DPU

Dr. D. Y. PATIL VIDYAPEETH, PUNE

(DEEMED UNIVERSITY)

SYLLABUS
for
I - MBBS
(Pre - Clinical Subjects)

2014-15

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HUMAN ANATOMY SYLLABUS

1.1 Goal :

The broad goal of the teaching of undergraduate students in Anatomy aims at providing comprehensive knowledge of the gross and microscopic structure and development of human body so also basic knowledge of genetics to provide a basis for understanding the clinical correlation of organs or structures involved and the anatomical embryological & genetic basis for the disease presentations

1.2 Objectives :

1.2.1 Knowledge ; At the end of the course the student shall be able to

I) Comprehend the normal disposition, clinically relevant interrelationships functional and cross sectional anatomy of the various structures in the body .

II) Identify the microscopic structure and correlate elementary ultra structure of various organs and tissues and correlate the structure with the functions as a pre- requisite for understanding the altered state in various disease processes

III) Comprehend the basic structure and connections of the central nervous system to analyse the integrative and regulative functions of the organs and systems . He/she shall be able to locate the site of gross lesions according to the deficits encountered.

IV) Demonstrate Knowledge of the basic principles and sequential development of the organs and systems , recognize the critical stages of development and the effects of common teratogens , genetic mutations and environmental hazards. He/ she shall be able to

explain the developmental basis of the major variations and abnormalities & genetic basis of different in inherited conditions.

1.2.2 Skills : At the end of the course student shall be able to –

I) Identify and locate all the structures of the body and mark the topography of the living anatomy.

II) Identify the organs and tissues under the microscope.

III) Understand the principles of Karyotyping, genetic mutation and identify the gross congenital anomalies.

IV) Understand principles of newer imaging techniques and interpretation of CT scan, sonogram etc.

V) Understand clinical basis of some common clinical procedures i.e. intramuscular and intravenous injection, lumber puncture and kidney biopsy, liver biopsy etc.

1.2.3 Integration:

From the integrated teaching with other basic sciences, student shall be able to comprehend the functions of the organs and systems in the body, with their structures so as to understand the correlation & interpret the anatomical basis of disease process.

1.3 Detailed study of Human anatomy is given under following heads.

A. General anatomy

B. Regional Anatomy

I. Upper Limb
II. Lower Limb
III. Abdomen with pelvis & perineum
IV. Thorax
V. Head, Face, Neck
VI. Spinal cord & Brian

C. Micro-Anatomy

I. General Histology
II. Systemic Histology

D. Developmental anatomy

I. General Embryology
II. Systemic Embryology

E. Genetics

F. Radiological Anatomy, USG, CT, MRI

G. Surface Anatomy, Living

Internal assessment & University Exam pattern, Theory & Practical Books recommended

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 & irregular types. Definition, functions & sites where present

iii. Ligaments, types & function , applied anatomy

iv. Retinacula & Aponeuroses -,

v. Cartilage – Definition, Types, Structure, Distribution, Nutrition histogenesis, growth of Cartilage, Cartilage Grafts,

vi. Bone – Definition Nutrition & Morphological classification, distribution and functions of bone. Appendicular & 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

III GENERAL ARTHROLOGY

i. Classification, Synarthrosis Amphiarthrosis, Diarthrosis

Fibrous- Sutures, Syndesnosis, Gomphosis

Cartilaginous- 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,& Thin hairy skin, functions, innervations 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 blood vessels, Ischaemia, Infarct Collateral circulation, Functional end arteries, Arteriosclerosis

ii. Lymphatic system Lymph vessels, Central lymphoid tissue, Peripheral lymphoid organs, Circulating lymphocytes - T & 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, Forearam, 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, pamaris brevis), position of rest and of function, fascial spaces: Surgical significance

OSTEOLOGY

Identification; anatomical postion; Parts of bones of upper limb, Joints formed; Development; identification of individual carpals in an articulated hand)

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, triange of auscultation

ANGIOLOGY
Axillary, Brachial, Raidal, Ulanar Arteries, veins, lymphatics
Commencement, Termination, Main area of distribution and drainage, Anastomosis- Applied aspects, artery : Damage of vessels, Raynaud's disease, Veins: thromobosis, 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 jont; 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: Indentification, regional bones, anatomical position ; parts, joints formed , for tarsals – identification of individual tarsals in an articulated foot & 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, congentital, 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 & applied
Veins: Venous drainage of lower limb, long and short Saphenous veins, Communication and valves. Varicose veins
Lymphatics : Inguinal & 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, vasectomy

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 & applied anatomy of

Urinary Bladder & Urethra, Uterus, Ovaries and Uterine Tubes, Prostate, Rectum and Anal Canal, Urogenital Diaphragm
Supports, micturition, stones in bladder, Ovarian cyst, enlargement, complications, fistula, Fissure, piles
Cystoscopy, Hysterectomy, cancer, supports of rectum

4. PERINEUM

Ischiorectal fossa, pudendal canal, perineal spaces Urogenital diaphragm, male urethra, penis, perineal pouches, Ischiorectal hernia, extra vasation of urine

5. MYOLOGY

Anterior abdominal wall , Rectus sheath, Psoas major, Quadratus lumborum, Thoracoabdomoinal diaphragm, pelvic diaphragm, Thoracolumbar fascia, perineal spaces & muscles
Psoas abscess

6. OSTEOLOGY

Pelvis, Lumbar vertebrae, Sacrum, curvatures of vertebral column
Pelvis - 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, sacrococcgeal joints

8. ANGIOLOGY

Origin, course, termination, relations, branches & Applied anatomy of Portal vein
Portasystematic communications
Portasystematic communications in detail: Development
Inferior Vena cava, Abdominal aorta, Internal iliac artery

9. NEUROLOGY, LUMBAR PLEXUS, SACRAL PLEXUS

IV. THORAX

1. THORACIC WALL, THORACIC INLET

Boundaries & contents

Thoracic Outlet, Boundaries & contents, muscles, Atypical intercostals space, Movements of respiration.

2. MEDIASTINUM

Divisions & major contents

Mediastinitis, Mediastinoscopy

Superior & Posterior Mediastina. List of Structures

Boundaries & contents:

Superior mediastinal syndrome, Course, relations and branches 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 bronchopulmonary segments

relations, blood supply, nerve supply

Postural drainage, surgical importance, of bronchopulmonary segments, foreign

body inhalation

4. **PERICARDIUM & 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 & **FACE** Muscles, nerve supply - blood supply
Scalp, Palate, Tongue, Larynx, Pharynx, Orbit, Infratemporal Fossa, Eyeball, Styloid Apparatus, Nasal Cavity, Terygopalatine Fossa Ear, Internal Ear, Middle, Ear, External Ear, Meninges

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

with important features and foramina, cervical vertebrae and curvatures of vertebral column.
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

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 & 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 & lower cervical, mid-thoracic, Lumbar & sacral levels Clinical correlation of lesions anomalies,lamination, syringomyelia, PID, tumours, TB, trauma, dislocation, myelography

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, malformation,

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 & 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 & 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, VA 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 & 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

4. Connective tissue, classification, structure, fibres, ground substance, loose areolar tissue, adipose tissue

Glycosaminoglycans
Scurvy, oedema, inflammation

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

6. **Muscle**
Skeletal muscle Plain muscle Cardiac muscle Intercalated disc, syncitium; Sarcomere,I and A bands, myofibrils, myofilaments,; Srcoplasmic reticulum

Innervation, Red fibres, white fibres
Hypertrophy, Hyperplasia, Rigor mortis, Myasthenia gravis

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

8. **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
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, Developing 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, Chalones

3. **Respiratory system**
   Olfactory mucosa; 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; Adenohypophysis; Neurohypophysis; Thyroid; ollicular, 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

Special senses

1. **Visual:** Three coats of Eyeball Cornea ; Sclerocorneal junction ; Canal of Schlemm; 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

1. **Introduction:** Stages of human life, phylogeny
   Ontogeny, Trimester, 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
2. **Gametogenesis**: Cell division, Mitosis, Meiosis, Menstrual cycle other reproductive cycles, Spermatogenesis, Oogenesis , Germ cell Transport and Fertilisation, Sperm capacitation, Methods of contraception, Sex determination
   Teratogenic influences; Fertility and Sterility, Surrogate motherhood; Social significance of “Sex-ratio”,

3. **Cleavage**, Blastocyst, Cytotrophoblast, Syncytiotrophoblast
   Implantation: Normal sites, Abnormal sites,; Placenta praevia, Extra-embryonic
   Mesoderm and Coelom; Bilaminar disc - Prochordal plate "abortion"; Decidual reaction, Chorionic Gonadotropins - Pregnancy test

4. 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, Alphafetoprotein
   Levels

5. **Folding of the embryo:** Derivatives of germ layers,
   Thalidomide tragedy, Estimation of Embryonic Age - Superfoetation & Superfoecundation

6. **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, (Lesser sac); Duodenum - Hepatobiliary apparatus, Pancreas, Spleen, Portal vein; 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 & 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 iris
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 inheritance, Polygenic inheritance, Mitochondrial inheritance, Pedigree charts with symbols Autosomal & 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, *Cridu-*
chat, Turner's, Klinefelter's syndromes

Dermatoglyphics
Genetic Counselling

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.

Estimation of age if epiphyseal line seen.

II) UPPER LIMB – X-Ray of
Shoulder region
Arm
Elbow region
Fore arm
Wrist and hand

III) LOWER LIMB
Hip region
Thigh
Knee region
Leg
Ankle region

IV) ABDOMEN
Plain X-ray
Ba meal
Ba meal follow through
Ba enema
Oral cholecystogram
Intravenous pylogram
Cystogram
Ascending pyelogram
Abdominal Aortogram
Hystero-salpingogram
Myelogram

V) THORAX
Plain X-ray
Ba swallow
Bronchogram
mediastinum
lung
Heart
Pleural recesses

VI) **HEAD-FACE**
X-ray skull plain
Carotid angiogram
Vertebral arteriogram
Ventriculogram

NECK
Plain X-ray cervical region

CT, MRI OF WHOLE BODY

G) LIVING SURFACE ANATOMY

I) LIVING ANATOMY:
1. Upper Limb
(BONY) LANDMARKS(PALPATION OF):

Clavicle, Spine of scapula, Inferior angle, Coracoid process, Epicondyles of humerus, lecranon process of ulna; Head and styloid processes of radius and ulna, Heads of etacarpals knuckles), Pisiform, Hook of Hammate, scaphoid, Anatomical snuff box

JOINTS (DEMONSTRATION OF MOVEMENTS):
Shoulder girdle, Shoulder joint, Elbow joint, Radio-ulnar joints, Wrist joint, 1st
carpo-metacarpal joint, MP and IP joints

MUSCLES (DEMONSTRATION OF ACTION)

Principle of testing: Trapezius, Serratus anterior, Latissimus dorsi, Pectoralis major, Deltoid, Biceps Brachii, Brachioradialis, Brachialis, Extensors at the elbow, Flexors of elbow
Supinators, Wrist extensors, Wrist flexors, Small muscles of the hand

NERVES: Dermatomes, Ulnar nerve
Ulnar nerve thickening in Leprosy

VESSELS (PALPATION OF): Axillary artery, Brachial artery, Radial artery

OTHERS: Axillary groups of lymph nodes; Anatomical snuff-box (boundaries& contents)

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

JOINTS (DEMONSTRATION OF MOVEMENTS): Hip , Knee , Ankle , Subtalar Joints
MUSCLES (DEMONSTRATION OF ACTION): Hip-Flexors, Extensors, Abductors, Adductors

Knee: Flexors, Extensors,
Ankle: Dorsiflexors, Plantar flexors

Subtalar: Invertors, Evertors

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

VESSELS (PALPATION OF): Femoral, Popliteal, Dorsalis pedis, Posterior tibial anterior tibial

OTHERS: Ligamentum patellae, Inguinal lymph nodes

TENDONS: Semitendinosus, Semimembranosus, Biceps femoris, Iliotibial tract Tendo achillis

3. ABDOMEN
(BONY) LANDMARKS (PALPATION OF): Anterior superior iliac spine, Pubic
Tubercle, iliac crest

JOINTS (DEMONSTRATION OF MOVEMENTS): Intervertebral
MUSCLES (DEMONSTRATION OF ACTION): Obliques, Transversus abdominis,
Rectus abdominis

NERVES: Dermatomes

OTHERS: Enlarged liver, spleen, kidneys, Abdominal quadrants and regions;Position of superficial and deep inguinal rings; Renal angle; McBurney's point;

Murphy's sign

4. THORAX (BONY) LANDMARKS(PALPATION OF): Sternal angle, Counting of rib spaces, locating thoracic spines

JOINTS (DEMONSTRATION OF MOVEMENTS): Intervertebral

MUSCLES (DEMONSTRATION OF ACTION): Respiratory movements
NERVES: Dermatomes
OTHERS: Apex beat, Apices of the lungs, Triangle of auscultation Heart valves

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

JOINTS (DEMONSTRATION OF MOVEMENTS): Temporomandibular joint, Atlanto axial, Atlanto occipital joint

MUSCLES (DEMONSTRATION OF ACTION): Of Mastication, Of Facial Expression

Cranial nerves (I to XIII) testing

(PALPATION OF): Superficial temporal artery, Facial artery, common carotid artery
(PALPATION OF**):** Symphysis menti, Hyoid bone, Thyroid cartilage, Cricoid
cartilage, Tracheal rings, Suprasternal notch, Transverse process of atlas, Spine of C7
(DEMONSTRATION OF MOVEMENTS): Atlanto-occipital joint, Cervical joints

(DEMONSTRATION OF ACTION): Sternocleidomastoid, Neck flexors and Extensors

(PALPATION OF): Common carotid artery, External carotid artery

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

ORGANS: a. Abdomen – 9 regions and projection of organs in them; Stomach, Duodenum, Caecum, Appendix, Ascending , Transverse and

descending colon, Pancreas, Liver, Gall bladder, Spleen, Kindneys (ventral and dorsal)

Abdominal aorta

b. THORAX

Heart and valves, Lungs, fissures and Hilum;Pleurae, Trachea

c. HEAD FACE NECK

ORGANS: Parotid gland & duct
Middle meningeal artery, facial artery
Pterion, Bregma, Reid's base line, Superameatal triangle
Thyroid gland, Common carotid artery , External carotid artery , Internal carotid artery, Internal jugular vein, Tachea

d. BRAIN

Sites of Lateral sulcus, Cental sulcus, Median longitudinal fissure, Superior sagittal sinus, Sigmoid sinus, transverse sinus

H) UNIVERSITY EXAMINATION PATTERN

I) Theory Examination Pattern (In Anatomy)

ANATOMY PAPER 1-includes gross anatomy, systemic histology and systemic embryology of the region **above diaphragm**.

ANATOMY PAPER 11-Includes gross anatomy & development of respiratory diaphragm , gross anatomy systemic histology and systemic embryology of the region **below diaphragm**. It also includes General histology, General embryology, general anatomy & genetics.

NATURE OF EACH QUESTION PAPER

Subject	Group	Duration	Question Paper Pattern	Marks
Anatomy	50 Marks	2Hrs. 30min.	**a)Sec-A(26)** Q.1 One line answer questions Answer any 10 out of 12 Q.2 Long answer question Answer any 2 out of 3 **b)Sec-B-(24)** Q.3 Short answer questions 3.(a) -PBL question- compulsory 3.(b) -any 7 out of 9	**10x1=10** **2x8=16** **8x3=24** **1x3=3** **7x3=21** **Total =50**

Practical

Practical - 40 marks

Histology spotting – 10 slides - 5 marks
Slide discussion – 1 slide - 5 marks
Soft parts above diaphragm - 10 marks
Soft parts below diaphragm - 10 marks
Living Surface Anatomy & Radiology - 10 marks

Viva - 20 marks

Osteology - Axial skeleton - 10 marks
Appendicular skeleton - 5 marks
Embryology models - 5 marks
Passing 50% separately for Theory & Practical

Internal Assessment Tests

I. Ist Continuous Assessment Test – 20 marks

II . IInd Continuous Assessment Test – 20 marks

III. Terminal - Theory Viva Practical
Marks 60 20 40
Portion – Complete portion for the term

IV. IIIrd Continuous Assessment Test – 20 marks

V. Prelims - Theory Viva Practical
Marks 100 20 40
Portion – Whole

PATTERN OF INTERNAL ASSESSMENT EVALUATION

Internal assessment -3 continuous assessment tests in addition to Terminal & Preliminary Examinations will be conducted. For calculation of Internal Assessment, marks of 2 best tests out of 3 continuous assessment tests will be considered. Internal Assessment will be as follows:

	Theory	**Viva**	**Practical**
Terminal Examination	**60**	**20**	**40**
Prelims	**100**	**20**	**40**
Continuous Assessment Tests			**40(2x20)**
Journal +Attendance			**20**
Total	**200**		**140**
Internal Assessment Calculation	**1/10**		**1/7**

35 % marks of Internal Assessment –Eligibility for appearing for university exam

50% marks of Internal Assessment –Passing