04)**				**Numberofprocedurest hatrequirecertification:(NIL)**			
PA10.1	Defineanddescribethepathogenesisandpathologyofmalaria	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	Microbiology
PA10.2	Defineanddescribethepathogenesisandpathologyof cysticercosis	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	Microbiology
PA10.3	Defineanddescribethepathogenesisandpathologyofleprosy	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	Microbiology
PA10.4	Define and describe the pathogenesis and pathology of commonbacterial,viral,protozoalandhelminthicdiseases	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	Microbiology
Topic:Geneticandpaediatricdiseases		**Numberofcompetencies:(03)**				**Numberofprocedurest hatrequirecertification:(NIL)**			
PA11.1	Describe the pathogenesis and features of common cytogeneticabnormalitiesandmutationsinchildhood	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		Pediatrics	
PA11.2	Describethepathogenesisandpathologyoftumorandtumour- like conditions in infancy and childhood	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		Pediatrics	
PA11.3	Describethepathogenesisofcommonstoragedisordersin infancy and childhood	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		Pediatrics	
Topic:Environmentalandnutritionaldiseases		**Numberofcompetencies:(03)**				**Numberofprocedurest hatrequirecertification:(NIL)**			

Number	COMPETENCY Thestudentshouldbeableto	Domain K/S/A/ C	Level K/KH/ S H/P	Core Y/N	SuggestedTeaching Learning methods	SuggestedAssessment methods	Number requiredto certify P	Verticalintegration	Horizontal Integration
PA12.1	Enumerateanddescribethepathogenesisofdisorderscaused by air pollution, tobacco and alcohol	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			Community Medicine
PA12.2	Describethepathogenesisofdisorderscausedbyprotein calorie malnutrition and starvation	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		Biochemistry, Pediatrics	
PA12.3	Describethepathogenesisofobesityanditsconsequences	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
Topic:Introductiontohaematology		**Numberofcompetencies:(05)**				**Numberofproceduresthatrequirecertification:(NIL)**			
PA13.1	Describehematopoiesisandextramedullaryhematopoiesis	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA13.2	Describetheroleofanticoagulantsinhematology	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA13.3	Defineandclassifyanemia	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA13.4	Enumerateanddescribetheinvestigationofanemia	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA13.5	Perform,Identifyanddescribetheperipheralbloodpicturein anemia	S	SH	Y	DOAPsession	Skillassessment		GeneralMedicine	
Topic:Microcyticanemia		**Numberofcompetencies:(03)**				**Numberofproceduresthatrequirecertification:(NIL)**			
PA14.1	Describeironmetabolism	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		Biochemistry	
PA14.2	Describetheetiology,investigationsanddifferentialdiagnosis of microcytic hypochromic anemia	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA14.3	Identifyanddescribetheperipheralsmearinmicrocytic anemia	S	SH	Y	DOAPsession	Skillassessment		GeneralMedicine	
Topic:Macrocyticanemia		**Numberofcompetencies:(04)**				**Numberofproceduresthatrequirecertification:(NIL)**			

Number	COMPETENCY Thestudentshouldbeableto	Domain K/S/A/ C	Level K/KH/ S H/P	Core Y/N	SuggestedTeaching Learning methods	SuggestedAssessment methods	Number requiredto certify P	Verticalintegration	Horizontal Integration
PA15.1	DescribethemetabolismofVitaminB12andtheetiologyand pathogenesis of B12 deficiency	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		Biochemistry, GeneralMedicine	
PA15.2	Describelaboratoryinvestigationsofmacrocyticanemia	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA15.3	Identifyanddescribetheperipheralbloodpictureofmacrocytic anemia	S	SH	Y	DOAPsession	Skillassessment			
PA15.4	Enumerate the differences and describe the etiology and distinguishingfeaturesofmegaloblasticandnon-megaloblastic macrocytic anemia	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
Topic:Hemolyticanemia		**Numberofcompetencies:(07)**					**Numberofproceduresthatrequirecertification:(01)**		
PA16.1	Defineandclassifyhemolyticanemia	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		Biochemistry,General Medicine	
PA16.2	Describethepathogenesisandclinicalfeaturesand hematologic indices of hemolytic anemia	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		Biochemistry,General Medicine	
PA16.3	Describethepathogenesis,features,hematologicindicesand peripheralbloodpictureofsicklecellanemiaandthalassemia	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		Biochemistry,General Medicine	
PA16.4	Describetheetiologypathogenesis,hematologicindicesand peripheral blood picture of Acquired hemolytic anemia	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		Biochemistry, GeneralMedicine	
PA16.5	Describetheperipheralbloodpictureindifferenthemolytic anaemias	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA16.6	Prepareaperipheralbloodsmearandidentifyhemolytic anaemia from it	S	P	Y	DOAPsession	Skillassessment	1		
PA16.7	Describethecorrecttechniquetoperformacrossmatch	S	SH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			
Topic:Aplasticanemia		**Numberofcompetencies:(02)**					**Numberofproceduresthatrequirecertification:(NIL)**		

Number	COMPETENCY Thestudentshouldbeableto	Domain K/S/A/ C	Level K/KH/ S H/P	Core Y/N	SuggestedTeaching Learning methods	SuggestedAssessment methods	Number requiredto certify P	Verticalintegration	Horizontal Integration
PA17.1	Enumeratetheetiology,pathogenesisandfindingsinaplastic anemia	K	K	N	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA17.2	Enumeratetheindicationsanddescribethefindingsinbone marrow aspiration and biopsy	K	K	N	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
Topic:Leukocytedisorders		**Numberofcompetencies:(02)**				**Numberofproceduresthatrequirecertification:(NIL)**			
PA18.1	Enumerateanddescribethecausesofleukocytosis,leucopenia lymphocytosis and leukemoid reactions	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			
PA`18.2	Describe the etiology, genetics, pathogenesis classification, features,hematologicfeaturesofacuteandchronicleukemia	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			
Topic:Lymphnodeandspleen		**Numberofcompetencies:(07)**				**Numberofproceduresthatrequirecertification:(NIL)**			
PA19.1	Enumeratethecausesanddescribethedifferentiatingfeatures of lymphadenopathy	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralSurgery	
PA19.2	Describethepathogenesisandpathologyoftuberculouslymphadeniti s	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralSurgery	
PA19.3	Identifyanddescribethefeaturesoftuberculouslymphadenitis in a gross and microscopic specimen	S	SH	Y	DOAPsession	Skillassessment			

PA19.4	Describeanddiscussthepathogenesis,pathologyandthe differentiating features of Hodgkin's and non-Hodgkin's lymphoma	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralSurgery	
PA19.5	IdentifyanddescribethefeaturesofHodgkin'slymphomaina gross and microscopic specimen	S	SH	Y	DOAPsession	Skillassessment		GeneralSurgery	

Number	COMPETENCY Thestudentshouldbeableto	Domain K/S/A/ C	Level K/KH/ S H/P	Core Y/N	SuggestedTeaching Learning methods	SuggestedAssessment methods	Number requiredto certify P	Verticalintegration	Horizontal Integration
PA19.6	Enumerateanddifferentiatethecausesofsplenomegaly	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		General Surgery, GeneralMedicine	
PA19.7	Identifyanddescribethegrossspecimenofanenlargedspleen	S	SH	Y	DOAPsession	Skillassessment			
Topic:Plasmacelldisorders		**Numberofcompetencies:(01)**				**Numberofproceduresthatrequirecertification:(NIL)**			
PA20.1	Describethefeaturesofplasmacellmyeloma	S	SH	Y	DOAPsession	Skillassessment			
Topic:Hemorrhagicdisorders		**Numberofcompetencies:(05)**				**Numberofproceduresthatrequirecertification:(NIL)**			
PA21.1	Describenormalhemostasis	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			
PA21.2	Classifyanddescribetheetiology,pathogenesisandpathology ofvascularandplateletdisordersincludingITPand haemophilia's	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		Pediatrics	
PA21.3	Differentiateplateletfromclottingdisordersbasedonthe clinical and hematologic features	S	SH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA21.4	Defineanddescribedisseminatedintravascularcoagulation,its laboratoryfindingsanddiagnosisofdisseminatedintravascular coagulation	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	

PA21.5	Defineanddescribedisseminatedintravascularcoagulation,its laboratory findings and diagnosis of Vitamin K deficiency	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
Topic:Bloodbankingandtransfusion		**Numberofcompetencies:(07)**				**Numberofproceduresthatrequirecertification:(NIL)**			
PA22.1	Classifyanddescribebloodgroupsystems(ABOand RH)	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			
PA22.2	Enumeratetheindications,describetheprinciples,enumerate and demonstrate the steps of compatibility testing	S	SH	Y	Lecture,Smallgroup discussion	Written/Viva voce		Obstetrics &Gynaecology	

Number	**COMPETENCY Thestudentshouldbeableto**	**Domain K/S/A/ C**	**Level K/KH/ S H/P**	**Core Y/N**	**SuggestedTeaching Learning methods**	**SuggestedAssessment methods**	**Number requiredto certify P**	**Verticalintegration**	**Horizontal Integration**
PA22.4	Enumeratebloodcomponentsanddescribetheirclinicaluses	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		General Surgery, GeneralMedicine	
PA22.5	Enumerateanddescribeinfectionstransmittedbyblood transfusion	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			Microbiology
PA22.6	Describetransfusionreactionsandenumeratethestepsinthe investigation of a transfusion reaction	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA22.7	Enumeratetheindicationsanddescribetheprinciplesand procedure of autologous transfusion	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			
Topic:ClinicalPathology		**Numberofcompetencies:(03)**				**Numberofproceduresthatrequirecertification:(NIL)**			
PA23.1	Describe abnormal urinary findings in disease states and identifyanddescribecommonurinaryabnormalitiesinaclinical specimen	S	SH	Y	DOAPsession	SkillAssessment			

PA23.2	Describeabnormalfindingsinbodyfluidsinvariousdisease states	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			
PA23.3	Describeandinterprettheabnormalitiesinapanelcontaining semen analysis, thyroid function tests, renal function tests or liver function tests	S	SH	Y	DOAPsession	SkillAssessment			
Topic:Gastrointestinaltract		**Numberofcompetencies:(07)**				**Numberofproceduresthatrequirecertification:(NIL)**			
PA24.1	Describetheetiology,pathogenesis,pathologyandclinical features of oral cancers	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		Dentistry	
PA24.2	Describetheetiology,pathogenesis,pathology,microbiology, clinical and microscopic features of peptic ulcer disease	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA24.3	Describeandidentifythemicroscopicfeaturesofpepticulcer	S	SH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	

Number	**COMPETENCY Thestudentshouldbeableto**	**Domain K/S/A/ C**	**Level K/KH/ S H/P**	**Core Y/N**	**SuggestedTeaching Learning methods**	**SuggestedAssessment methods**	**Number requiredto certify P**	**Verticalintegration**	**Horizontal Integration**
PA24.4	Describeandetiologyandpathogenesisandpathologic features of carcinoma of the stomach	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralSurgery	
PA24.5	Describeandetiologyandpathogenesisandpathologic features of Tuberculosis of the intestine	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralSurgery	
PA24.6	Describeandetiologyandpathogenesisandpathologicand distinguishing features of Inflammatory bowel disease	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralSurgery	
PA24.7	Describetheetiology,pathogenesis,pathologyand distinguishing features of carcinoma of the colon	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralSurgery	

Topic:Hepatobiliarysystem	Numberofcompetencies:(06)			Numberofproceduresthatrequirecertification:(01)				
PA25.1	Describebilirubinmetabolism,enumeratetheetiologyand pathogenesis of jaundice, distinguish between direct and indirect hyperbilirubinemia	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		Biochemistry,General Medicine	
PA25.2	Describethepathophysiologyandpathologicchangesseenin hepatic failure and their clincial manifestations, complications and consequences	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine, General Surgery	
PA25.3	Describe the etiology and pathogenesis of viral and toxic hepatitis:distinguishthecausesofhepatitisbasedonthe clinical and laboratory features. Describe the pathology, complications and consequences of hepatitis	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA25.4	Describethepathophysiology,pathologyandprogressionof alcoholic liver disease including cirrhosis	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine, General Surgery	
PA25.5	Describetheetiology,pathogenesisandcomplicationsofportal hypertension	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine, General Surgery	
PA25.6	Interpret liver function and viral hepatitis serology panel. Distinguishobstructivefromnon-obstructivejaundicebasedon clinical features and liver function tests	S	P	Y	DOAPsession	Skillassessment	1	GeneralMedicine	

Number	COMPETENCY Thestudentshouldbeableto	Domain K/S/A/ C	Level K/KH/ S H/P	Core Y/N	SuggestedTeaching Learning methods	SuggestedAssessment methods	Number requiredto certify P	Verticalintegration	Horizontal Integration
Topic:RespiratorysystemNumberofcompetencies:(07)		Numberofproceduresthatrequirecertification:(NIL)							
PA26.1	Defineanddescribetheetiology,types,pathogenesis,stages, morphology and complications of pneumonia	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	Microbiology

PA26.2	Describetheetiology,grossandmicroscopicappearanceand complications of lung abscess	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	Microbiology
PA26.3	Defineanddescribetheetiology,types,pathogenesis,stages, morphology and complications and evaluation of Obstructive airway disease (OAD) and bronchiectasis	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		Physiology, General Medicine	Microbiology
PA26.4	Defineanddescribetheetiology,types,pathogenesis,stages, morphology microscopic appearance and complications of tuberculosis	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	Microbiology
PA26.5	Define and describe the etiology, types, exposure, environmentalinfluence,pathogenesis,stages,morphology, microscopic appearance and complications of Occupational lung disease	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		General Medicine, CommunityMedicine	
PA26.6	Define and describe the etiology, types, exposure, genetics environmentalinfluence,pathogenesis,stages,morphology, microscopic appearance,metastases and complications of tumors of the lung and pleura	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA26.7	Define and describe the etiology, types, exposure, genetics environmental influence, pathogenesis, morphology, microscopicappearanceandcomplicationsofmesothelioma	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		General Medicine, CommunityMedicine	
Topic:Cardiovascularsystem		**Numberofcompetencies:(10)**				**Numberofproceduresthatrequirecertification:(NIL)**			
PA27.1	Distinguisharteriosclerosisfromatherosclerosis.Describethe pathogenesis and pathology of various causes and types of arteriosclerosis	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA27.2	Describe the etiology, dynamics, pathology types and complicationsofaneurysmsincludingaorticaneurysms	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	

Number	**COMPETENCY Thestudentshouldbeableto**	**Domain K/S/A/ C**	**Level K/KH/ S H/P**	**Core Y/N**	**SuggestedTeaching Learning methods**	**SuggestedAssessment methods**	**Number requiredto certify P**	**Verticalintegration**	**Horizontal Integration**

PA27.3	Describetheetiology,types,stagespathophysiology,pathology and complications of heart failure	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine, Physiology	
PA27.4	Describetheetiology,pathophysiology,pathology,grossand microscopicfeatures,criteriaandcomplicationsof rheumatic fever	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	Microbiology
PA27.5	Describe the epidemiology, risk factors, etiology, pathophysiology, pathology, presentations, gross and microscopicfeatures,diagnostictestsandcomplicationsof ischemic heart disease	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA27.6	Describe the etiology, pathophysiology, pathology, gross and microscopicfeatures,diagnosisandcomplicationsofinfective endocarditis	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	Microbiology
PA27.7	Describetheetiology,pathophysiology,pathology,grossand microscopic features, diagnosis and complications of pericarditis and pericardial effusion	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA27.8	Interpretabnormalitiesincardiacfunctiontestinginacute coronary syndromes	S	SH	Y	DOAPsession	SkillAssessment		Physiology,General Medicine	
PA27.9	Classifyanddescribetheetiology,types,pathophysiology, pathology, gross and microscopic features, diagnosis and complications of cardiomyopathies	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine, Physiology	
PA27.10	Describetheetiology,pathophysiology,pathologyfeaturesand complications of syphilis on the cardiovascular system	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	Microbiology
Topic:UrinaryTract		**Numberofcompetencies:(16)**				**Numberofproceduresthatrequirecertification:(NIL)**			
PA28.1	Describethenormalhistologyofthekidney	K	K	Y	Lecture,Smallgroup discussion	Written/Vivavoce			
PA28.2	Define, classify and distinguish the clinical syndromes and describetheetiology,pathogenesis,pathology,morphology, clinical and laboratoryand urinaryfindings, complications of renal failure	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce			

Number	COMPETENCY Thestudentshouldbeableto	Domain K/S/A/ C	Level K/KH/ S H/P	Core Y/N	SuggestedTeaching Learning methods	SuggestedAssessment methods	Number requiredto certify P	Verticalintegration	Horizontal Integration
PA28.3	Defineanddescribetheetiology,precipitatingfactors, pathogenesis, pathology, laboratory urinary findings, progression and complications of acute renal failure	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA28.4	Defineanddescribetheetiology,precipitatingfactors, pathogenesis, pathology, laboratory urinary findings progressionandcomplications of chronic renalfailure	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA28.5	Define and classify glomerular diseases. Enumerate and describetheetiology,pathogenesis,mechanismsofglomerular injury, pathology, distinguishing features and clinical manifestations of glomerulonephritis	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		Physiology, General Medicine	
PA28.6	Define and describe the etiology,pathogenesis, pathology, laboratory,urinaryfindings,progressionandcomplicationsof IgA nephropathy	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA28.7	Enumerateanddescribethefindingsinglomerular manifestations of systemic disease	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA28.8	Enumerateandclassifydiseasesaffectingthetubular interstitium	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA28.9	Define and describe the etiology,pathogenesis, pathology, laboratory,urinaryfindings,progressionandcomplicationsof acute tubular necrosis	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA28.10	Describe the etiology, pathogenesis, pathology, laboratory findings,distinguishingfeaturesprogressionandcomplications of acute and chronic pyelonephritis and reflux nephropathy	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		HumanAnatomy, General Surgery	
PA28.11	Define classify and describe the etiology,pathogenesis pathology,laboratory,urinaryfindings,distinguishingfeatures progression and complications of vascular disease of the kidney	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	

Number	COMPETENCY Thestudentshouldbeableto	Domain K/S/A/ C	Level K/KH/ S H/P	Core Y/N	SuggestedTeaching Learning methods	SuggestedAssessment methods	Number requiredto certify P	Verticalintegration	Horizontal Integration
PA28.12	Defineclassifyanddescribethegenetics,inheritance,etiology, pathogenesis, pathology, laboratory, urinary findings, distinguishingfeatures,progressionandcomplicationsofcystic disease of the kidney	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine, Pediatrics	
PA28.13	Define classify and describe the etiology,pathogenesis, pathology,laboratory,urinaryfindings,distinguishingfeatures progression and complications of renal stone disease and obstructive uropathy	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralSurgery	
PA28.14	Classify and describe the etiology, genetics, pathogenesis, pathology,presentingfeatures,progressionandspreadofrenal tumors	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		Pediatrics	
PA28.15	Describe the etiology, genetics, pathogenesis, pathology, presentingfeaturesandprogressionofthromboticangiopathies	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	
PA28.16	Describetheetiology,genetics,pathogenesis,pathology, presenting features and progression of urothelial tumors	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralSurgery	
Topic:MaleGenitalTractNumberofcompetencies:(05)		**Numberofproceduresthatrequirecertification:(NIL)**							
PA29.1	Classify testicular tumors and describe the pathogenesis, pathology,presentinganddistinguishingfeatures,diagnostic tests, progression and spread of testicular tumors	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralSurgery	
PA29.2	Describe the pathogenesis, pathology, presenting and distinguishingfeatures,diagnostictests,progressionand spread of carcinoma of the penis	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralSurgery	

PA29.3	Describethepathogenesis,pathology,hormonaldependency presenting and distinguishing features, urologic findings & diagnostic tests of benign prostatic hyperplasia	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralSurgery	
PA29.4	Describethepathogenesis,pathology,hormonaldependency presenting and distinguishing features, diagnostic tests, progression and spread of carcinoma of the prostate	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralSurgery	

Number	COMPETENCY Thestudentshouldbeableto	Domain K/S/A/ C	Level K/KH/ S H/P	Core Y/N	SuggestedTeaching Learning methods	SuggestedAssessment methods	Number requiredto certify P	Verticalintegration	Horizontal Integration
PA29.5	Describetheetiology,pathogenesis,pathologyandprogression of prostatitis	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralSurgery	
Topic:FemaleGenitalTract		**Numberofcompetencies:(09)**				**Numberofproceduresthatrequirecertification:(NIL)**			
PA30.1	Describetheepidemiology,pathogenesis,etiology,pathology, screening, diagnosis and progression of carcinoma of the cervix	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		Obstetrics &Gynaecology	
PA30.2	Describethepathogenesis,etiology,pathology,diagnosisand progressionand spread of carcinoma of the endometrium	K	KH	Y	Lecture,Smallgroup discussion	Written/Viva voce		Obstetrics &Gynaecology	
PA30.3	Describethepathogenesis,etiology,pathology,diagnosisand progressionand spread of carcinoma of the leiomyomas and leiomyosarcomas	K	KH	Y	Lecture,Smallgroup discussion	Written/Viva voce		Obstetrics &Gynaecology	
PA30.4	Classifyanddescribetheetiology,pathogenesis,pathology, morphology, clinical course, spread and complications of ovarian tumors	K	KH	Y	Lecture,Smallgroup discussion	Written/Viva voce		Obstetrics &Gynaecology	
PA30.5	Describetheetiology,pathogenesis,pathology,morphology, clinical course, spread and complications of gestational trophoblastic neoplasms	K	KH	Y	Lecture,Smallgroup discussion	Written/Viva voce		Obstetrics &Gynaecology	

PA30.6	Describetheetiologyandmorphologicfeaturesofcervicitis	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		Obstetrics &Gynaecology	
PA30.7	Describetheetiology,hormonaldependence,featuresand morphology of endometriosis	K	KH	N	Lecture,Smallgroup discussion	Written/Viva voce		Obstetrics &Gynaecology	
PA30.8	Describetheetiologyandmorphologicfeaturesofadenomyosis	K	KH	N	Lecture,Smallgroup discussion	Written/Viva voce		Obstetrics &Gynaecology	

Number	**COMPETENCY Thestudentshouldbeableto**	**Domain K/S/A/ C**	**Level K/KH/ S H/P**	**Core Y/N**	**SuggestedTeaching Learning methods**	**SuggestedAssessment methods**	**Number requiredto certify P**	**Verticalintegration**	**Horizontal Integration**
PA30.9	Describetheetiology,hormonaldependenceandmorphology of endometrial hyperplasia	K	KH	N	Lecture,Smallgroup discussion	Written/Viva voce		Obstetrics &Gynaecology	
Topic:Breast		**Numberofcompetencies:(04)**			**Numberofproceduresthatrequirecertification:(NIL)**				
PA31.1	Classify and describe the types, etiology, pathogenesis, pathologyandhormonaldependencyofbenignbreastdisease	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		HumanAnatomy, General Surgery	
PA31.2	Classify and describe the epidemiology, pathogenesis, classification, morphology, prognostic factors, hormonal dependency,stagingandspreadofcarcinomaofthebreast	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralSurgery	
PA31.3	Describeandidentifythemorphologicandmicroscopicfeatures of carcinoma of the breast	S	SH	N	DOAPsession	SkillAssessment		GeneralSurgery	
PA31.4	Enumerateanddescribetheetiology,hormonaldependency and pathogenesis of gynecomastia	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		Pediatrics, General Medicine	

Topic:Endocrinesystem	Numberofcompetencies:(09)	Numberofproceduresthatrequirecertification:(NIL)							
PA32.1	Enumerate,classifyanddescribetheetiology,pathogenesis, pathology and iodine dependency of thyroid swellings	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		Human Anatomy, Physiology, General Medicine, General Surgery	
PA32.2	Describe the etiology, cause, iodine dependency, pathogenesis,manifestations,laboratoryandimagingfeatures and course of thyrotoxicosis	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		Physiology, General Medicine	
PA32.3	Describetheetiology,pathogenesis,manifestations,laboratory and imaging features and course of thyrotoxicosis/ hypothyroidism	K	KH	Y	Lecture,Smallgroup	Written/Vivavoce		Physiology, General Medicine	

Number	COMPETENCY Thestudentshouldbeableto	Domain K/S/A/ C	Level K/KH/ S H/P	Core Y/N	SuggestedTeaching Learning methods	SuggestedAssessment methods	Number requiredto certify P	Verticalintegration	Horizontal Integration
PA32.4	Classifyanddescribetheepidemiology,etiology,pathogenesis, pathology, clinical laboratory features, complications and progression of diabetes mellitus	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		Physiology, General Medicine	
PA32.5	Describetheetiology,genetics,pathogenesis,manifestations, laboratory and morphologic features of hyperparathyroidism	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		Physiology, General Medicine	
PA32.6	Describetheetiology,pathogenesis,manifestations, laboratory, morphologic features, complications and metastases of pancreatic cancer	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralSurgery	
PA32.7	Describe the etiology,pathogenesis, manifestations, laboratory,morphologicfeatures,complicationsofadrenal insufficiency	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		Physiology, GeneralMedicine	

PA32.8	Describetheetiology,pathogenesis,manifestations,laboratory, morphologic features, complications of Cushing's syndrome	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		Physiology,General Medicine	
PA32.9	Describetheetiology,pathogenesis,manifestations,laboratory and morphologic features of adrenal neoplasms	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		Human Anatomy, Physiology,General Medicine, General Surgery	
Topic:Boneandsofttissue		**Numberofcompetencies:(05)**			**Numberofproceduresthatrequirecertification:(NIL)**				
PA33.1	Classify and describe the etiology, pathogenesis, manifestations,radiologicandmorphologicfeaturesand complications of osteomyelitis	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		HumanAnatomy, Orthopaedics	Microbiology
PA33.2	Classify and describe the etiology, pathogenesis, manifestations,radiologicandmorphologicfeaturesand complications and metastases of bone tumors	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		Orthopaedics	
PA33.3	Classify and describe the etiology, pathogenesis, manifestations,radiologicandmorphologicfeaturesand complications and metastases of soft tissue tumors	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		Orthopaedics	

Number	**COMPETENCY Thestudentshouldbeableto**	**Domain K/S/A/ C**	**Level K/KH/ S H/P**	**Core Y/N**	**SuggestedTeaching Learning methods**	**SuggestedAssessment methods**	**Number requiredto certify P**	**Verticalintegration**	**Horizontal Integration**
PA33.4	Classify and describe the etiology, pathogenesis, manifestations,radiologicandmorphologicfeaturesand complications of Paget's disease of the bone	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		Orthopaedics	
PA33.5	Classifyanddescribetheetiology,immunology,pathogenesis, manifestations, radiologic and laboratory features, diagnostic criteria and complications of rheumatoid arthritis	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	

Topic:Skin		**Numberofcompetencies:(04)**			**Numberofprocedurresthatrequirecertification:(NIL)**				
PA34.1	Describetheriskfactorspathogenesis,pathologyandnatural history of squamous cell carcinoma of the skin	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		Dermatology, Venereology&Leprosy	
PA34.2	Describetheriskfactorspathogenesis,pathologyandnatural history of basal cell carcinoma of the skin	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		Dermatology, Venereology&Leprosy	
PA34.3	Describe the distinguishing features between a nevus and melanoma.Describetheetiology,pathogenesis,riskfactors morphology clinical features and metastases of melanoma	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		Dermatology, Venereology&Leprosy	
PA34.4	Identify,distinguishanddescribecommontumorsoftheskin	S	SH	N	DOAPsession	SkillAssessment		Dermatology, Venereology&Leprosy	
Topic: CentralNervous System		**Numberofcompetencies:(03)**			**Numberofprocedurresthatrequirecertification:(01)**				
PA35.1	Describetheetiology,typesandpathogenesis,differentiating factors, CSF findings in meningitis	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		GeneralMedicine	Microbiology
PA35.2	Classify and describe the etiology, genetics, pathogenesis, pathology,presentationsequelaeandcomplicationsofCNS tumors	K	KH	Y	Lecture,Smallgroup discussion	Written/Vivavoce		Pediatrics	

Number	**COMPETENCY Thestudentshouldbeableto**	**Domain K/S/A/ C**	**Level K/KH/ S H/P**	**Core Y/N**	**SuggestedTeaching Learning methods**	**SuggestedAssessment methods**	**Number requiredto certify P**	**Verticalintegration**	**Horizontal Integration**

PA35.3	IdentifytheetiologyofmeningitisbasedongivenCSF parameters	S	P	Y	DOAPsession	SkillAssessment	1	GeneralMedicine	Microbiology
Topic:Eye		**Numberofcompetencies:(01)**				**Numberofproceduresthatrequirecertification:(NIL)**			
PA36.1	Describe the etiology, genetics, pathogenesis, pathology, presentation,sequelaeandcomplicationsofretinoblastoma	K	KH	N	Lecture,Smallgroup discussion	Written/Vivavoce		Ophthalmology	

Competencies to be covered in each block

BLOCKI		BLOCKII		BLOCKIII	
Competency	**Topics**	**Competency**	**Topics**	**Competency**	**Topics**
PH1.1-1.12, 1.52, 1.59, 1.60, 1.64	GeneralPharmacology Clinical Pharmacology AndToxicology	PH1.26-1.31	CardiovascularSystem	PH1.36 –1.41	Endocrine
PH1.13-1.14	AutonomicNervousSystem	PH1.24	Diuretics	PH1.42 -1.48	Chemotherapy
PH1.18-1.23	CentralNervousSystem	PH1.32-1.33	RespiratorySystem	PH1.49	Anti-CancerDrugs
PH1.15,1.17	PeripheralNervousSystem	PH1.34	GastrointestinalTract	PH1.50	Immunomodulators
PH1.16	Autacoids	PH1.57, 1.58	DrugsUsedInSkinDiseases& OcularDiseases		
PH1.25 & 1.35	BloodAnd Blood Products &Anaemia	PH1.51,1.53, 1.54,1.55,1.62, 1.63	Miscellaneous(Vaccines Etc..,)		

TOPICSFORHORIZONTALINTEGRATION

	Pathology	Microbiology	Pharmacology	ForensicMedicine	CommunityMedicine	ConcernedClinicalsubjects
BLOCK 1	Immunology Anaemia Wound healing Shock	Immunology Anaemia Shock Surgicalpractice Infectiveendocarditis& Rheumaticheartdisease Immunisation	Immunology Anaemia& anticoagulantsEssentialmedicines ShockToxicology Drugsofabuse(FM) ANTIBIOTICSTEWARDSHIPPROG (Micro+Genmed+Paed)	Woundhealing Toxicology	Essentialmedicines	Shock Surgicalpractice Toxicology Infectiveendocarditis& Rheumaticheartdisease Immunisation
BLOCK 2	Infective endocarditis & Rheumaticheart disease(Nesting) Myocardial infarction Atherosclerosis	Tuberculosis Leprosy AIDS Malaria Entericfever Viralhepatitis	IHD (Path + Gen med)CHF(Path) Br Asthma COPD (Path+Pulmed) PUD-(Physio + Gen med +Path) IBD&IBS (Path) Tuberculosis Leprosy(Micro+Dermat) AIDS		Tuberculosis Leprosy AIDS Malaria	Myocardialinfarction Atherosclerosis Tuberculosis Leprosy AIDS Malaria

	Tuberculosis LeprosyAIDS Malaria	Acid peptic diseaseBone&Jointinf ectionMeningitisEnce phalitis STI	Malaria			Enteric feverViralhep atitis Acid peptic diseaseBone&Jointinf ectionMeningitisEnce phalitis STI
BLOCK 3	Diabetesmellitus Hepatitis(Sharing /Nesting)	Zoonoticdisease Hospitalacquired infection Nationalhealthprograms of communicablediseases	Endocrines Thyroid, DM, Osteoporosis(Path) Malaria, Kala azar,Ameobiasis, Helminthiasis(GenMed+Micro) HIV, UTI, STD (Micro)NHP(CM)		Diabetesmellitus Zoonoticdisease Hospitalacquiredinfection Nationalhealthprogramsofcommunicablediseases	Diabetesmellitus Zoonoticdisease Hospitalacquiredinfection Endocrines

NOTE - National days of importance for AIDS, Leprosy, Tuberculosis, Malaria, Mental health, Breast feeding promotion, World health day, etc. can be used to conduct full day integrationsessions forstudents

Beyondthesetopics,Institutions arefreetointegrate topicswithconcerneddepartments, whereverfeasiblewithin theMCIstipulations.

Minimumtwoofthesuggested topicsshouldbecoveredineachblock.

TOPICSFORVERTICALINTEGRATION

	COMPETENCY	
Number	Thestudentshould beableto	VerticalIntegration
PA26.4	Define and describe the etiology, types, pathogenesis, stages, morphology microscopic appearance and complications of tuberculosis – include other organs with Tuberculosis and slide-lobar pneumonia	General Medicine Microbiology
PA 24.5	Describe and etiology and pathogenesis and pathologic features of Tuberculosis of the intestine PA24.6 Describe and etiology and pathogenesis and pathologic and distinguishing features of Inflammatory bowel disease	Surgery
PA14.1 PA14.2	Describe iron metabolism Describe the etiology, investigations and differential diagnosis of microcytic hypochromic anemia	Physiology, Medicine
PA15.1 PA15.2 PA 15.4	Describe the metabolism of Vitamin B12 and the etiology and pathogenesis of B12 deficiency Describe laboratory investigations of macrocytic anemia distinguishing features of megaloblastic and non-megaloblastic macrocytic anemia	Physiology, Medicine
PA24.3	Describe and identify the microscopic features of peptic ulcer	Pharmacology
PA33.2	Classify and describe the etiology, pathogenesis, manifestations, radiologic and morphologic features and complications and metastases of bone tumors Bone Tumors- Osteoclastoma, Osteosarcoma.	Orthopaedics
PA28.1 PA28.5	Describe the normal histology of the kidney Define and classify glomerular diseases. Enumerate and describe the etiology, pathogenesis, mechanisms of glomerular injury, pathology, distinguishing features and clinical manifestations of glomerulonephritis PA28.6 Define and describe the etiology, pathogenesis, pathology, laboratory, urinary findings, progression and complications of IgA nephropathy	Nephrology
PA30.4	Classify and describe the etiology, pathogenesis, pathology, morphology, clinical course, spread and complications of ovarian tumors	OBG, Radiology
PA25.3	Describe the etiology and pathogenesis of viral and toxic hepatitis: distinguish the causes of hepatitis based on the clinical and laboratory features. Describe the pathology, complications and consequences of hepatitis	General Medicine, Microbiology, Biochemistry

Student needs to perform the following steps for OSPE

Blood group		
Sl No	**Steps**	**Marks awarded**
1	Take 1 or 2 slides and mark the slides appropriately	0.5
2	Take anti-sera and place according to the marking	1
3	Add a drop of blood to the anti-sera	0.5
4	Mix well	1
5	Look for the agglutination and interpret	2
Total		**5**

Preparation of peripheral smear		
Sl No	**Steps**	**Marks awarded**
1	Take a clean slide	0.5
2	Take a drop of blood and place it appropriately on the slide	0.5
3	The spreader slide is to be placed at an angle of 45^0 and moved back to make contact with the drop, spreading it evenly along the line of contact. Pull the spreader steadily to make a smear and label the slide	2
4	Smear needs to be tongue shaped and without any windows.	2
Total		**5**

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CERTIFIABLE SKILLS IN PATHOLOGY

Sl No	Competency to be certified with Competency number	No.required
1	Prepare peripheral blood smear. Identify Hemolytic anaemia (PA 16.6)	1
2	Interpret liver function tests and viral hepatitis serology panel. Distinguish obstructive and non obstructive jaundice based on clinical features and liver function tests (PA 25.6)	1
3	Identify the etiology of meningitis based on given CSF parameters (PA 35.3)	1

ANNEXURE I C

CERTIFICATION OF SKILL ACQUISITION IN PATHOLOGY

SL. NO	COMPETENCY NO	TOPIC	CERTIFICATION DATE	SIGNATURE OF FACULTY
1.	PA 16.6	Prepare peripheral blood smear. Identify Hemolytic anaemia		
2.	PA 25.6	Interpret liver function tests and viral hepatitis serology panel. Distinguish obstructive and non obstructive jaundice		

		based on clinical features and liver function tests		
3.	PA 35.3	Identify the etiology of meningitis based on given CSF parameters		

AETCOM MODULE

Competency addressed	PA 2.4
Name of the activity	Working in a healthcare team
Date completed	
***Attempt at activity**	
#Grading	
Initial of the faculty and date	
Feedback	
Initial of the learner	

*F

AETCOM MODULE

AETCOM module number-

Name of the module-

Date-Time-

Name of the facilitator-

Assessment method-

Write a summary of what you learnt in this session and its future implications

A – Excellent (exceeds expectation)

B – Good (Meets expectations)

C – Average (Satisfactory)

Signature of the student

Signature of thefacilitator

REFERENCES & RECOMMENDATIONS

1. Robbins &Cotran Pathologic Basis of Disease (Robbins Pathology) 9/ 10th Edition, Vinay Kumar MBBS MD FRC Path (Author), Abul K. Abbas MBBS (Author), Jon C. Aster MD PhD (Author)
2. **Robbins Basic Pathology (Robbins Pathology) 10th Edition.Vinay Kumar MBBS MD FRCPath (Editor), Abul K. Abbas MBBS (Editor), Jon C. Aster MD PhD (Editor)**
3. Robbins and Cotran Review of Pathology (Robbins Pathology) 5th Edition by Edward C. Klatt MD (Author), Vinay Kumar MBBS MD FRCPath (Author)
4. Robbins and Cotran Atlas of Pathology (Robbins Pathology)3rd Edition by Edward C Klatt MD (Author)
5. Essentials of Hematology, 3rd Edition, by Shirish M Kawathalkar.
6. Essentials of Clinical Pathology, 2nd Edition, by Shirish M Kawathalkar.
7. Text Book of Pathology, 8th Edition by Harsh Mohan.
8. Practical Pathology,4th Edition by Harsh Mohan.
9. Exam preparatory Manual for Under Graduates Pathology, 4th Edition, by RamdasNayak and RakshathaNayak.

CDSIMER
Dr. Chandramma Dayananda Sagar
Institute of Medical Education and Research
(Unit of Dayananda Sagar University)

Curriculum

Phase – II MBBS

MICROBIOLOGY

MINIMUM TEACHING HOURS

MCI No	Specific Learning Objective	Number of competencies	LECTURE	TUTORIAL /SGD	Practicals	SDL
MI1	General Microbiology and Immunity	11	16	8	15	3
MI2	CVS and Blood	7	9	9	5	1
MI3	Gastrointestinal and hepatobiliary System	8	10	4	5	0
MI4	Musculoskeletal system skinand soft tissue Infections	3	10	3	5	2
MI5	CentralNervous System Infections	3	6	7	3	1
MI6	Respiratorytract Infections	3	6	9	7	1
MI7	Genitourinary& Sexually transmitted infections	3	5	2	4	1
MI8	Zoonotic diseases andmiscellaneous	16	11	13	11	1
	TOTAL	**54**	**73**	**55**	**55**	**10**
	CBME Requirement		**70**	**110**		**10**

Syllabus (As per the "Competency based Undergraduate Curriculum for the Indian Medical Graduate2018: National Medical Council of India)

Number	COMPETENCY The student should beable to	Domain K/S/A/C	Level K/KH/SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certifyP	Vertical integration	Horizontal Integration
Topic: General Microbiologyand Immunity		**Number of competencies: (11)**			**Number of procedures that require certification : (01)**				
MI1.1	Describe the different causative agents of Infectious diseases+A208, the methods used in their detection, and discuss the role of microbes in health and disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
MI1.2	Perform and identify the different causative agents of Infectious diseases by Gram Stain,ZN stain and stool routine microscopy	S	P	Y	DOAP session	Skill assessment	5		
MI1.3	Describe the epidemiological basis of common infectious diseases	K	KH	Y	Lecture	Written/ Viva voce			Community Medicine
MI1.4	Classify and describe the different methods ofsterilization and disinfection. Discuss the application of the different methods in the laboratory, in clinicaland surgical practice	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
MI1.5	Choose the most appropriate method of sterilization and disinfection to be usedin specific situations inthe laboratory, in clinical and surgical practice	K	KH	Y	Small group discussion ,Case discussion	Written/ Viva voce/ OSPE		General Surgery	
MI1.6	Describe the mechanisms of drug resistance, and the methods of antimicrobial susceptibility testingand monitoring of antimicrobial therapy	K	K	Y	Lecture, group Small discussion	Written/ Viva voce			Pharmacology
MI1.7	Describe the immunological mechanisms in health	K	KH	Y	Lecture	Written/ Viva voce			Pathology
MI1.8	Describe the mechanisms of immunity and responseof the host immune system to infections	K	KH	Y	Lecture	Written/ Viva voce			Pathology
MI1.9	Discuss the immunological basis of vaccines and describe the Universal Immunization schedule	K	KH	Y	Lecture	Written/ Viva voce		Paediatrics	
MI1.10	Describe the immunological mechanisms in immunological disorder (hypersensitivity, autoimmune disorders and immunodeficiency states) and discuss the laboratory methods used in detection.	K	KH	Y	Lecture	Written/ Viva voce		Paediatrics	
MI1.11	Describe the immunological mechanisms of transplantation and tumor immunity	K	KH	Y	Lecture	Written/ Viva voce			

Topic: CVS and Blood		Number of competencies: (7)			Number of procedures that require certification :(NIL)				
MI2.1	Describe the etiologic agents in rheumatic feverand their diagnosis	K	KH	Y	Lecture, group Small discussion	Written/ Viva voce		General Medicine	Pathology
MI2.2	Describe the classification etio-pathogenesis, clinical features and discuss thediagnostic modalities of Infective endocarditis	K	KH	Y	Lecture, group Small discussion	Written/ Viva voce		General Medicine	Pathology
MI2.3	Identify the microbial agents causing Rheumatic Heart Disease & infective Endocarditis	S	SH	Y	DOAP session	Skill assessment		General Medicine	Pathology
MI2.4	List the common microbial agents causinganemia. Describe the morphology, mode of infection and discuss thepathogenesis, course treatment of the clinical course, diagnosis and prevention and commonmicrobial agents causing Anemia	K	KH	Y	Lecture, group Small discussion	Written/ Viva voce		General Medicine	Pathology
MI2.5	Describe the etio- pathogenesis and discussthe clinical evolution andthe laboratory diagnosis of kalaazar, malaria, filariasis and other common parasitesprevalent in India	K	KH	Y	Lecture, group Small discussion	Written/ Viva voce		General Medicine	Pathology
MI2.6	Identify the causativeagent of malaria and filariasis	K/ S	SH	Y	DOAP session	Skill assessment		General Medicine	
MI2.7	Describe the epidemiology, the etio-pathogenesis, evolution complications, opportunistic infections, diagnosis, prevention and the principles of management of HIV	K	KH	Y	Lecture, group Small discussion	Written/ Viva voce		General Medicine	Pathology
Topic: Gastrointestinal and hepatobiliary system		**Number of competencies: (8)**			**Number of procedures that require certification : (NIL)**				
MI3.1	Enumerate the dysenterymicrobial agents causingdiarrhea and dysentery. Describe the epidemiology, morphology, pathogenesis, clinical features and diagnostic modalities of theseagents	K	KH	Y	Lecture, group Small discussion	Written/ Viva voce		General Medicine, Paediatrics	Pathology
MI3.2	Identify the common etiologic agents of diarrhea and dysentery	S	zSH	Y	DOAP session	Skill assessment		General Medicine, Paediatrics	
MI3.3	Describe the enteric feverpathogens and discuss the evolution of the clinical course and the laboratory diagnosis of the diseases caused by them	K	KH	Y	Lecture, group Small discussion	Written/ Viva voce		General Medicine	Pharmacology, Pathology
MI3.4	Identify the different modalities for diagnosis of enteric fever. Choose the appropriate test related to the duration of illness	S	SH	Y	DOAP session	Skill assessment		General Medicine	Pathology

MI3.5	Enumerate the causativeagents of food poisoningand discuss the pathogenesis, clinical course and laboratorydiagnosis	K	KH	Y	Lecture, group Small discussion	Written/ Viva voce		General Medicine	Pharmacology
MI3.6	Describe the etio- pathogenesis of Acid peptic disease (APD) andthe clinical course. Discuss the diagnosis and management of thecausative agent of APD	K	KH	Y	Lecture, group Small discussion	Written/ Viva voce		General Medicine	Pharmacy, Pathology
MI3.7	Describe the epidemiology, the etio-pathogenesis and discussthe viral markers in the evolution of Viral hepatitis. Discuss the modalities in the diagnosis and preventionof viral hepatitis	K	KH	Y	Lecture, group Small discussion	Written/ Viva voce		General Medicine	Pathology
MI3.8	Choose the appropriatelaboratory test in the diagnosis of viral hepatitis with emphasis on viral markers	K	KH	Y	Lecture, group Small discussion	Written/ Viva voce		General Medicine	Pathology
Topic: Musculoskeletal systemskin and soft tissue infections		**Number of competencies: (3)**			**Number of procedures that require certification : (NIL)**				
MI4.1	Enumerate the microbialagents causing anaerobicinfections. Describe the etiopathogenesis and etiopathogenesis, clinicalcourse discuss the laboratory diagnosis of anaerobic infections	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	
MI4.2	Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of bone & joint infections	K	KH	Y	Lecture	Written/ Viva voce		Orthopaedics	
MI4.3	Describe the etio- pathogenesis of infections of skin and soft tissue and discuss the clinical course and the laboratory diagnosis	K	KH	Y	Lecture	Written/ Viva voce		Dermatology, Venereology & Leprosy, General Surgery	
Topic: Central Nervous Systeminfections		**Number of competencies: (3)**			**Number of procedures that require certification : (NIL)**				
MI5.1	Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of meningitis	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Pediatrics	Pathology
MI5.2	Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of encephalitis	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Pediatrics	Pathology
MI5.3	Identify the microbial agents causing meningitis	S	SH	Y	DOAP session	Skill assessment		General Medicine, Pediatrics	
Topic: Respiratory tractinfections		**Number of competencies: (3)**			**Number of procedures that require certification : (2)**				
MI6.1	Describe the etio- pathogenesis, laboratorydiagnosis and preventionof Infections of upper and lower respiratory tract	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	

MI6.2	Identify the common etiologic agents of upperrespiratory tract infections (Gram Stain)	S	SH	Y	DOAP session	Skill assessment		General Medicine	
MI6.3	Identify the common etiologic agents of lowerrespiratory tract infections (Gram Stain & Acid fast stain)	S	SH	Y	DOAP session	Skill assessment		General Medicine	
Topic: Genitourinary & Sexually transmitted infections		**Number of competencies: (3)**			**Number of procedures that require certification : (nil)**				
MI7.1	Describe the etio- pathogenesis and discuss the laboratory diagnosis of infections of genitourinary system	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
MI7.2	Describe the etio- pathogenesis and discuss the laboratory diagnosis of sexually transmitted infections. Recommend preventive measures	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Dermatology and OBG	
MI7.3	Describe the etio- pathogenesis, clinical features, the appropriate method for specimen collection, and discuss the laboratory diagnosis of Urinary tract infections	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
Topic: Zoonotic diseases and miscellaneous		**Number of competencies: (16)**			**Number of procedures that require certification : (01)**				
MI8.1	Enumerate the microbial agents and their vectors causing Zoonotic diseases. Describe the morphology, mode of transmission, pathogenesis and discuss the clinical course laboratory diagnosis course, and prevention	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
MI8.2	Describe the etio- pathogenesis of opportunistic infections (OI) and discuss the factors contributing to the occurrence of OI, and the laboratory diagnosis	K	KH	Y	Lecture	Written		General Medicine	Pathology
MI8.3	Describe the role of oncogenic viruses in theevolution of virus associated malignancy	K	KH	Y	Lecture	Written		General Medicine	Pathology
MI8.4	Describe the etiologicagents of emerging Infectious diseases. Discuss the clinical course and diagnosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Com Med.	
MI8.5	Define Healthcare Associated Infections(HAI) and enumeratethe types. Discuss thefactors that contributeto the development of HAI and the methodsfor prevention	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Com Med.	
MI8.6	Describe the basics ofInfection control	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Community Medicine
MI8.7	Demonstrate Infectioncontrol practices and use of Personal Protective Equipments (PPE)	S	P	Y	DOAP session	Skill assessment	3 each in (Hand hygiene & PPE)	General Surgery	Community Medicine
MI8.8	Describe the methods used and significance ofassessing the microbial contamination of food,water and air	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

MI8.9	Discuss the appropriatemethod of collection ofsamples in the performance of laboratory tests in the detection of microbial agents causing infectious diseases	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
MI8.10	Demonstrate the appropriate method of collection of samples in the performance of laboratory tests in the detection of microbial agents causing Infectious diseases	S	SH	Y	DOAP session	Skill assessment			
MI8.11	Demonstrate respect for patient samples sent to the laboratory for performance of laboratory tests in the detection of microbial agents causing Infectious diseases	A	SH	Y	DOAP session	Skill assessment			
MI8.12	Discuss confidentiality pertaining to patient identity in laboratory results	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
MI8.13	Choose the appropriate laboratory test in the diagnosis of the infectious disease	S	SH	Y	DOAP session	Skill assessment			
MI8.14	Demonstrate confidentiality pertaining to patient identity in laboratory results	A	SH	Y	DOAP session	Skill assessment		AETCOM	
MI8.15	Choose and Interpret the results of the laboratory tests used in diagnosis of the infectious diseas	K/S	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
MI8.16	Describe the National Health Programs in the prevention of common infectious disease (for information purpose only as taught in CM)	K	K	Y	Lecture	Written/ Viva voce			

TEACHING & LEARNING METHODS

TOPIC- GENERAL BACTERIOLOGY & IMMUNOLOGY MI 1.1-1.11

NO OF COMPETENCIES – 11

NO OF PROCEDURES REQUIRING CERTIFICATION – 01

Sl. No	LECTURES (10)	TUTORIALS/SGD (8)	SDL (3)	PRACTICAL (15)
1	**MI1.1.1** Introduction to infectious diseases and History	Microscopy - Types of microscopes, principles and applications of each	**MI1.7.2** immune system	Simple stain exercise and hanging frop demonstration
2	**MI1.1.2** Morphology &Physiology of Bacteria	**MI1.1.2.3** Culture Media	**MI1.7.3** Antigen& immunoglobulins	**MI1.1.2.3** Culture media and methods (including anaerobic)
3	**MI1.1.3** Introduction to virology	**MI1.1.2.4** Principles of lab diagnosis of infectious diseases – identification of bacteria (including biochemicaltests)	**MI1.10.4** Immunodeficiency	Identification of bacteria based on Biochemical tests
4	**MI1.1.4** Introduction to mycology	**MI1.3** Epidemiology & pathogenesis of Infectious diseases		**MI1.1.3** Demonstration ofViral Diagnostic methods - microscopy/culture/ immunological/ molecular
5	**MI1.1.5** Introduction to parasitology	Visit to CSSD		**MI1.1.4** Demonstration of Diagnostic methodsused in Fungal infections - microscopy/culture/ immunological/ molecular
6	**MI1.4.1** Sterilization & Disinfection - Physical methods	**MI1.5.1** Sterilization & Disinfection, Spaulding's classification, chemical methods		**MI1.1.5** Demonstration of Diagnostic methods used in parasitic infections - microscopy/culture/ immunological/ molecular; stool examination Exercise(1)
7	**MI1.6.1** Bacterial genetics (Bacteriophage)	**MI1.6.2** Principles and types of antibiotic susceptibility testing (Introduce MRSA, ESBL,MBL, VRE)		**MI1.2** Gram staining (1)
8	**MI1.7.1** Immunity	**MI1.9** Immunological basis of vaccine & Universal		**MI1.2** Gram staining (2)

		Immunization Schedule		
9	**MI1.7.4** Complement system			**MI1.2** Acid fast staining (1)
10	**MI1.7.5** Antigen-Antibody reactions			**MI1.2** Acid fast staining **(2)**
11	**MI1.8.1** Immune response - Humoral			**MI1.2** Stool examination (2)
12	**MI1.8.2** Immune response - cell mediated			**MI1.5** Physical methods of sterilization - Demo
13	**MI1.10.1** Hypersensitivity -1			**MI1.5** Identify the most appropriate method of sterilization /disinfection in the given case scenarios. Discuss the reason for choosing the method of sterilization /disinfection.
14	**MI1.10.2** Hypersensitivity - 2			**MI1.6.2** Antimicrobial susceptibility testing and interpretation – Disk diffusion Demo
15	**MI1.10.3** Autoimmunity			**MI1.7.5** Demonstration of types of Antigen Antibody reactions
16	**MI1.11** Immunology of transplantation & tumour immunity			

TOPIC – CVS & BLOOD MI 2.1-2.7

NO OF COMPETENCIES --- 07

NO OF PROCEDURES REQUIRING CERTIFICATION --- NILL

SL.NO	LECTURE (9)	TUTORIALS/SGD (9)	SDL (2)	PRACTICAL (5)
1	**MI2.1** Rheumatic fever -Microbial agent and pathogenesis, Lab diagnosis and management - Streptococcuspyogenes	**MI2.4** Anaemia (1)	Diphyllobothrium latum and Mansonella	**MI2.1AE** Rheumatic fever - Streptococci -ASLO
2	**MI2.2** Infectiveendocarditis	Case discussion- Hookworms, pathogenesis,clinical course, lab diagnosis, treatment and prevention	**MI2.5.4** Filarialworm	**MI2.3.1AE** Sepsis markers - CRP, Procalcitonin -Applied exercise
3	**MI2.3.1** Septicemia	Case discussion- Malaria with complication and reinforce life cycle, Babesiosis		**MI2.2AE** Infective endocarditis- (Viridans Streptococci, Coagulase negative Staphylococci)
4	**MI2.5** Parasites endemic to India-Classification, distribution and diseases burden	**MI2.5.3** Trypanasomes		**MI2.4** stool examination(3) (Hookworm)
5	**MI2.5.1** Malaria, mode of infection, pathogenesis, clinical course, lab diagnosis, treatment and prevention	**MI2.5.5** Schistosomes		**MI2.6** Demonstration of blood parasites - Plasmodia, Microfilaria **(smear)**
6	**MI2.5.2** Leishmania pathogenesis, clinical course, lab diagnosis, treatment and prevention	**MI2.7.2** Opportunistic infections - relevant to HIV/AIDS		**MI2.5.2,3** Demonstration of blood parasites - Leishmania, Trypanosomes (smear/picture
7	**MI2.7.1** HIV I	**MI2.7.4** NACO guidelines, strategies, pre-test counseling, post- test counseling		**MI2.7.3 AE** Serological diagnosis of HIV - ICT, ELISA, PCR
8	**MI2.7.3** HIV 2	**MI2.7.5** Modes of transmission, prevention		**MI2.7.3** Pre & Posttest counselling, Confidentaility (AETCOM - OSPE)

TOPIC: GASTROINTESTINAL & HEAPATOBILIARY SYSTEM MI3.1-3.8

NO OF COMPETENCIES -- 08

NO OF PROCEDURES REQUIRING CERTIFICATION – NIL

SL.NO	LECTURES (10)	TUTORIALS/ SGD (4)	SDL (0)	PRACTICAL (6)
1	**MI3.1.1** Introduction to gastrointestinal infections	**MI3.1.2** Diarrheagenic E.coli	**MI3.1.4** Antibiotic associated diarrohea	**MI3.1.2 ,3,5 AE** -3 Diarrheagenic E.coli, cholera, food poisoning Hanging drop preperation
2	**MI3.1.3** Cholera	**MI3.1.5** Viral diarhhea		**MI3.1.7 ,8,9** DOAP: Stool examination (3,4,5); Demonstration - Enatamoeba Giardia, Coccidia
3	**MI3.1.6** Bacillary dysentery	**MI3.1.9** Soil transmitted helminthic infections		**MI3.1.6** AE Bacillary dysentery
4	**MI3.1.7** Parasitic dysentery E.histolytica Balantidium coli	**MI 3.6** Overview of Acid peptic disorder		**MI3.4** AE – Lab diagnosis of Enteric fever 1st week-blood culture 2nd week widal test
5	**MI3.1.8** Parasitic Diarrhea in immunocompetent and immunocompromised			**MI3.7** AE Seromarkers of Hepatitis B, Hepatitis C
6	**MI3.3** Enteric fever			Applied bacteriology, virology and parasitology exercises in GIT
7	**MI3.5** Food poisoning			
8	**MI 3.7. 1** Enterically transmitted Viral hepatitis - Hepatitis A and E			
9	**MI 3.7. 2** - Hepatitis B			
10	**MI 3.7. 3** Hepatitis C and D			

TOPIC: INFECTIONS OF SKIN & MUSCULOSKELETAL SYSTEM MI 4.1-4.3

NO OF COMPETENCIES – 03

NO OF PROCEDURES REQUIRING CERTIFICATION – NIL

SL.NO	LECTURE (10)	TUTORIAL/SGD (3)	SDL (1)	PRACTICAL (4)
1	**MI4.1.1** Introduction to anaerobic infections	**MI4.1.6** Actinomycosis, Nocardia	**MI4.3.3a** Pox virus	**MI4.3.1** Gram stain exercise Gram stain of Cl.tetaniDemo) Demonstration of sample collection – (collection of pus)
				AE 3- 1. Cellulitis (Streptococcus pyogenes), 2.Surgical site infection, 3.Burns wound infection (Pseudomonas)
2	**MI4.1.2** Tetanus	**MI4.3.7** Cellulitis including diabetic foot		**MI4.2 AE** 1. Osteomyelitis 2. Infective arthritis
3	**MI4.1.5** Infections of Nonsporing anaerobes	**MI4.3.6** Tissue nematode infections of skin and soft-tissue		**MI4.3.2** ZN staining - Demonstration of slides of 1. M Leprae, preparation of Split Skin Smear demo (video)
4	**MI4.2** Bone & joint infections			**MI4.3.4,5** AE Dermatophytoses & Mycetoma collection of sample KOH mount, culture, Side culture; LPCB mount
5	**MI4.3** Introduction to skin and soft tissue infections			**MI4.3.3** AE - Viral exanthematous fever
6	**MI4.3.2** Leprosy, (Atypical mycobacteria affecting skin			
7	**MI4.3.3-** Herpes viruses			
8	**MI4.3.3a** Viral exanthematous infections			
9	**MI4.3.4** Superficial mycoses			
10	**MI4.3.5** Subcutaneous mycoses			

TOPIC: CENTRAL NERVOUS SYSTEM INFECTIONS MI5.1-5.3

NO OF COMPETENCIES – 03

NO OF PROCEDURES THAT REQUIRE CERTIFICATION: NILL

SL.NO	LECTURES (6)	TUTORIALS/SGD (7)	SDL (2)	PRACTICAL (3)
1	**MI5.1.1** Introduction to CNS infections	**MI5.1.2a** Pyogenic meningitis	Prevention of Polio and rabies	**MI5.2.7,8** Spotter – Polio vaccine, Hydatid cyst **MI5.2.8** AE 1.Rabies – using Negri body slide /photograph **MI5.2.12** 2.- Hydatid cyst, 3.Neurocysticercosis (specimen/CT scan picture) 4.cerebral malaria – peripheral smear- Pl.falciparum or ICT
2	**MI5.1.2** Pyogenic meningitis	**MI5.1.3** Chronic meningitis		**MI5.1.8,9,10** AE. Pyogenicmeningitis- Sample collection - CSF (Manequin) 1.Meningococcus, H.influenzae 2.Neonatal meningitis -Streptococcus agalctiae
3	**MI5.1.5** Fungal meningitis	**MI5.1.4** Aseptic meningitis - Viral causes		**MI5.1.13** **AE-** 3.Tubercular meningitis **MI5.1.16. AE** 4.Cryptococcal meningitis **MI5.2.11** **AE -** Cerebral abscess Anaerobes/ Staphylococcus /Nocardia/
4	**MI5.2.1** Viral encephalitis	**MI5.2.4** Slow viral infections		
5	**MI5.2.2** Polio	MI5.2.5 Parasitic meningitis and encephalitis Toxoplasmosis, cerebral malaria		
6	MI5.2.3 Rabies	**MI5.2.5** Parasitic meningitis and encephalitis Primary amoebic encephalitis		
7		**MI5.2.6** Infectious space occupying lesions of CNS		

TOPIC: RESPIRATORY TRACT INFECTIONS MI6.1-6.3

NO OF COMPETENCY - 03

NO OF PROCEDURES REQUIRE CERTIFICATION – 02

Sl.No	LECTURE (6)	TUTORIALS/SGD (9)	SDL (1)	PRACTICAL (7)
1	**MI6.1-6.4** Introduction to URTI - normal structure &protective mechanisms, etiology, pathogenesis, general lab diagnosis, treatment	**MI6.1.7&8** Community acquired pneumonia - Pneumococcus, H.influenzae	**MI6.1.9** HAP- staph, Legionella	**MI6.1.3 &4** **AE** Otitis Proteus,Aspergillus
2	**MI6.1.5** Diphtheria	**MI6.1.6** Whooping cough and croup B.pertusis, Parainfluenza		**MI6.1.5** **AE**-white patchin oral cavity - Albert stain,
3	**MI6.1.13** Viral pneumonia - Influenza viruses (Corona- COVID19)	**MI6.1.12** Viral lower respiratory infections - Adeno, RSV, EBV		**AE-** **CAP** S.pneumo, H.influenzae, K.pneumoniae **VAP** Acinetobacter
4	**MI6.1.15** Mycobacterium tuberculosis- class 1	**MI6.1.11** Atypical Pneumonia - Mycoplasma, Chlamydia, viral		**MI 6.2** AE Gram's staining - withhistory - otitis media, sinusitis
5	**MI6.1.16** Mycobacterium tuberculosis- class 2	Tb- lab diagnosis with diagnostic algorithm and treatment - integrated with Path, Pharmac		**MI 6.3.1,2,3AE** Gram's staining - sputum (pneumococcus, Klebsiella, quality of sample)
6	**MI6.1.18 & 19** Fungal infections oflower respiratory tract	**MI6.1.17** Atypical Mycobacteria		**MI6.3.4** Acid fast staining(4)
7		**MI6.1.21** Immunoprophylaxis of Respiratory infection		**MI6.3.4** Acid fast staining (5)
8		**MI6.1.20** General diagnosis of pulmonary parasitic infections- Lung flukes, Paragonimus		
9		**MI6.1.14** Pneumonia in immunocompromised		

TOPIC: GENITOURINARY & SEXUALLY TRANSMITTEDINFECTIONS

MI7.1-7.3

NO OF COMPETENCIES –- 03

NO OF PROCEDURES REQUIRING CERTIFICATION – NIL

Sl.no	LECTURE (5)	TUTORIALS/SGD (2)	SDL (1)	PRACTICAL (4)
1	**MI 7.1** Normal anatomy & infections of Genito urinary system-pathogenesis, general lab diagnosis	**MI 7.2.7** Prevention measures in STD	**MI 7.2.4** Nongonococcal urethritis including mycoplasma, Ureaplasma, Chlamydia	**MI 7.2.3** **AE** Discharge per vagina (differncebetween bacterial vaginosis & bacterial vaginitis), Urethral syndrome
2	**MI 7.2.1& 2.2** Pathogens causing ulcerative Lesions in the genital tract 1-Syphilis	**MI 7.2.10** Congenital infections		**MI 7.2.2** **AE**-ulcerative lesions in the external genitalia
3	**MI 7.2.2** Pathogens causing ulcerative Lesions in the genital tract 2 (Haemophilus ducreyi, LGV Calymmatobacterium granulomatis, Herpes Virus)			**MI 7.3** **AE** – UTI sample collection
4	**MI 7.2.3** Pathogens causing urethral discharge/ white discharge per vagina (Gonnorhoea, Candida, Trichomonas vaginalis, Bacterial vaginosis)			**MI 7.3.11** **AE** CAUTI
5	**MI 7.3** Urinary tract infections - E.coli, Klebsiella, Proteus, Enterococcus, others			

TOPIC- ZOONOTIC DISEASES & MISCELLANEOUS

(MI8.1-8.16)

NO OF COMPETENCIES –16

NO OF PROCEDURES REQUIRE CERTIFICATION --- 01

SL.NO	LECTURE (6)	TUTORIALS/SGD (9)	SDL (1)	PRACTICAL (11)
1	**MI8.1&1.1** Introduction to zoonotic infections,Anthrax	**MI8.1.2** Plague	ZoonoticTB, cat scratch disease, rat bite fever	**MI 8.1.3,4,5** **AE- PUO** Brucellosis leptospirosis **SEROLOGY** Brucella Agg LeptospirosisWeil Felix
2	**MI8.1.3** Brucellosis	**MI8.1.6** Viral hemorrhagic fevers - Yellow fever, Ebola, Roboviruses (Hanta, Arena), Lassa, Marburg		**MI8.1.6** **AE-**Lab diagnosis ofdengue, chikungunya
3	**MI8.1.4** Leptospirosis , Borreliosis	**MI8.1.8** Taeniasis, (Cysticercosis, partly covered in CNS) and (Hymenolepiasis)		**Mi8.1.8&9** Stool Examination (5)-larva of Strongyloides Demonstration of specimen Taenia adult worms,hydatid cyst & slide of hydatid cyst
4	**MI8.1.5** Rickettsial infections, Other zoonoses (Nontyphoidal Salmonellosis, Prions, Zoonotic mycoses)	**MI8.2** Introduction to opportunistic infections & viral opportunistic infections, candidiasis (Also covered in HIV-CVS MI2.7)		**MI8.2** **AE** Candidiasis Mucromycosis
5	**MI8.1.6** Arboviral infections-Classification, Spotted fever group, Dengue, Chukungunya, KFD, Gen Lab diagnosis; (Zikavirus)	**MI8.2** Opportunistic Intestinal parasitic infections - Cystisosporiasis, Cryptosporidiasis, Cyclosporiasis, Microsporidiasis and Strongyloidiasis, Giardia - (covered in GIT 3.3)		**MI8.7** Donning & doffing of PPE for a given situation - 1
6	**MI8.1.9** Hydatid cyst disease	**MI8.4** Emerging infections and bioterrorism		**MI8.7** Donning & doffing of PPE for a given situation - 2

7	**MI8.2** Zygomycosis	**MI8.5** Hospital Associated Infections (seminar)		**MI8.7** Donning & doffing of PPE for a given situation - 3
8	**MI8.3** Oncogenic viruses -HPV, HTLV (HBV, HDV,,EBV etc)	**MI8.6** Biomedical waste management		**MI8.6** 1.How to manage bio-spill in a simulated setting (AETCOM) 2. Advice a HCW with needle stick injury in complete and correct sequence in a simulated setting AETCOM 3. Segregate biomedical waste as per BMW2016 rules
9	**MI8.6** Antibiotic stewardship	**MI8.8** Food, water and air microbiology		**MI8.9** Collection of throat swab, nasopharyngeal swab peripheral venous blood for culture in simulated situation
10	**MI8.6** Infection control in hospitals- Principles, components and application; surveillance - standard & transmission based precautions, HICC	**MI8.9,10 & 11** Sample collection and transportation - (T/L opportunities - General micro/Individual systems /Together at the end as applied Micro practical classe**s**)		**MI8.9** Collection of wound swab and pus sample in simulated situation Instruct sample collection procedure (sputum, urine, stool, for culture)
11	**MI8.16** National health programs on infectious diseases - Integrated with PSM	**MI8.12** Discuss with help of case scenarios or role plays or videos: a. Request form or container with incomplete or wrong information b. Lost CSF sample c. Contaminated blood for culture d. Delayed submission of urine sample for culture e. Salivary sample for ZN stain		**MI8.9** Skin scraping, hair clippings and nail samples) collection procedure independently in a simulated setting (covered in skin) Demonstrating respect to patient samples -OSPE (AETCOM)

12		**MI8.14** Interaction with ICTC staff - AETCOM		
13		**MI8.15** Case based discussion - reflection confidentiality- Pt identity, lab results) - AETCOM		

PANDEMIC MANAGEMENT (Infection control)

- Define Standard precautions
- List the components of Standard precautions
- Describe the various transmission-based precautions.
- Describe the constitution and functions of HICC.
- Define Biomedical waste
  - Classify biomedical waste and describe methods of segregation, decontaminationand disposal of each type as per Biomedical waste management rule
  - Describe appropriate management of needle stick injury in healthcare setting
  - Manage bio-spill
  - Describe vaccines that are useful in healthcare workers

INNOVATIVE TEACHING METHODS

- Students will follow up the patients admitted in our teaching hospital to assess the therapeutic benefit received by them after Antibiotic sensitivity test report and correlate the report with the cases (ex- Staphylococcus aureus isolated in laboratory correlated with cases like abscess, folliculitis in surgery department).
- Antimicrobial Resistance (AMR): Orientation and Demonstration including Reading the Antibiotic sensitivity test & analysis of the same. And interpreting the isolate as MRSA, MSSA, ESBL and carbepenamase producer.
- Students shall visit CSSD to study the method of cleaning and sterilization of instruments.
- Students shall visit biomedical waste management section to understand practical application of the segregation, treatment and disposable of waste generated in the hospital.

CURRICULAR ENRICHMENT

- The students in the 2nd trimester of Phase II will be taken to the Molecular laboratory for giving the first hand exposure about PCR.
- Module work up: Module based teaching for HIV & AIDS, Meningitis and Hepatitis.
- Celebrating WHO health days: This will create awareness and educational activity will be performed by the students like role play, video making, model making, sports & microbiology, using “Do It Yourself (DIY) “concept.

TOPICS FOR INTEGRATION

Sl.No	Competency No	Topics	To be integrated with	Type of integration
1	MI1.7,1.10,1.11	Immunological mechanism in health, transplant rejection, cancer and immunological disorders	Pathology - PA7.5,9.1,9.3 Surgery-SU13.1,13.2	Pathology –Sharingand nesting Surgery- Sharing and nesting
2	MI18.13,18.15	Infectiousdisease & control measures	Community medicine-CM7.7,8.1	Community medicine – Sharing and nesting
3	MI13.7,13.8	Hepatitis	General medicine- IM5.4, 5.14,5.17Community medicine-CM3.3 Paediatrics-PE26.1,26.2,26.3	General Medicine -Sharing Nesting DOAP sessionBedside clinicCommunity Medicine - Sharing Paediatrics - sharing
4		Tuberculosis	Pathology - PA26.4 Pharmacology -PH1.45 General medicine- IM 3.7, 3.4.13, 4.14, 4.20, Paediatrics-PE34.1, 34.2, 34.3, 34.4, 34.5,34.6,34.7 Respiratory medicine-CT1.2, 1.3, 1.7	Pathology - Sharing Pharmacology - Sharing General medicine - nesting, sharing, Faculty presentation Bedside clinic, DOAP Session Paediatrics -Nesting, Sharing, Bedside clinic, faculty presentation
5		AIDS	Pathology - PA9.6 General medicine – IM 6.1, 6.2, 6.3, 6.4, 6.10, 6.17, 6.18, 6.19 Pharmacology - PH 1.48	Pathology-sharing Pharmacology – Faculty presentation General Medicine – Faculty presentation
6	MI2.5,2.6	Malaria	Pathology -10.1 General medicine - 4.6,4.15,4.23,4.26 Pharmacology - PH1.47	Pathology- Sharing/ Faculty presentation General medicine -Nesting/ faculty presentation , DOAP session Pharmacology-Sharing
7	MI15	Meningitis	Pathology-PA35.1,35.3 General medicine-IM17.7,17.8,17.9 Paediatrics-PE30.1,30.2,30.21	Pathology Nesting / sharing General medicine-DOAP Session, nesting Paediatrics- DOAP Session, nesting
8	MI1.6	Antimicrobials Rational use, Testing , resistances & antibiotic stewardship program	Pharmacology-PH1.43, General Medicine-IM3.3,13.12	Pharmacology- Sharing General Medicine- Bedside clinic, DOAP Session
9	MI14.3	Skin and soft tissue Infections - Dermatophytosis	Dermatology-DR6.1,7.1,7.2,8.1,9.1,12.715.2 15.3	Dermatology- Nesting/Sharing, Bed side clinic
10	MI14.2	Bone and soft tissue infections-Osteomyelitis	1.Pathology-PA33.1 2.Orthopaedics-OR3.1	Pathology Nesting/Sharing Orthopaedics - Nesting/Sharing
11		Vaccines & National immunization programme	2 Paediatrics PE19.1, 19.219.3, 19.4,19.5, 3. General medicine - IM3.19	Paediatrics- Nesting/Sharing General medicine- Sharing

12	MI13.2	Diarrheal disease	Pharmacology – PH1.47 General Medicine - IM16.1, 16.13, 16.8, 16.11, Community medicine - CM3.3 Paediatrics - PE24.1, 24.2, 24.6, 24.8	Pharmacology - Sharing General Medicine- Sharing/Nesting Community medicine-Nesting
13		Genitourinary tract infections and & Sexually transmitted disease	General surgery- SU29.3 Pharmacology-PH1.48 OBG Dermatology- DR10.6, 10.7, 10.8,11.111.211.3	General surgery- Sharing/ Nesting Pharmacology- Sharing Dermatology- Sharing ,bedside clinic
14	MI12.1,12.3	Infective syndromes of heart	Pathology - PA27.4,27.6,27.10 General medicine- IM1.3, 1.9, 1.221.27,3.11,25.9	Pathology-Sharing General medicine- Nesting, sharing, DOAP Session
15		Respiratory tract infections	Pathology-PA26.1,26.2,26.3 General medicine-IM3.1, 3.2, 3.3,3.7	Pathology - sharing General medicine - Sharing, DOAP Session
16	MI1.5	Sterilization and disinfection	General surgery - SU14.1	General surgery - Nesting

Note:

Beyond these topics, Institutions are free to integrate topics with concerned departments, whereverfeasible

CERTIFIABLE COMPETENCIES

It should be certified that the student is competent to perform the below skills independently without supervision.

SI. NO	NUMBER	COMPETENCY	Number required to certify
1	MI1.2	Perform and identify the different causative agents of Infectious diseases by Gram Stain, ZN stain and stool routine microscopy	**5**
2	MI6.2	Identify the common etiologic agents of upper respiratory tract infections (Gram Stain)	**3**
3	MI6.3	Identify the common etiologic agents of lower respiratory tract infections (Gram Stain & Acid fast stain)	**3**
4	MI8.7	Demonstrate Infection control practices and use of Personal Protective Equipment (PPE)	**3 each in (Hand hygiene & PPE)**

COMPETENCY DISTRIBUTION IN EACH BLOCK

MCI No	BLOCK WISE COURSE	Competencies	LECTURE	TUTORIAL/SGD	Practical	SDL
MI1	IST BLOCK	General Microbiologyand Immunoly	16	8	15	3
MI2	FEB to MAY	CVS and Blood	9	9	5	1
MI3	2nd BLOCK JUN to AUG	Gastrointestinal and hepatobiliary system	10	4	5	0
MI4		Musculoskeletal system skin and soft tissue infections	10	3	5	2
MI5		Central Nervous System infections	6	7	3	1
MI6		Respiratory tract infections	6	9	7	1
MI7		Genitourinary & Sexually transmitted infections	5	2	4	1
MI8	3rd BLOCK OCT to JAN	Zoonotic diseases and miscellaneous	11	13	11	1
			73	55	55	10
		CBME Requirement	70	110		10

Teaching Hours with Teaching Learning Methods

Teaching Learning Methods	Teaching Hours
Lectures	70 hrs
Practical	55 hrs
Small group teaching/Tutorials/Group Discussion	52hrs
Self-Directed Learning (SDL)	10 hrs
AETCOM	3 hrs
Activities: Quiz, role play at the end of the year	

DISTRIBUTON OF ATTITUDE ETHICS AND COMMUNICATION SKILLS(AETCOM) MODULE

SI NO	MODULE	TOPIC	DEPARTMENT	No. of hours	Formative assessment	Summative assessment
1	2.7	Bioethics- Case studies on patient autonomy and decision making (consent for surgical procedures)	Microbiology	5	**Yes**	**Yes**

RECOMMENDED LIST OF BOOKS

1. Apurba Sastry and Sandhya Bhat; Essentials of Medical Microbiology, 3rd Edition,2021
2. Ananthanarayan: (AnanthanarayanandJayaramPaniker's) Textbook of Microbiology, Et. & Orient Longmen Ltd., Chennai.
3. Textbook of Microbiology (Prof. C.P.Baveja) Arya publications New Delhi, Fourthedition.
4. Textbook of Microbiology (Dr. D.R. Arora) CBS publications New Delhi, thirdedition.
5. Jawetz (Melnick) et al, Medical Microbiology, ed Z Appleton and Lange, USA.
   Chatterjee (KDC), Parasitology, Chatterjee Medical Publishers, Clacutta
6. Chatterjee (KDC), Parasitology, Chatterjee Medical Publishers, Clacutta
7. Paniker (C.K.Jayaram), Text book of Medical Parasitology, Jaypee, New Delhi.
8. Textbook of Medical Parasitology by P. Chakraborthy new central book agency Ltd.Kolkata
9. Lippincott Illustrated Reviews Microbiology,South Asian Edition by Cynthia Nau Cornelissen, Marcia Metzgar Hobbs SAE editors Sumathi Muralidharan & Rohith Chawla As per CBME
10. Ananthnaryan & Panikar's Text Book of Microbiology 11th Edition. edited by Reba Kanungo
11. Basic Medical Microbiology Patric R Murray
12. Roitt's Essential Immunology Peter J ,Delves Seamus J. Martin Dennis R Burton Ivan M Roitt
13. K D Chatterjee Parasitology Protoazoology and Helminthology 13th edition 2019
14. C K Jayaram Panicker Panicker's text Book of Medical Parasitology 8Th edition
15. Text book of Medical parasitology by Subhash Chandra Parij

REFERENCE BOOKS

- Apurba Sastry and Sandhya Bhat; Essentials of hospital infection control 1st Edition,2019
- Mandell, Douglas,and Bennett's Principles and practice of Infectious diseases
- Harrison's principles of internal Medicine
- Green wood, Medical Microbiology, Ed-15 Churchill Livingstone.
- Roitt (Ivan.M), Essential Immunology, Ed.6, ELBS, Hong Kong.
- Mims (Cedric, Playfair) et al, Pathogenesis of Infectious diseases, Academic Press,London.
- Stites (Terr and Parslow), Medical Immunology, Appleton and Lange USA.
- Bailey and Scott, Diagnostic Microbiology, Mosby Publishers
- Mackie & Macartney – Vol II (Collee & Duguid) et al, Churchill Livingstone.
- Basic Laboratory Procedures in Medical Parasitiology, WHO.
- Basic Laboratory Procedures in Medical bacteriology WHO
- Essentials of clinical infectious diseases Willium F Wright
- APIC Text book of infection control & epidemiology