

## **P.G. Curriculum M.S. Anatomy Index**

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# Curriculum M.S. Anatomy

The infrastructure and facilities will be as per MCI guidelines.

## 1. Goals

The goal of MD Course in Anatomy is to produce a competent anatomist who has comprehensive knowledge of all aspects of anatomy (gross, microscopic, development, clinical applications, and recent advances) and related topics of other specialties.

## 2. Objectives

- ❖ To make a good undergraduate teacher
- ❖ To make a good research worker
- ❖ To motivate and devise innovative teaching and research strategies in order to collaborate in integrated teaching and research
- ❖ To inculcate the habit of self learning and keeping abreast with current developments and latest equipment to be harnessed to improve teaching methodology

## 3. Syllabus

### 3.1 Theory

#### 3.1.1 Gross Anatomy

Entire human body through dissection, specimens, prosections, bones; Surgical anatomy and Sectional anatomy

#### ❖ General Anatomy

Introduction; Skin with appendages - functions and applied; Fascia- superficial and deep, functions and applied; General classification of bones & cartilage including examples, functions and applied; General classification of joints with general features, examples, movements and applied; General classification of muscles - features, function, examples and applied including myophysiology; General anatomy of cardiovascular system- arteries, veins, capillaries, end arteries, functions and applied; Lymphatic system – functions and applied; Nervous system- including relevant neurophysiology and General principles of radiology

#### ❖ Skeletal System/Osteology

General: including Exo-skeleton and Endo-skeleton

#### \* Classification:

- ⊙ Morphological - types, distribution and functions
- ⊙ Structural- types, distribution and function
- ⊙ Developmental- types, distribution and function
- ⊙ Microscopic - types, distribution and function
- ⊙ Regional - distribution

- \* Bone grafts
- \* Important diseases and disorders of bones
- \* Mechanism of fracture healing
  
- \* **Region wise**
  - ⊙ Trunk:
    - Vertebral column – curvature- normal, abnormal. Line of centre of gravity in an articulated full skeleton
    - Intervertebral disc - structure, function
    - Vertebrae - typical, atypical, parts of vertebra, special features of all vertebrae, articulations, blood supply and clinical importance
    - Sternum – special emphasis on developmental correlation with applied
    - Attachments on all bones
    - Clinical applications including weight transmission
  
  - ⊙ Thoracic cage:
    - Inlet, outlet
    - Joints of the thoracic cage
    - Attachments
  
  - ⊙ Pelvis:
    - Anatomical position
    - Parts
    - Difference between male and female pelvis with types.
    - Articulations
    - Attachments
    - Vascular and nervous supply
    - Pelvimetry
  
  - ⊙ Limbs:
    - Identification of bones
    - Anatomical position
    - Parts
    - Articulations
    - Attachments
    - Bones in an articulated hand and foot
    - Individual bones including ossification
    - Vascular and nervous supply
    - Clinical correlation
  
  - ⊙ Head and Neck
    - Skull:
      - i. Identification of parts in all the views of the skull
      - ii. Identification, classification and distribution of sutures, wormian bones
      - iii. Identification of foramina and structures passing through them
      - iv. Age changes in skull
      - v. Individual skull bones
      - vi. Clinical correlation

- Mandible:
  - i. Parts
  - ii. Age changes
  - iii. Articulations
  - iv. Attachments, important relations
  - v. Vascular and nervous supply
  - vi. Clinical correlation
- Hyoid bone
- Cartilages of larynx
- Bony middle and internal ear, ear ossicles

### ❖ **Arthrology**

- ★ Definition and Classification of joints
- ★ Region wise
  - All joints of the body- large and small
    - i. Bones taking part
    - ii. Articular cartilage
    - iii. Capsule and its thickenings
    - iv. Ligaments
    - v. Synovial membrane (if applicable)
    - vi. Intra capsular structures (if any)
    - vii. Structure, nutrition of articular cartilage and its significance
    - viii. Innervation
    - ix. Blood supply
    - x. Movements with muscles responsible for such movements
    - xi. Relations
    - xii. Applied anatomy

### ❖ **Regional Anatomy**

- ★ Upper Limb
  - i. Introduction to upper limb
  - ii. Pectoral Region, Breast
  - iii. Axilla
  - iv. Scapular Region
  - v. Arm & Cubital Fossa
  - vi. Forearm & hand
  - vii. Joints of upper limb
  - viii. Nerves, Dermatomes and Nerve Injuries
  - ix. Applied anatomy of each region
  - x. Sectional Anatomy
  - xi. Recent advances

#### ★ Lower Limb

- i. Introduction to Lower Limb
- ii. Thigh
- iii. Gluteal region
- iv. Popliteal fossa
- v. Leg & dorsum of foot

- vi. Sole
- vii. Venous drainage & lymphatic drainage of lower limb
- viii. Joints of lower limb
- ix. Arches of foot
- x. Nerves , dermatomes and nerve injuries
- xi. Applied anatomy of each region
- xii. Sectional anatomy
- xiii. Recent advances

★ Thorax

- i. Introduction to thorax
- ii. Walls of thorax & Respiratory Movement
- iii. Thoracic cavity
- iv. Lung with Pleura
- v. Heart with Pericardium
- vi. Mediastinum- subdivisions, detailed contents and applied
- vii. Joints of thorax
- viii. Applied aspects of all regions including bypass surgeries and stents
- ix. Sectional Anatomy
- x. Recent advances

★ Abdomen and Pelvis

- i. Introduction of Abdomen and pelvis
- ii. Abdominal walls including fascia
- iii. Vessels of Abdomen and pelvis
- iv. Peritoneal cavity including details of fossae, sub-phrenic spaces, peritoneal bands
- v. Viscera of abdominal cavity
- vi. Diaphragm including details of diaphragmatic hernias
- vii. Nerves of abdomen and pelvis
- viii. Female reproductive system
- ix. Male reproductive system
- x. Urinary system
- xi. Perineum
- xii. Pelvic diaphragm
- xiii. Joints of abdomen and pelvis
- xiv. Sectional anatomy of abdomen and pelvis
- xv. Applied anatomy of all regions of abdomen and pelvis
- xvi. Recent advances

★ Head and Neck

- i. Scalp & face
- ii. Cervical fascia
- iii. General arrangement of triangles of neck with contents
- iv. Cranial cavity
- v. Vertebral canal
- vi. Orbit
- vii. Parotid region
- viii. Submandibular region
- ix. Temporal & infratemporal fossa

- x. Lymph nodes & lymphatic drainage of head & neck
- xi. Deep structures in neck
- xii. Nose and paranasal sinuses
- xiii. Tongue
- xiv. Mouth and Pharynx
- xv. Larynx
- xvi. Ear
- xvii. Eyeball
- xviii. Sympathetic chain and cranial nerves
- xix. Vessels of head & neck
- xx. Joints of head and neck
- xxi. Applied anatomy of all regions of head and neck
- xxii. Sectional anatomy of head and neck
- xxiii. Recent advances

### 3.1.2 Microanatomy

Knowledge of tissues of the body in order to correlate structure with functions and to know all about procedures of studying microanatomy including ultra structure.

- ❖ Cells and organelles including ultrastructure
- ❖ Cell junctions
- ❖ Epithelial tissue-I : Simple -Types. Distribution and functions including ultrastructure .Compound- Types. Distribution and functions including ultrastructure
- ❖ Epithelial tissue-II: Glandular epithelium including ultrastructure & function
- ❖ Classification of connective tissue, distribution and components
- ❖ Connective tissue I: loose areolar, elastic, collagenous and adipose
- ❖ Connective tissue-II: Cartilage - hyaline, elastic, fibro
- ❖ Connective tissue-III: Bone - compact and cancellous
- ❖ Connective tissue-IV: Blood
- ❖ Lymphoid-tissue/Immune system-I: classification, cells, histocompatibility
- ❖ Antigens, mononuclear phagocytic system, antigen presenting cells
- ❖ Lymphoid tissue/Immune system-II: Lymphoid tissues and organs- classification, origin, functions and clinical aspects
- ❖ Muscular tissue: smooth, striated, cardiac and myoepithelial cells
- ❖ Nervous Tissue: different types of neurons, neuroglia, spinal cord, spinal and sympathetic ganglia, nerve, cerebral cortex, cerebellar cortex.
- ❖ Digestive system-I: oral cavity, lip, tongue, taste buds and salivary glands
- ❖ Digestive system-II: oesophagus, stomach -fundus, body & pylorus
- ❖ Digestive system-III: duodenum, jejunum, ileum, appendix, colon and rectum
- ❖ Digestive system-IV: liver, gall bladder and pancreas
- ❖ Urinary system: kidney, ureters, urinary bladder and urethra
- ❖ Male reproductive system: testis, epididymis, vas deferens, prostate, seminal vesicle, penis
- ❖ Female reproductive system-I: ovary, fallopian tube, uterus, cervix and vagina
- ❖ Female reproductive system-II: mammary gland lactating, non -lactating; placenta, umbilical cord
- ❖ Integumentary system
- ❖ Respiratory system-I: upper respiratory tract
- ❖ Respiratory system-II: lower respiratory tract
- ❖ Cardio vascular system: arteries, arterioles, capillaries, veins, sinusoids, heart, conducting system

- ❖ Endocrine organs-I: pituitary, pineal, endocrine tissues in pancreas, testis and ovary
- ❖ Endocrine organs-II: thyroid, parathyroid, adrenal
- ❖ Special sense organs: Eye - eye lid, retina, cornea and sclerocorneal junction, ear with special reference to internal ear
- ❖ Parachromaffin system

### 3.1.3. Developmental anatomy including genetics

Knowledge of all the developmental sequences from conception to birth and further morphological changes throughout life; Critical periods and times of attainment of functions of growing/developing organs/systems; Correlate congenital anomaly with development; Anatomical basis of contraception and road to health progress in growth and development in view of national programs of MCH and Genetics-Chromosomes and chromosome abnormalities, Single gene disorders. Polygenic Disorders, Mutation and human disease, Genes in Populations and genetic counseling, Genetic techniques e.g. Karyotyping and other recent advances.

#### 3.1.3.1. GENERAL EMBRYOLOGY

- ★ Introduction: Male and female reproductive system, testis and ovary, migration of primordial germ cells into gonadal ridge, definition of gametes, knowledge of histogenesis and organogenesis of various systems
  - ★ Ovum, oogenesis, growth of ovarian follicles and uterine cycle, ovulation.
  - ★ Sperm, spermatogenesis, spermiogenesis, normal sperm count and abnormal conditions.
  - ★ Principles of family planning and sex determination.
- ❖ **First Two Weeks of Development**
    - ★ Fertilization process, *in vitro* fertilization, cleavage, blastocyst formation.
    - ★ Implantation - types, formation of decidua, its subdivisions and abnormal implantation.
    - ★ Formation of Embryoblast and trophoblast, bilaminar germ disc. Trophoblast development, formation of cytotrophoblast and syncytiotrophoblast.
    - ★ Amniotic membrane, Yolk sac, Extra embryonic mesoderm, Extraembryonic coelom, connecting stalk, chorion, formation of prochordal plate.
  - ❖ **Third Week of Development**
    - ★ Embryoblast - primitive streak, node, formation of intra - embryonic mesoderm, Trilaminar germ disc, notochord, buccopharyngeal and cloacal membranes, pericardial bar.
    - ★ Trophoblast - secondary yolk sac, intra - embryonic coelom and allantoic diverticulum, intra - embryonic mesoderm, division, derivatives of Ectoderm, endoderm, mesoderm.
  - ❖ **Fourth to Eighth Week of Development**

Formation of somites, neural tube, cephalo - caudal folding and lateral foldings of embryo, formation of gut and its subdivisions, vitelline duct.

### ❖ **Foetal Membranes, Placenta**

- \* Formation, functions, features, types, circulation, abnormalities of placenta and placental barrier.
- \* Umbilical cord, Amnion, Amniotic fluid its function, chorion leavae, decidua, Amniocentesis.
- \* External appearance during second month, crown - rump length, crown head length, estimation of age and growth of foetus.
- \* Twins - formation, types, conjoint twins, multiple pregnancies.
- \* Causative factors for congenital malformations - Teratogens.

### **3.1.3.2. SYSTEMIC EMBRYOLOGY**

- \* Development of skeletal system and muscular system.
- \* Development of body cavities and serous membranes.
- \* Development of digestive system.
- \* Rotation of gut, liver and pancreas, development of hindgut.
- \* Development of urinary system.
- \* Development of genital system in male.
- \* Development of genital system in female.
- \* Development of heart loop, formation of chambers.
- \* Heart, septal development and valves.
- \* Development of arteries, normal, abnormal.
- \* Development of veins, birth defects.
- \* Development of pharyngeal arches, structures developed from it.
- \* Pharyngeal pouches, clefts.
- \* Development of Face, oral cavity, palate.
- \* Development of respiratory system.
- \* Development of nervous system.
- \* Development of Special sense organs.
- \* Development of glands – Exocrine and endocrine.
- \* Mammary gland development.
- \* Special reference to vulnerable periods with respect to each system.
- \* Congenital malformations associated with each system
- \* Recent advances

### **3.1.3.3. Genetics**

Human genetics and its subdivisions;

- \* Cytogenetics; chromosomal study- classification, methods to study chromosomes, behaviour of chromosomes during cell division, mutations and abnormal chromosomes.
- \* Molecular genetics-DNA organization of chromosomes, molecular structure of nucleic acids, classification of DNA & RNA, gene and genetic code, types of genes, genetic control on protien biosynthesis, penetrance and expressivity.
- \* Eugenetics- clinical application of principles of heredity.
- \* Physiological genetics- Normal functions of various organelles of cell controlled by genes.
- \* Population genetics and twinning.
- \* Biochemical genetics including metabolic disorders governed by genes.



- \* Experimental genetics- Technologies of genetic engineering and recombinant DNA
- \* Clinical genetics
  - ⊙ For population
    - i. Hardy-Weinberg rule, factors altering this equilibrium for e.g. mutation, selection and balance between selection and mutation, genetic heterogeneity, genetic drift.
    - ii. Dermatoglyphics
    - iii. Pedigree charting
    - iv. Karyotyping- autosomal dominance - autosomal recessive, X- linked recessive ,X linked dominance, Y - linked inheritance , polygenic inheritance.
  - ⊙ Prenatal and post natal diagnosis of genetic disorders-Evolving technologies for genomic analysis
    - i. Procedures- maternal serum, amniocentesis, chorionic villous biopsy
    - ii. Techniques- Fluorescence in situ hybridization(FISH)
      - a. Spectral Karyotyping (SKY)
      - b. RNA localization
      - c. Molecular diagnosis for prevalent diseases in Punjab e.g Thalessemia- PCR-ARMS technique, Reverse Dot Blot technique, Alpha thalessemia deletion analysis and sequencing analysis and other recent advances.
- \* Gene Therapy
 

Genetic counselling- preventive and social health promotional measures in problems of genetic disorders. Matters pertaining to causation, incidence, risk of recurrence, radiation hazards, mutant viral strains are dealt with.

### 3.1.4. Neuroanatomy

Knowledge of nervous system along with skill for electing functions of various parts and solve neurological problems.

- ❖ Introduction: evolution - centralization - encephalization - development - tube derivatives - crest derivatives – subdivisions.
- ❖ Cells of the nervous System: - neurons - nerve fibres - neuroglia - functions – synapse.
- ❖ Peripheral nervous System: - spinal nerves - plexus formation, Nerve endings - Receptors – Effectors.
- ❖ Autonomic nervous System: Introduction - Subdivisions - distribution – ganglia – route of supply to all end organs- functions and clinical applications.
- ❖ Central nervous System: Spinal cord - morphology - external - internal - sections - sacral - lumbar - thoracic - cervical - grey matter & cells - white matter & tracts -central canal - covering - blood supply - applied anatomy - lumbar puncture - lesions.
- ❖ Brain Stem :Medulla Oblongata (closed) - external features - internal features - sections - motor decussation - sensory decussation - central canal, blood supply, lesions.
- ❖ Medulla Oblongata (Open) :external features - internal features - sections - floor of IV ventricle - nuclei of cranial nerves - inferior cerebellar peduncle - blood supply - lesions.

- ❖ Pons :external features - internal features - floor of IV ventricle - nuclei - middle cerebellar peduncle - blood supply – lesions.
- ❖ Mid brain :external features - internal features - sections - IC level - SC level - aqueduct - nuclei - superior cerebellar peduncle, blood supply, lesions
- ❖ Cerebellum :subdivisions with functional and evolutionary correlations - structure ,white matter - submerged nuclear masses – structural organization -blood supply - lesions.
- ❖ Functional columns of nuclei.
- ❖ Thalamic Complex :subdivisions and functions - hypothalamus - meta thalamus - epi thalamus - sub thalamus - blood supply, lesions.
- ❖ Cerebral hemisphere: major subdivisions - functional areas - submerged nuclear masses (basal ganglia) – white matter – structural organization-- blood supply - lesions.
- ❖ Limbic System: parts & functions, clinical applications.
- ❖ Reticular System: parts & functions, clinical applications
- ❖ Ventricular system of brain and clinical applications.
- ❖ Meninges and blood Supply, clinical applications.
- ❖ Cerebro spinal fluid: composition,secretion - circulation - drainage – cisterns-clinical applications.
- ❖ Cranial nerves : Nuclei, course, distribution, lesions.
- ❖ Ascending and descending pathways of CNS.
- ❖ Sectional anatomy.
- ❖ Applied anatomy of all regions with special reference to neurophysiology and neuropharmacology.
- ❖ Recent advances.

### **3.1.5. Radiological anatomy**

Basics of radiological study of living anatomy and the principles of various procedures eg.X-Rays, ultrasound, CT Scan, MRI,PET, special procedures to visualize viscera and cavities.

### **3.1.6.Forensic anatomy**

Anatomy applicable to forensic medicine with respect to age determination, sexing of bones and other forensic aspects.

### **3.1.7 Comparative anatomy**

Basics of, to explain certain embryological events where ontogeny repeats phylogeny.

## **3.2. Practical**

### **3.2.1. Upper Limb**

- ❖ Bones
  - \* Clavicle
  - \* Scapula

- \* Humerus
- \* Radius
- \* Ulna
- \* Articulated Hand
- \* Individual bones of hand
- ❖ Cadaveric dissection
- ❖ Surface anatomy
- ❖ Radiological anatomy
- ❖ Sectional anatomy

### **3.2.2. Lower Limb**

- ❖ Bones
  - \* Hip Bone
  - \* Femur
  - \* Patella and other clinically important sesamoid bones
  - \* Tibia
  - \* Fibula
  - \* Articulated foot
  - \* Individual bones of foot
- ❖ Cadaveric dissection
- ❖ Surface anatomy
- ❖ Radiological anatomy
- ❖ Sectional anatomy

### **3.2.3. Thorax**

- ❖ Bones
  - \* Sternum
  - \* Ribs
  - \* Vertebra
- ❖ Cadaveric dissection
- ❖ Surface anatomy
- ❖ Radiological anatomy
- ❖ Sectional anatomy

### **3.2.4. Abdomen and Pelvis**

- ❖ Bones
  - \* Hip bone
  - \* Lumbar vertebra
  - \* 12th rib
  - \* Sacrum & coccyx,
  - \* Bony pelvis- young, adult, old age. Male & female with relevant age

- ❖ Cadaveric dissection
- ❖ Surface anatomy
- ❖ Radiological anatomy
- ❖ Sectional anatomy

### **3.2.5. Head and Neck**

- ❖ Bones
  - \* Norma verticalis

- \* Norma Occipitalis
- \* Norma frontalis
- \* Norma lateralis
- \* Norma Basalis
- \* Interior of skull
- \* Cranial cavity
- \* Cervical vertebra
- \* Mandible
- \* Hyoid bone
- \* Individual skull bones
- \* Cartilages of larynx
- \* Bony ear and ear ossicles
- ❖ Cadaveric dissection
- ❖ Surface anatomy
- ❖ Radiological anatomy
- ❖ Sectional anatomy

### 3.2.6. Microanatomy

- ❖ Skills of tissue processing
- ❖ Skills of all equipment, stains and special procedures for staining
- ❖ Knowledge of different types of microscopes and their advantages/disadvantages
- ❖ Should be able to identify, draw labelled diagrams and give detailed viva voce on:
  - \* Epithelial tissue-I
    - ⊙ Simple epithelium
  - \* Compound epithelium
  - \* Epithelial tissue-II :Glandular epithelium;
  - \* Connective tissue I :loose areolar; elastic; collagenous; adipose.Blood.
  - \* Connective tissue-II :Cartilage - hyaline, elastic, fibro.
  - \* Connective tissue-III :Bone - compact - cancellous
  - \* Lymphoid tissue/immune system-I :lymph node, spleen, solitary lymphatic nodule
  - \* Lymphoid tissue/Immune system-II :thymus, tonsil.
  - \* Muscular tissue :smooth ,skeletal & cardiac.
  - \* Nervous Tissue :,spinal cord, spinal and sympathetic ganglia; nerve; cerebral cortex, cerebellar cortex
  - \* Digestive system-I :Oral cavity, lip, tongue, taste buds, salivary glands
  - \* Digestive system-II :oesophagus stomach fundus,body &pylorus.
  - \* Digestive system-III :duodenum, jejunum, ileum, appendix, colon, rectum.
  - \* Digestive system-IV :liver, gall bladder, pancreas.
  - \* Urinary system :kidney, ureters, urinary bladder,urethra.
  - \* Male reproductive system :testis, epididymis, vas deferens, prostate, seminal vesicle, penis.
  - \* Female reproductive system-I: ovary, fallopian tube, uterus, cervix and vagina.
  - \* Female reproductive system-II: mammary gland lactating, non -lactating; placenta; umbilical cord.
  - \* Integumentary system:
  - \* Respiratory system-I :Upper respiratory tract
  - \* Respiratory system-II :Lower respiratory tract
  - \* Cardio vascular system :arteries, vein,arterioles,capillaries, sinusoids, heart

- \* Endocrine organs-I :pituitary, pineal, endocrine tissues in pancreas, testis and ovary.
- \* Endocrine organs-II :thyroid, parathyroid, adrenal.
- \* Special sense organs :Eye - eye lid, retina, cornea, sclerocorneal junction.

### 3.2.7. DEVELOPMENTAL ANATOMY INCLUDING GENETICS

Identification and viva-voce on embryology models pertaining to each

#### ❖ Genetics

- \* Mitosis, Meiosis, Barr Body
  - ⊙ Stages of mitosis, meiosis are focussed under microscope.
  - ⊙ To draw and label the different phases of mitosis, meiosis.
  - ⊙ To draw the Barr body which is demonstrated under microscope.
- \* Karyotyping, Clinical Features of Common Genetic Syndromes
  - ⊙ To prepare a karyotype from the xerox copies of numbered G. banded chromosomes.
  - ⊙ Normal male, female chromosomal spreads are focussed under microscope
  - ⊙ Observation and writing the clinical features of Down's syndrome, Patau's syndrome, Edward's syndrome, Klinefelters syndrome, Turner's syndrome shown in photographs.
- \* Preparing Pedigree Chart
  - ⊙ Symbols used for making a pedigree are provided.
  - ⊙ To make a pedigree considering the student as a proband.

### 3.2.8. Neuroanatomy

- ❖ Cadaveric dissection of all parts
- ❖ Surface anatomy
- ❖ Radiological anatomy
- ❖ Sectional anatomy –transverse, coronal and sagittal

### 3.2.9. SURFACE ANATOMY

Bony landmarks and projection of various viscera, vessels, nerves on the body surface to gain comprehensive knowledge of clinical anatomy.

## 4. Teaching programme

### 4.1 General principles

Acquisition of practical competencies being the keystone of postgraduate medical education, postgraduate training is skills oriented.

Learning in postgraduate program is essentially self-directed and primarily emanating from clinical and academic work. The formal sessions are merely meant to supplement this core effort.

### 4.2 Teaching sessions

All postgraduates are supposed to take undergraduate teaching in the form of small group discussions, dissection demonstrations, slide demonstrations,

osteology & embryology teachings on specimens and models, surface marking and radiology.

All postgraduates have to actively participate in PG teaching sessions which include Dissection discussion, P.G. Class, Histology slides discussion/preparation, Seminar, Journal club and Central teaching sessions. In addition they take part in horizontal and vertical integrated teaching programmes.

#### ❖ **Essential skills**

- \* Have skill to look up references from journals and present seminars.
- \* Have computer skills.
- \* Embalm Cadavers after independently preparing embalming fluid.
- \* Collect tissues for histology, preserve, process for paraffin block and sectioning, staining with H&E and other special stains as laid down in curriculum, mount and identify.

### **4.3 Teaching schedule**

Suggested weekly schedules will be as follows:-

1. Dissection discussion	Once a week
2. P.G. Class	Once a week
3. Histology slides discussion/ preparation	Once a week
4. Seminar	Once a week
5. Journal club	Once a week
6. Central teaching sessions	Once a week

### **5. Postings**

All P.G's should be rotated to related clinical specialties for in-depth knowledge of clinical application of anatomy.

### **6. Thesis**

- 6.1. Every candidate shall carry out work on an assigned research project under the guidance of a recognized postgraduate teacher. The project shall be written & submitted in the form of a thesis.
- 6.2. Every candidate shall submit thesis plan to the university within the time frame given by the university.
- 6.3. Thesis shall be submitted to the university six months before the commencement of theory examination, i.e. for examination May/June session, 30<sup>th</sup> November of the preceding year of examination and for November/December session, 31st May of the year of examination.
- 6.4. The students will (i) Identify a relevant research question;(ii) conduct a critical review of literature;(iii) formulate a hypothesis;(iv) determine the most suitable study design; (v) state the objective of the study; (vi) prepare a study protocol; (vii) undertake a study according to the protocol; (viii) analyze and interpret research data, and draw conclusion; (ix) write a research paper.

## 7. Assessment

All the PG residents are assessed daily for their academic activities and also periodically

### 7.1. General Principles

- ❖ The assessment is valid, objective and reliable.
- ❖ It covers cognitive, psychomotor and affective domains.
- ❖ Formative, continuing and summative (final) assessment is also conducted in theory as well as practical/clinical. In addition, thesis is also assessed separately.

### 7.2. Formative Assessment

The formative assessment is continuous as well as end-of - term. The former is to be based on the feedback from the senior residents and the consultants concerned.

End of term assessment is held at the end of each semester (upto 5<sup>th</sup> semester).

Formative assessment will not count towards pass/fail at the end of the programme, but will provide feedback to the candidate.

### 7.3 Internal Assessment

The performance of the Postgraduate student during the training period should be monitored throughout the course and duly recorded in the log books as evidence of the ability and daily work of the student. Marks should be allotted out of 100 as followed.

Sr. No.	Items	Marks
1.	Personal Attributes	20
2.	Practical Work	20
3.	Academic activities	20
4.	End of term theory examination	20
5.	End of term practical examination	20

#### 1. Personal attributes:

- ❖ **Behavior and Emotional Stability:** Dependable, disciplined, dedicated, stable in emergency situations shows positive approach.
- ❖ **Motivation and Initiative:** Takes on responsibility, innovative, enterprising, does not shirk duties or leave any work pending.
- ❖ **Honesty and Integrity:** Truthful, admits mistakes, does not cook up information, has ethical conduct, exhibits good moral values, loyal to the institution.
- ❖ **Interpersonal Skills and Leadership Quality:** Gets on well with colleagues and paramedical staff, is respectful to seniors, has good communication skills.

#### 2. Practical Work:

- ❖ **Availability:** Punctual, available continuously on duty, responds promptly on assignments and takes proper permission for leave.
- ❖ **Diligence:** Dedicated, hardworking, does not shirk duties, leaves no work pending, does not sit idle, competent in practical work.

- ❖ **Academic ability:** Intelligent, shows sound knowledge and skills, participates adequately in academic activities, and performs well in oral presentation and departmental tests.
  - ❖ **Performance:** Proficient in presentations and discussion during academic sessions in the department.
- 3. Academic Activity:** Performance during presentation at Journal club/ Seminar/ Case discussion/ Stat meeting and other academic sessions. Proficiency in skills as mentioned in job responsibilities.
- 4. End of term theory examinations** conducted at end of 1<sup>st</sup>, 2<sup>nd</sup> year and after 2 years 9 months.
- 5. End of term practical/oral examinations** after 2 years 9 months.

Marks for **personal attributes** and **work done** should be given annually by all the consultants under whom the resident was posted during the year. Average of the three years should be put as the final marks out of 20.

Marks for **academic activity** should be given by the all consultants who have attended the session presented by the residents.

The Internal assessment should be presented to the Board of examiners for due consideration at the time of Final Examinations.

## 7.4 Summative Assessment

- ❖ Ratio of marks in theory & practical will be equal.
- ❖ The pass percentage will be 50%.
- ❖ Candidate will have to pass theory and practical examinations separately

### A. Theory Examination (Total = 400)

Paper	Title	Marks
Paper I	Anatomy as applied to various clinical disciplines including Radiological & forensic anatomy	100
Paper II	Gross human Anatomy including comparative Anatomy	100
Paper III	Developmental & Microanatomy including elementary genetics	100
Paper IV	Neuroanatomy & recent advances in anatomy	100

### B. Practical & Viva voice Examination(Total = 400)

Dissection of any given area followed by <i>viva voce</i> examination	125
★ Histology	125



- \* Tissue processing followed by viva voce
- \* Identify 10 Histology slides and Viva voce.
- \* Microteaching on the given topic for 15 mins. 50

Viva voce examination will be conducted at four stations independently by four examiners covering non-overlapping portions of the entire subject, including bones, gross anatomy including neuroanatomy, sectional anatomy, embryology models, radiology, surface marking and genetics.

100

## 8. Job responsibilities

### For teaching

- ❖ Be able to take a class using audiovisual aids right from blackboard & chalk to that with laptop & multimedia projection
- ❖ Should be able to make good museum specimens.
- ❖ Should be able to take short lectures under senior teacher's supervision.
- ❖ Should be well versant with all Radiological & Imaging techniques.
- ❖ Should have learnt to make PowerPoint presentations.
- ❖ Should have learned to make multiple-choice questions.
- ❖ The P.G student must attend all undergraduate theory and practical classes.
- ❖ They must play an active role in table teaching in all practical classes

### For research work

- ❖ Have skill to look up references from journals and present seminars.
- ❖ Have Computer skills.
- ❖ Candidates will be expected to be familiar with standard methods of preparing a bibliography and for preparing manuscripts and illustrations for publications.

### Essential skills

- ❖ Embalm Cadavers after independently preparing embalming fluid.
- ❖ Collect tissues for histology, preserve, process for paraffin block and sectioning, staining with H&E and other special stains as laid down in curriculum, mount and identify.

## MODEL QUESTION PAPER

MS (Anatomy)  
Paper-IAnatomy as applied to various clinical disciplines including Radiological  
& forensic Anatomy

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*Max. Marks:100**Time: 3 hrs*

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- **Attempt ALL questions**
  - **Answer each question & its parts in SEQUENTIAL ORDER**
  - **ALL questions carry equal marks**
  - **Illustrate your answer with SUITABLE DIAGRAMS**
- 

- I Explain the menisci of knee joint .Mention its applied importance.
- II Enumerate the subphrenic spaces. Give an account of left posterior intraperitoneal space.
- III Draw the scheme of formation and branches of Brachial Plexus. Explain Klumpke's paralysis.
- IV List various types of Diaphragmatic hernia. Elaborate on Congenital Diaphragmatic Hernia.
- V Describe nerve supply of stomach .Add a note on role of Vagotomy in gastric ulcers.
- VI Compare features of male & female bony pelvis.
- VII Elaborate PET.
- VIII Explain anatomical basis of black eye.
- IX Write a note on surgical anatomy of Anal Canal. Discuss haemorrhoids.
- X Give an account of intrapetrous course of facial nerve. Add a note on Bell's palsy.

## MODEL QUESTION PAPER

MS (Anatomy)  
Paper-II

Gross Human Anatomy Including Comparative Anatomy

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*Max. Marks:100**Time: 3 hrs*

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- **Attempt ALL questions**
  - **Answer each question & its parts in SEQUENTIAL ORDER**
  - **ALL questions carry equal marks**
  - **Illustrate your answer with SUITABLE DIAGRAMS**
- 

- I Outline Lymphatic drainage of Tongue. Correlate its nerve supply with development.
- II Discuss briefly movement possible at shoulder joint .Add a note on the applied anatomy.
- III Describe morphological changes of pelvic floor in humans
- IV Draw a well labeled diagram of T.S at the level of 4<sup>th</sup> Thoracic vertebrae.
- V Give an account on Ansa Cervicalis.
- VI Explain the anatomy of Ischio rectal fossa .Give its applied anatomy.
- VII Elaborate on the formation & branches of the lumbar plexus.
- VIII Draw well labeled diagram showing the relations of right & left kidneys.
- IX Define Epiphysis. Give classification with examples.
- X Explain AV anastomosis

## MODEL QUESTION PAPER

MS (Anatomy)  
Paper-III

Developmental & Microanatomy including Elementary genetics

*Max. Marks:100*

*Time: 3 hrs*

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- **Attempt ALL questions**
  - **Answer each question & its parts in SEQUENTIAL ORDER**
  - **ALL questions carry equal marks**
  - **Illustrate your answer with SUITABLE DIAGRAMS**
- 

- I List the cells of lung epithelium. Compare the microanatomy of principle bronchus with bronchiole.
- II Describe briefly the microanatomy of liver with special references to its ultra structure.
- III Discuss the development and congenital anomalies of kidney.
- IV Enumerate congenital anomalies of small intestine. Discuss in brief Meckels diverticulum.
- V Give the development & fate of Primitive Streak.
- VI Mention the type of chromosomal anomaly in Turner's syndrome, Give probable causes. Add a note on its clinical features.
- VII Draw microanatomy of ovary. Add a note on its age changes.
- VIII Elaborate on Placental circulation.
- IX Define the term 'genetic counseling'. Elaborate on the steps involved in its procedure.
- X Explain Autosomal Inheritance with examples.

## MODEL QUESTION PAPER

MS (Anatomy)  
Paper-IV

Neuroanatomy & Recent Advances in Anatomy

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Max. Marks:100

Time: 3 hrs

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- **Attempt ALL questions**
  - **Answer each question & its parts in SEQUENTIAL ORDER**
  - **ALL questions carry equal marks**
  - **Illustrate your answer with SUITABLE DIAGRAMS**
- 

- I Describe the nuclei, connections and functions of thalamus.
- II List the speech areas of brain .Add a note on Aphasias.
- III Outline briefly the Visual Pathway. What will be the effect of lesions at different levels of the Pathway
- IV Give an account of the Cardiac Catheterization in angiography.
- V Write a short note on Arthroscopy of knee joint.
- VI Elaborate on confocal microscopy. Add a note on its uses.
- VII Explain Wallenburg's Syndrome.
- VIII Define Plasticity. Give its applications.
- IX Describe various methods of preservation & disposal of human cadavers.
- X Discuss CSF under the following headings:
  - a) Composition
  - b) Circulation
  - c) Absorption
  - d) Clinical aspects