

# **DETAIL SYLLABUS OF HUMAN ANATOMY**

## **A. GENERAL ANATOMY**

### **I DESCRIPTIVE TERMS :**

Terms used for describing the position of the body, Anatomical planes, commonly used terms in Gross Anatomy, Terms used in Embryology, terms related to limbs, for hollow organs, for solid organs to indicate the side, for describing muscle, for describing movements.

### **II CONNECTIVE TISSUE :**

- i. Loose areolar tissue – definition function, sites where present.
- ii. Dense connective tissue- regular and irregular types. Definition, functions and sites where present
- iii. Ligaments, types and function, applied anatomy
- iv. Retinacula and Aponeuroses,
- v. Cartilage– Definition, Types, Structure, Distribution, Nutrition, histogenesis, growth of Cartilage, Cartilage Grafts,
- vi. Bone – Definition Nutrition and Morphological classification, distribution and functions of bone. Appendicular and Axial skeleton. Diaphysis, Metaphysis, Epiphysis, Types of epiphyses Primary centres, Law of ossification. Mechanical properties of bones. Effect of hormones on bony growth, Wolff's law, Surface topology of articular surfaces, Spin, Swing, shunt movements.

### **III GENERAL ARTHROLOGY :**

- i. Classification, Synarthrosis Amphiarthrosis, Diarthrosis Fibrous- Sutures, Syndesmosis, Gomphosis Cartilagenous - Primary, Secondary Synovial – Axis of movement, structure of typical synovial joints. Classification of synovial joints, according to the shape axes of movements and morphology Simple, Compound, Complex joints, Blood supply and nerve supply. Factors limiting range of

movement,

Kinesiologically: Sellar, Ovoid, Joint position: Loose-packed, Close-packed, Kinesiology, Body lever system.

- ii. BURSA, Structure, Functions, Types:  
Adventitious bursae - Housemaid's knee, Clergyman's knee, Student's elbow, Weaver's bottom, Porter's shoulder, Bursitis.

#### IV. GENERAL MYOLOGY :

Definition, types: Origin, insertion, Morphological classification Actions of muscles, nerve supply Functional classification, Prime movers, Fixators, Antagonists, Synergists, Number and diameter of fibres, Range of contraction, Active insufficiency, Passive insufficiency.

#### V. INTEGUMENT :

##### a) **Skin – Introduction:**

Types: Thick and Thin hairy skin, functions, innervation Surface area. Structure: Epidermis, Dermis, Clinical correlation, significance of Langer's lines, Tension lines, flexure lines, Appendages, Special sensory organs Skin grafts,

##### b) **Superficial Fascia**

Distribution of fat, functions

##### c) **Deep Fascia**

Features, Modifications, Functions

#### VI. GENERAL ANGIOLOGY :

- i. Arteries- Muscular, Elastic; Arterioles; Capillaries. Sinusoids. Veins- Anatomosis: End arteries; Vasa vasorum, nerve supply of bloodvessels, Ischaemia, Infarct Collateral circulation, Functional end arteries, Arteriosclerosis.
- ii. Lymphatic system Lymph vessels, Central lymphoid tissue, Peripheral lymphoid organs, Circulating lymphocytes - T and B lymphocytes, functions. Tissue transplantation – role of lymphoid tissue.

## VII. GENERAL NEUROLOGY :

Structure of nervous tissue, Neurons: Synapses : Structural types, functional types Classification of neurons - According to polarity and According to relative lengths of axons and dendrites. Neuroglia: Nerves  
– Cranial – Spinal, structure of typical spinal nerve  
Autonomic nervous system: Sympathetic ganglia, postganglionic fibres Sympathetic: Parasympathetic: Cranial outflow, sacral outflow.

## B.REGIONAL ANATOMY

### I. UPPER LIMB

**REGIONS:** Mammary gland, Axilla, Cubital fossa, Arm, Forearm, fascial spaces of the hand, relations and functional importance of individual structures, Dupuytren's contracture. Hand as a functional unit-grips, Nerve injury, carpal tunnel syndrome, Clavipectoral fascia; Salient features about carpals;

**ARTHOLOGY:** Shoulder girdle; Shoulder joint; Elbow: Radioulnar joints: Wrist; Carpometacarpal joint of thumb; Bones taking part Classification of joints, Movements with muscles causing movements, midcarpal joint, metacarpophalangeal joints, Interphalangeal joints Fall on the outstretched hand

**Axilla:**Collaterals Lymph nodes (breast) axillary sheath cervico-axillary canal, Abscess drainage, Palm: comparative anatomy (thumb, pmarisbrevis), position of rest and of function, fascial spaces: Surgical significance.

**OSTEOLOGY:** Identification; anatomical position; Parts of bones of upper limb, Joints formed; Development; identification of individual carpals in an articulated hand, muscle and ligament attachments.

**Clavicle:** Line of weight transmission, commonest site of fracture  
Humerus: fractures-Colles fracture, Smith's fracture  
Carpals, Metacarpals, Phalanges: Carpal tunnel syndrome, fracture scaphoid  
Surgical approaches, Subluxation of head of radius, carrying angle

**MYOLOGY :**

Muscles of upper limb, attachment, Nerve supply, Actions  
Applied aspects: Volkmann's ischaemic contracture  
Quadrangular and triangular spaces, triangle of auscultation

**ANGIOLOGY :**

Axillary, Brachial, Radial, Ulnar Arteries, veins, lymphatics  
Commencement, Termination, Main area of distribution and drainage, Anastomosis - Applied aspects, artery : Damage to vessels, Raynaud's disease, Veins: thrombosis, Lymphatics: Lymphangitis (red streaks), lymphadenitis.

**NEUROLOGY :**

**A. Nerves in details**

Axillary, median, ulnar, musculocutaneous, radial Origin, course, distribution, Root value, Applied anatomy.

**B. Plexus : Brachial**

Applied aspects: nerve injuries at various sites - Tendon reflexes- Winging of scapula, Erb's palsy, Klumpke's palsy, Crutch palsy, Saturday night palsy, ulnar paradox.

**II. LOWER LIMB**

**REGION:** boundaries, major contents; Gluteal region  
femoral triangle; Adductor canal, compartments of thigh, leg; Popliteal fossa, sole Arches of foot, gluteal IM injections, Femoral hernia Blood supply of head of femur; Fracture neck of femur, mechanics of movements of joints; hip and knee, trendelenberg's test; Knee joint; derangement, injuries to cruciate ligaments, menisci; (tear-bucket handle type); Ankle: Sprain Mechanism of venous return, varicose veins. Applied aspects of Adductor canal, Popliteal aneurysms.

**OSTEOLOGY:** Identification, regional bones, anatomical position ; parts, joints formed , for tarsals – identification of individual tarsals in an articulated foot and separately.

**Applied aspects:** Bony specialization for bipeds, walking and transmission of weight, Fracture, femoral torsion, neck shaft angle, bone grafts

**ARTHROLOGY:** Hip, knee, ankle, subtalar, Tibiofibular.

**Hip joint:** dislocation, congenital, traumatic, surgical approaches of joints (anatomical basis) : traumatic effusion, bursitis.

**MYOLOGY:** Attachments, nerve supply, actions of Muscles of lower limb, Calf pump, antigravity muscles.

**ANGIOLOGY:**

**Artery:** femoral, Profunda femoris, popliteal, dorsalis pedis, plantar arteries, commencement, termination, main area of supply, course, relations and applied

**Veins:** Venous drainage of lower limb, long and short Saphenous veins, Communication and valves. Varicose veins.

**Lymphatics :** Inguinal and Popliteal group of lymph nodes Intermittent claudication, clinical significance of anastomosis : around knee, venous thrombosis.

**NEUROLOGY**

- a. Plexus: Lumbar and sacral, Location, Formation, Distribution
- b. Nerves : Root value of sciatic, femoral, Obturator, tibial, common peroneal nerves; Origin, course, distribution; sciatica, foot drop sciatica.

### III. ABDOMEN

#### 1. ANTERIOR ABDOMINAL WALL

Rectus sheath, quadrants and regions, Testes, epididymis, spermatic cord, scrotum Surgical incisions of abdomen, types of inguinal herniae Peritoneum, Omentum, Omental Bursa, Epiploic Foramen, Testes: Morphology, blood supply, lymphatic drainage

#### SPERMATIC CORD

Definition, beginning, end, course and contents, coverings, Applied.

#### 2. ABDOMINAL ORGANS

Morphology, relations Blood supply, lymphatics, nerve supply and applied anatomy of following organs-Stomach, Spleen, Liver; Biliary Apparatus, Pancreas, Small Intestine, Large Intestine, Caecum and Vermiform Appendix, Kidneys, Ureters, Suprarenal Glands.

Peptic ulcer, Splenic circulation, splenic vascular segments, liver biopsy, Support of liver, Gall stones, duct system of pancreas, Surgical approach to kidney, stones (Renal), Ureter, Sites of constrictions, Hydronephrosis, pheochromocytoma Gastroscopy, Achlorhydria, Splenectomy, Liver transplant, Pancreatitis, diabetes, renal transplant, Stones in Ureter, Cushing's disease.

#### 3. PELVIC VISCERA:

Morphology, relations, Blood supply nerve supply and applied anatomy of urinary bladder and urethra, uterus, ovaries and uterine tubes, prostate, rectum and anal canal, urogenital diaphragm (ugd) Supports, micturition, stones in bladder, Ovarian cyst, enlargement, complications, fistula, Fissure, piles Cystoscopy, Tubectomy, Hysterectomy, cancer, supports of rectum.

#### 4. PERINEUM

Ischioanal fossa, pudendal canal, perineal spaces Urogenital diaphragm, Testis, Vas deferens male

urethra, penis, perineal pouches, Ischiorectal hernia, extra vasation of urine Vasectomy

**5. MYOLOGY**

Anterior abdominal wall, Rectus sheath, Psoas major, Quadratuslumborum, Thoracoabdominal diaphragm, pelvic diaphragm, Thoracolumbar fascia, perineal spaces and muscles Psoasabscess

**6. OSTEOLOGY**

Pelvis, Lumbar vertebrae, Sacrum, curvatures of vertebral columnPelvis - types  
Various diameters, identification of different lumbar vertebrae, anatomical basis of disc prolapse, nerve compression Sacralization, Lumbarization.

**7. ARTHOLOGY**

Movements of lumbar vertebrae, lumbosacral, sacroiliac, sacrococgeal joints.

**8. ANGIOLOGY**

Origin, course, termination, relations, branches and Applied anatomy of Portal vein Portosystemic communications in detail.  
Development Inferior Vena cava, Abdominal aorta, Internal iliac artery

**9. NEUROLOGY, LUMBAR PLEXUS, SACRAL PLEXUS**

**IV. THORAX**

**1. THORACIC WALL, THORACIC**

**INLETBoundaries and contents**

Thoracic Outlet, Boundaries and contents, muscles, Typical and Atypical intercostal space, Movements of respiration.

**2. MEDIASTINUM**

Divisions and major contents Mediastinitis, Mediastinoscopy Superior and Posterior Mediastina. List of Structures Boundaries andcontents:Superior mediastinal syndrome, Course, relations andbranches of aorta, area of drainage Coarctation of aorta,

aneurysm, developmental anomalies.

### 3. PLEURA

Pleural reflections, recesses, innervation  
importance of recesses pleural effusion

### LUNGS

Gross description including lobes, fissures and broncho pulmonary segments relations, blood supply, nerve supply  
Postural drainage, surgical importance, of  
bronchopulmonary segments, foreign body inhalation

### 4. PERICARDIUM AND HEART

Divisions of pericardium and sinuses  
referred pain Pericardial effusion

### HEART

Anatomical position, location, surfaces and borders,  
interior of all chambers, conducting system of heart;  
vessels of heart

Relations, nerve supply - patent foramen ovale, IV  
septum, over-riding aorta, referred pain, functional end  
arteries - coronaries PDA, Fallot's tetralogy, etc.

### 5. OSTEOLOGY

Identification and parts of Vertebrae, Ribs – Sternum,  
Vertebral column and curvatures of vertebral columns.  
Identification of T1, T9, T10, T11, T12, vertebrae and  
atypical ribs - 1, 2, 11, 12. relations, attachments,  
ossification Fracture ribs, flail chest, compression fracture  
of vertebra.

## v) HEAD-FACE NECK

### 1. REGIONS AND ORGANS, FASCIAE OF THE NECK TRIANGLES OF NECK DEEP FASCIA OF NECK

Spaces and spread of infections, axillary sheath, Relations  
of contents, Damage to accessory nerve, sialogram,  
approach to Submandibular gland, bidigital palpation of



submandibular gland, Dangerous area of face, squint surgical neck incisions, external jugular vein-air embolism, LN biopsy, JVP, pulse, Frey's syndrome.

### **GLANDS**

Thyroid, Parathyroid, Parotid, Submandibular, sublingual, Pituitary Morphology, capsule, relations, nerve supply, blood supply, Applied anatomy and Face Muscles, nerve supply - blood supply.

Scalp, Palate, Tongue, Larynx, Pharynx, Orbit, Infratemporal Fossa, Eyeball, Styloid Apparatus, Nasal Cavity, PTerygopalatine Fossa, Ear- Internal Ear, Middle, Ear, External Ear, Meninges.

## **2. OSTEOLOGY**

Identification, anatomical position, parts, foramina in the skull, structures passing through them, normabasalis, verticalis, frontalis, lateralis, occipitalis and interior of cranial cavity. Identification and side determination of separate bones.

Foetal skull; Mandible: Age changes Fontanellae, Dental formula Fractures of the skull, Age of dentition, cervical rib, disc herniation

## **3. ARTHROLOGY**

TM JOINT, Joints between cervical vertebrae Dislocation

## **4. MYOLOGY**

Sternomastoid, Digastric, Mylohyoid, Hyoglossus, Suprahyoid, Infrahyoid muscles, Muscles of facial expression, mastication, larynx, pharynx, tongue, palate and Extra-ocular muscles Relations, development, Nerve supply, actions Facial nerve palsy nerve injuries.

## **5. ANGIOLOGY ARTERIES**

Origin, parts, course, relations, branches of: Subclavian, Internal carotid, External carotid, Vertebral, Lingual, Superior thyroid, Facial, Maxillary Superficial temporal Sub-branches, distributions Subclavian steal syndrome, Subclavian-axillary anastomosis.

## **VEINS**

External and internal Jugular veins, venous drainage of face.

## **VENOUS SINUSES**

Names, locations, drainage, classification Emissary Veins, Cavernous Sinus, Lymphatic Drainage of Head Face Neck

## **6. NEUROLOGY**

Cranial nerves, Nuclei, course, relations, branches, distribution, reflex pathways and applied anatomy, PLEXUS: Cervical, Brachial, Parasympathetic Ganglia, Cervical Sympathetic Chain.

## **VI) NEUROANATOMY**

### **1. SPINAL CORD**

**Gross features:** Extent (child / adult), enlargements, conus medullaris, filum terminale, spinal meninges Tracts Ascending and Descending Spinal segments, vertebral correlation, significance of enlargements, nuclei of grey matter at upper and lower cervical, mid-thoracic, Lumbar and sacral levels Clinical correlation of lesions anomalies, lamination, syringomyelia, PID, tumours, TB, trauma, dislocation, myelography Transverse sections at the cervical, Thoracic, Lumbar and Sacral levels.

### **2. MEDULLA OBLONGATA**

**Gross features:** Motor decussation: Sensory decussation: Inferior olivary nucleus Cranial nerve nuclei, Tuber cinereum, pontobulbar body, Order of neurons, Details of nuclei and organization of white matter medullary syndromes-Bulbar palsy, increased ICT, Arnold- Chiari syndrome, malformations. Cross sections of Medulla at the level of motor decussation, sensory decussation, inferior olivary muscles.

### **3. PONS**

**Cross sections at the level of:**

Facial colliculus, Trigeminal nucleus

**General features:** Peduncles, Floor of the fourth ventricle  
Relations, Tumours, pontine haemorrhage

#### 4. CEREBELLUM

**Gross features:** Divisions, Lobes, relations, internal structure – connections of, cerebellar cortex and intracerebellar nuclei, white matter, Cerebellar Peduncles classification, Purkinje neuron, dysfunction, dysequilibrium, ataxia, hypotonia  
**Nuclei:** Names of nuclei and important connections  
**Peduncles :** Important tracts in the peduncles.

**Functions :** Of archicerebellum, paleocerebellum and neocerebellum

#### 5. MIDBRAIN

**General features :** relations, contents of interpeduncular cistern, connections of red nucleus. Weber's syndrome, Benedikt's syndrome

T.S. at inferior colliculus, TS at superior colliculus

#### 6. CEREBRUM

Cortex, White Matter, Basal Nuclei, Limbic Lobe  
Surfaces, borders, major sulci, gyri, poles, lobes, major functional areas, interior - gray and white matter  
Gray - cortex - granular / agranular, striate, Basal nuclei - names, White matter - classification with examples;  
Internal capsule and corpus callosum, Components of limbic lobe  
Handedness, Connections of limbic lobe

#### 7. DIENCEPHALON

Dorsal thalamus Epithalamus Metathalamus  
Hypothalamus Subthalamus  
Boundaries, parts, relations (gross), cavity, major nuclei, gross connections

#### 8. VENTRICULAR SYSTEM Lateral, IIIrd, IVth ventricles

Parts, boundaries, foramina, correlation with parts of brain  
Choroid fissure, recesses, Queckenstedt's test  
Hydrocephalus, VV shunt

## **9. BLOOD SUPPLY OF BRAIN**

Circle of Willis, arteries, veins blood brain barrier, Hemiplegia End arteries, CSF formation , subarachnoid space,

## **10. MENINGES**

Cerebral and spinal meninges, folds of dura, contents of subarachnoid spaces, arachnoid villi and granulations, direction of flow of CSF, lumbar puncture Cisterns, Definition, terminology, cisterna magna cisternal puncture, Queckensted's test, vertebral venous plexus, choroid plexus. Extracerebral and intracerebral communication, CSF block, Epidural space.

# **C) MICROANATOMY**

## **I) GENERAL HISTOLOGY**

### **1. MICROSCOPE**

Light microscope: Parts, magnification, resolution, Basics of Electron microscope Basics of Micro techniques, H and E staining

### **2. CYTOLOGY**

Cell, Cytoplasm and nucleus, Cytomembranes, Unit membrane, Cell organelles. Golgi apparatus, Endoplasmic reticulum, Protein synthesis Mitochondrial DNA, mitochondrial myopathy

Specialisations of cell surface, Sarcoplasmic reticulum of muscle, Primary and secondary lysosomes, residual bodies, Effect of colchicine and anticytotic drugs on spindles preventing mitosis, Endocytosis, exocytosis, movement of microvilli; Cell mitotic activity Lysosomal storage disease

### **NUCLEUS –**

Structure, nuclear envelope, chromatin, Barr body, nucleolus

### **3. EPITHELIUM**

Definition, Classification, Structure of various types and

subtypes of epithelia Nutrition, Renewal, Innervation  
Metaplasia; Surface modifications, Cilia; Microvilli;  
Stereocilia; Cell junction and junctional complexes;  
Glands, Classification; Unicellular and Multicellular;  
Exocrine, Endocrine, Amphicrine. Exocrine: Simple,  
Compound; Apocrine, Merocrine, Holocrine, Paracrine;  
Tubular, alveolar, tubuloalveolar; Serous; Mucous; Mixed  
Connective tissue, classification, structure, fibres, ground  
substance, loose areolar tissue, adipose tissue  
Glycosaminoglycans  
Scurvy, oedema, inflammation

#### **4. BONE AND CARTILAGE**

Bone, Compact, Cancellous, Developing bone;  
ossification, Woven, lamellar bone Cartilage,  
Classification, types, Perichondrium, functions Growth:  
Interstitial, Appositional; Bone callus, Osteomalacia,  
Osteoporosis, Osteoma Chondroma

#### **5. MUSCLE**

Skeletal muscle smooth muscle Cardiac muscle  
Intercalated disc, syncytium; Sarcomere, I and A bands,  
myofibrils, myofilaments,; Srcoplasmic reticulum  
Innervation, Red fibres, white fibres Hypertrophy,  
Hyperplasia, Rigor mortis, Myasthenia gravis

#### **6. NERVOUS TISSUE**

Neurons, types; Neuroglia, types; Myelinated nerve fibre  
LS; T.S. Non-myelinated nerve fibre; Peripheral nerve;  
Nodes of Ranvier; Synapses;

#### **7. VESSELS**

Large sized artery Medium sized artery, Arteriole;  
Capillary, Sinusoid; Medium sized vein; Atherosclerosis,  
Aneurysm, Infarcts, clotting

#### **LYMPHOID TISSUE**

T cells, B cells; Mucosa Associated Lymphoid Tissue;  
Humoral immunity, Cell mediated immunity; Lymph node  
section; Thymus, Spleen, Tonsil, Appendix

Blood-thymus barrier, Open and closed circulation in the spleen Organ transplantation, Graft rejection, Autoimmune disease.

## II) SYSTEMIC HISTOLOGY

Basic organization, salient features, Identification  
Structure and function correlation, individual features.

### 1. Integumentary system

Skin – Types; Epidermis and dermis; various cells,  
Appendages of skin, Sensory organs of skin  
Renewal of epidermis, Albinism, melanoma, Acne

### 2. ALIMENTARY SYSTEM

#### a) Oral tissues

Lip, Tongue, taste buds, Papillae; Tooth, Salivary glands  
Striated duct, ion transport.

#### b) GI Tract

Basic organization - 4 layers; Oesophagus with glands  
Stomach - Fundus, Chief cells, Parietal cells, intrinsic factor;  
Stomach – Pylorus. Duodenum Brunner's glands; Small intestine - with Peyer's patch, Appendix,  
Large intestine Pernicious anaemia, ulcer, gastritis, Hirschsprung's disease or megacolon.

#### c) Glands

Pancreas: Exocrine, islets of Langerhans; Liver,  
Hepatic lobule, portal lobule; portal acinus; Gall bladder  
Liver as an endocrine gland  
Diabetes mellitus, Cirrhosis of liver, liver regeneration, Cholestasis

### 3. RESPIRATORY SYSTEM

Epiglottis; Trachea, Lung, Bronchus, bronchiole,  
alveolar duct, sac, alveoli, pulmonary type I and II cells  
spirally arranged bronchial smooth muscle  
Bronchial asthma, Hyaline membrane disease, Heart failure cells

#### **4. URINARY SYSTEM**

Basic organization; Nephron - Parts, podocytes, Collecting system; Kidney - Cortex, Medulla Ureter; Urinary bladder, Spongy Urethra Juxtaglomerular apparatus

#### **5. MALE REPRODUCTIVE SYSTEM**

Basic organization; Gonads, Ducts, Accessory glands; Testis; Epididymis; Vas deferens; Prostate; Penis  
Stages of spermatogenesis Immotile sperm

#### **6. FEMALE REPRODUCTIVE SYSTEM**

Basic organization; Gonads, ducts, Accessory glands; Ovary - with corpus luteum; Fallopian tube; Uterus; Mammary gland Active, Passive, Placenta, umbilical cord  
Stages of maturation of ovarian follicle, Phases of menstruation Colostrum, IgA, Placenta : Maternal unit, Foetal unit, Umbilical cord: Wharton's Jelly

#### **7. ENDOCRINE SYSTEM: PITUITARY;**

ADENOHYPHYSIS; Neurohypophysis; Thyroid; Follicular, parafollicular cells; Parathyroid; Chief cells, oxyphil cells; Adrenal; Pancreas; Testis; Ovary  
Hypothalamo-pituitary Portal system Pheochromocytoma

#### **8. NERVOUS SYSTEM**

##### **A. Central**

Basic organization; Cerebrum; Cerebellum; Spinal cord; Cervical, Thoracic, Lumbar, Sacral,

##### **B. Peripheral**

Sensory ganglia; Autonomic ganglia (sympathetic ganglion); Peripheral nerve TS, LS.

#### **SPECIAL SENSES :**

- 1. Visual:** Three coats of Eyeball Cornea; Sclerocorneal junction; Canal of Schlemmn Lens; Retina; Optic nerve, Eyelid, Keratoplasty, eye donation, glaucoma, retinal

detachment

2. **Auditory:**  
Demonstration of Internal ear; Cochlea;  
Semicircular canals; Vestibule;
3. **Olfactory**  
Demonstration of olfactory mucosa
4. **Gustatory**  
Tongue with taste buds

## D) DEVELOPMENTAL ANATOMY

### I. GENERAL EMBRYOLOGY

- i. **Introduction:** Stages of human development, phylogeny  
Ontogeny, Viability,  
Terms of reference: e.g. Cranial, Rostral, Caudal, Dorsal,  
Ventral, Lateral, Medial, Median, Planes of section  
The law of recapitulation, "Critical period",  
malformations, USG, Amniocentesis Chorionic Villus  
Biopsy, Fetoscopy, etc Teratology History of Embryology
- ii. **Gametogenesis:** Cell division, Mitosis, Meiosis, Menstrual  
cycle other reproductive cycles, Spermatogenesis,  
Oogenesis , Germcell Transport and Fertilisation, Sperm  
capacitation, Methods of contraception, Sex determination  
Teratogenic influences; Fertility and Sterility, Surrogate  
motherhood; Social significance of "Sex-ratio",
- iii. **Cleavage,** Blastocyst, Cytotrophoblast,  
Syncytiotrophoblast Implantation: Normal sites,  
Abnormal sites; Placenta praevia, Extra- embryonic  
Mesoderm and Coelom; Bilaminar disc - Prochordal plate  
"abortion"; Decidual reaction, Chorionic Gonadotrop ins -  
Pregnancytest
- iv. **Primitive streak Notochord,** Trilaminar embryo, Neural



tube and its fate Neural crest cells- their fate, Development of somites, Intra- embryonic coelom, Foetal membranes :Chorionic villi, Amnion, Yolk sac, Allantois Umbilical cord

Congenital malformations, Nucleus pulposus, Sacrococcygeal teratomas, Neural tube defects, Anencephaly

Signs of pregnancy in the first trimester, Role of teratogens, Alpha-fetoprotein Levels

- v. **Folding of the embryo:** Derivatives of germ layers, Thalidomide baby, Estimation of Embryonic Age – Superfoetation and Superfoecundation
  
- vi. **Fetal membranes:** Formation, Functions, fate of: Chorion ;Amnion; Yolk sac; Allantois; Decidua; Umbilical cord; Placenta - Physiological functions; Foetomaternal circulation, Placental barrier, Twinning: monozygotic, dizygotic Placental hormones, Uterine growth, Parturition, Estimation of fetal age Types of cord attachments, Chorion villus biopsy and Amniocentesis; Uses of amniotic membranes, Trophoblastic tumours - Rh incompatibility, Haemolytic disease of newborn

## II. SYSTEMIC EMBRYOLOGY

- i) **Cardiovascular System** - Venous System; Heart - Chambers - Septa - Truncus - Aortic arches, Venous system, Inferior vena cava, Portal vein- Fetal circulation - Changes at birth, ASDs, VSDs, PDA, Fallot's Tetralogy. Veins, abnormalities, Surgical corrections
  
- ii) **The Respiratory System:** Development of Larynx, Trachea, Bronchi, Lungs; Tracheo-oesophageal Fistula Malformations Respiratory Distress Syndrome; Premature births

- iii) **The Alimentary System:** Foregut: Oesophagus, Stomach, (Lessersac); Duodenum - Hepatobiliary apparatus, Pancreas, Spleen, Portalvein; Midgut: Rotation and Fixation, Caecum and Appendix, Meckel's diverticulum; Hindgut : Cloaca; Rectum and Anal Canal Malformation – Tracheo - oesophageal fistulae; Congenital Hypertrophic Pyloric Stenosis; Atresia; Omphalocele, Hernia; Malformations - Fistulae, Situs inversus; Nonrotation; Mixed rotation of gut.
  
- iv) **The Urogenital System,** Development of Kidneys and Ureters; Cloaca – Urinary Bladder and Urethra; Suprarenal gland; Genital System - Testis and Ovary; Ducts and associated glands; External genital organs, Mesonephric and paramesonephric ducts, Uterine tube, Uterus and vagina  
Congenital malformations; Ambiguous genitalia and Hermaphroditism;  
Remnants and Vestiges of Ducts and Tubules.
  
- v) **Integument:** Development of mammary gland, skin and appendages
  
- vi) Pharyngeal arches, nerves, muscles, cartilage, development of face, palate, Pharyngeal pouches
  
- vii) **Endocrine :** Glands, Adrenal, Thyroid, Parathyroid, Pituitary
  
- viii) **The Nervous System:**  
Neural Tube: Spinal Cord and Brain i.e., Forebrain, Midbrain and Hindbrain, Hypophysis cerebri; Neural Crest: Peripheral Nervous System Correlation Spina bifida; Anencephaly, Hydrocephalus, glaucoma; Coloboma iridis Myelination of tracts shortening of spinal cord, Neural Tube Defects.

**Organs of The Special Senses - Eye and Ear**

**Eye-** Eye ball, optic nerve, cornea, lens, retina, Retinal detachment;  
**Ear -** Internal ear -; External and middle ear - anomalies of the Ear.

## **E) GENETICS**

- i) **Introduction** – Mendelism, Laws Genetic code  
Evolution, Eugenics and Polygenic inheritance,  
Radiation and mutation, Sex chromatin, Population  
genetics
- ii) **Cytogenetics**–  
Structure and function of chromosomes, Cell cycle, Cell divisions,
- iii) **Molecular genetics** (Normal)  
Gene, Genetic code, Structure and types of DNA, Structure of RNA
- iv) **Inheritance**: Single gene inheritance, Multifactorial in  
inheritance, Polygenic inheritance, Mitochondrial inheritance,  
Pedigree charts with symbols Autosomal and sex linked  
inheritance.

### **GENETIC BASIS OF VARIATION :**

Mutation, Polymorphism, Multiple allelism. Types, Factors influencing mutational load

### **DEVELOPMENTAL GENETICS :**

Chromosomes; Lyon's hypothesis; Hermaphroditism and pseudohermaphroditism; teratogenesis Gonadal dysgenesis, Adrenogenital syndrome Androgen insensitivity Genetic Counselling Pedigree charting.

### **CHROMOSOMAL BASIS OF DISEASE:**

Numerical, Structural abnormalities Down's, Cri-du-chat, Turner's, Klinefelter's syndromes Dermatoglyphics, Genetic Counselling.

### **CONCEPT OF PRENATAL DIAGNOSIS**

Maternal Serum Sampling; Fetal USG; Fetal Amniocentesis; Fetal Chorion Villus Sampling (cordocentesis); Foetoscopy Eugenics

## F) RADIOLOGICAL ANATOMY

### I) INTRODUCTION :

Principles of plain radiograms and CT scan. Identification of gross anatomical features in plain and contrast radiographs. *Identification of gross anatomical features in normal CT scan especially of the Thorax, Abdomen and Head- Face-Neck-Brain regions. Diagnostic procedures. Technical details (e.g. dye) are not necessary.*

<b>I) UPPER LIMB – X-Ray of</b>	<b>II) LOWER LIMB</b>
Shoulder region	Hip region
Arm	Thigh
Elbow region	Knee region
Forearm	Leg
Wrist and hand	Ankle region

<b>III) ABDOMEN</b>	<b>IV) THORAX</b>
Plain X-ray	Plain X-ray
Ba meal	Ba swallow
Ba meal follow through	Bronchogram
Ba enema	mediastinum
Oral cholecystogram	lung
Intravenous pyelogram	Heart
Cystogram	Pleural recesses
Ascending pyelogram	
Abdominal Aortogram	
Hystero-salpingogram	
Myelogram	

<b>V) HEAD-FACE</b>	<b>VI) NECK</b>
X-ray skull plain	Plain X-ray cervical region
Carotid angiogram	
Vertebral arteriogram	
Ventriculogram	

### CT, MRI OF WHOLE BODY

## **G) SURFACE ANATOMY**

### **H) SURFACE ANATOMY :**

#### **1. UPPER LIMB**

*(BONY) LANDMARKS (PALPATION OF) :*

*Clavicle, Spine of scapula, Inferior angle, Coracoid process, Epicondyles of humerus, olecranon process of ulna; Head and styloid processes of radius and ulna, Heads of metacarpals knuckles), Pisiform, Hook of Hamate, scaphoid, Anatomical snuff box.*

**NERVES :** *Mark, Ulnar nerve Ulnar nerve thickening in Leprosy*

**VESSELS :** *Mark Axillary artery, Brachial artery, Radial artery*

#### **2. LOWER LIMB**

*(BONY) LANDMARKS (PALPATION OF): Anterior superior iliac spine, Iliac crest, Tubercle of the iliac crest, Ischial tuberosity, Greater trochanter, Adductor tubercle, Head and neck of fibula, Lateral and medial malleoli, Tibial tuberosity, Subcutaneous surface of tibia, Patella*

**NERVES :**  
*Mark Sciatic, Tibial, Common peroneal, Femoral, Obturator Thickening of common peroneal nerve in Leprosy*

**VESSELS :**  
*Mark Femoral, Popliteal, Dorsalis pedis, Posterior tibial anterior tibial*

- *Femoral artery*
- *Femoral vein*
- *Femoral nerve*
- *Popliteal artery*
- *Posterior tibial artery*
- *Anterior tibial artery*
- *Dorsalis pedis artery*
- *Great saphenous vein*

### 3. **ABDOMEN**

**(BONY) LANDMARKS (PALPATION OF) :** *Anterior superior iliac spine, Pubic Tubercle, iliac crest*

#### **OTHERS:**

*Enlarged liver, spleen, kidneys, Abdominal quadrants and regions; Position of superficial and deep inguinal rings; Renal angle; Mc Burney's point;*

- *Marking of Plane and Quadrants*
- *Marking of coccaum*
- *Marking of appendix*
- *Marking of Abdominal Aorta*
- *Marking of Kidney*
- *Marking of inguinal ligament*
- *Saphenous opening*
- *Adductor tubercle*
- *Sciatic nerve*
- *Safe area for I. M injection*
- *Head, neck of fibula*
- *All bony prominences*

### 4. **THORAX (BONY) LANDMARKS (PALPATION OF) :**

*Sternal angle, Counting of rib spaces, locating thoracic spine*

#### **OTHERS :**

*Apex beat, Apices of the lungs, Triangle of auscultation Heart valves -*

- *Reflections of pleura with tracing*
- *Margins of lungs with borders*
- *Margins of pericardium*
- *Borders of heart*
- *Apex of lung*
- *Arch of Aorta*
- *Valve of heart –  
Tricuspid Bicuspid  
Semilunar*

### 5. **HEAD FACE NECK - (BONY) LANDMARKS**

**(PALPATION OF) :** *Nasion, Glabella, superciliary arches,*

*Inion, Mastoid process, Suprameatal triangle, Zygoma, Zygomatic arch, Angle of mandible, Head of mandible*

**OTHERS:**

*Thyroid gland, Cervical lymph nodes, (Horizontal and vertical), Midline structures in the neck.*

**c. HEAD FACE NECK**

*ORGANS: Parotid gland and duct Middle meningeal artery, facial artery Pterion, Bregma, Reid's base line, Suprameatal triangle Thyroid gland, Common carotid artery, External carotid artery, Internal carotid artery, Internal jugular vein, Trachea.*

**d. BRAIN**

*Sites of Lateral sulcus, Central sulcus, Median longitudinal fissure, Superior sagittal sinus, Sigmoid sinus, transverse sinus.*

*Topics Anatomy with radiology and Imaging in integrated teaching:*

<b>Sr. No</b>	<b>Topic</b>	<b>Faculty</b>	<b>Hrs</b>	<b>Session</b>
1	Introduction to imaging modalities	Radiology	1	Theory
2	Introduction to cross sectional anatomy	Anatomy	1	Theory
3	Sectional anatomy of upper limb	Anatomy	1	Practical
4	Sectional anatomy of lower limb	Anatomy	1	Practical
5	Imaging of anatomy of extremities	Anatomy	1	Practical
6	Sectional anatomy of thorax, abdomen	Anatomy	1	Practical
7	Imaging modalities of thorax and abdomen	Radiology	1	Theory
8	Introduction to Sono anatomy	Radiology	1	Theory
9	Sectional anatomy of Brain	Anatomy	1	Practical
10	Sectional Anatomy of neck and	Anatomy	1	Practical

0	face			l
1	Normal USG anatomy of abdomen and pelvis	Radiology	1	Practical

*All these hours will be adjusted in existing teaching hours after rescheduling of lectures and practical sessions.*

*Following value added sessions to enhance the competency of the MBBS students :-*

*1. Bioethics - 5 sessions in 1st MBBS*

*Language - During I and II MBBS Each session will be of one hour duration*



**MAPPING OF PROGRAMME OUTCOMES [POs] AND  
COURSE OUTCOMES [COs] OF MBBS  
PROGRAMMES**

<b>Programme Outcomes</b>	
<b>Programme Name: MBBS</b>	
<b>Subject Code:01010101</b>	
<b>Sr.No.</b>	<b>By the end of the programme, the MBBS Graduate will have /be:</b>
PO 1	Knowledge and Skills
PO 2	Planning and Problem-solving abilities
PO 3	Communication
PO 4	Research Aptitude
PO 5	Professionalism and Ethics
PO 6	Leadership
PO 7	Societal Responsibilities
PO 8	Environment and Sustainability
PO 9	Lifelong Learner

<b>Course Outcomes and Mapping with Programme Outcomes</b>	
<b>Year I</b>	
<b>Course Code</b>	<b>Course Title</b>
<b>01010101</b>	Human Anatomy
<b>01010102</b>	Human Physiology
<b>01010103</b>	Human Biochemistry

<b>Human Anatomy (01010101)</b>		
<b>CO No.</b>	<b>At the end of the course, the learners should be able to :</b>	<b>Mapped Programme Outcomes</b>
CO 1	Comprehend normal position and clinically relevant interrelationships and cross- sectional anatomy of various structures of the body	PO1, PO4, PO5, PO7, PO9
CO 2	Identify the microscopic structure and correlate elementary ultra-structure of various organs and tissues and understand various functions as a prerequisite to altered state in disease process	PO1, PO4, PO5, PO9
CO 3	Comprehend basic structure and connections of central nervous system to analyze the integrative and regulatory functions of organs and system Shall be able to locate the site of gross lesions in central nervous system according to deficits encountered	PO1, PO4, PO5, PO9
CO 4	Demonstrate knowledge of principles and sequential development of organ system. Recognize critical stages of effect of teratogens and genetic mutations	PO1, PO4, PO5
CO 5	Identify and locate all the structures of the body and mark topographically in a subject /cadaver	PO1, PO4, PO5, PO9
CO 6	Identify organs and tissues under microscope	PO1, PO5
CO 7	Understand principles of karyotyping and genetic mutations in major developmental anomalies	PO1, PO9
CO 8	Identify the structures on X-ray, CT and MR images Understand anatomical basis for safe conduct of common clinical procedures	PO1,

01010101.09	Develop respect to the human cadaver, empathy towards diseased and sense of gratification for the voluntary body donors and their families	PO1, PO5, PO6, PO7, PO8, PO9
-------------	--	---