



TAKSHASHILA UNIVERSITY

(Established under Tamil Nadu Private Universities Act, 2019 &
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ONGUR, TINDIVANAM TK, VILLUPURAM DT

FACULTY OF MEDICINE

Ph.D. Entrance Examination Syllabus

Department of Anatomy

I. General Anatomy and Cell Biology & Gross Anatomy of Extremities

General Anatomy and Cell Biology

- Anatomical terminology, anatomical planes, positions, and movements.
- Cell biology: cell membrane, cytoplasm, cell organelles, cytoskeleton, cell inclusions, cilia, and flagella.
- Musculoskeletal system: Classification, morphology, ossification, blood supply, and functions of bones. Classification, morphology, blood supply, innervation, and functions of muscles.
- Cardiovascular system: Structure and classification of blood vessels. Microcirculation and capillaries.
- Lymphatic system: Formation, circulation, lymphatic channels, thoracic duct, and functions.
- Integumentary system: Skin, appendages, blood supply, innervation, and functions.
- Nervous system: Central and peripheral nervous systems. Cranial nerves, spinal nerves, and autonomic nervous system.

Gross Anatomy of Extremities

Upper Limb

- Pectoral region and mammary gland.
- Axilla, brachial plexus, axillary vessels, and lymphatics.
- Shoulder region and scapular region.
- Arm, cubital fossa, forearm, hand, and palmar spaces.
- Shoulder, elbow, radioulnar, wrist, and hand joints.
- Venous and lymphatic drainage.
- Dermatomes and nerve injuries.
- Osteology of upper limb: clavicle, scapula, humerus, radius, ulna, and hand bones.

Lower Limb

- Front and medial compartments of thigh.
- Femoral triangle and adductor canal.
- Gluteal region and back of thigh.
- Popliteal fossa.
- Leg and foot.
- Hip, knee, ankle, tibiofibular, and foot joints.
- Venous and lymphatic drainage.
- Arches of foot and nerve injuries.
- Osteology of lower limb: hip bone, femur, patella, tibia, fibula, and foot bones.

II. Gross Anatomy of Thorax, Abdomen, Pelvis and Perineum

Thorax

- Thoracic wall and intercostal spaces.
- Pleura and lungs.
- Mediastinum and its subdivisions.
- Heart, pericardium, and coronary circulation.
- Thoracic aorta, azygos system, thoracic duct, and oesophagus.
- Autonomic nervous system.
- Mechanism of respiration.
- Osteology of thorax: sternum, ribs, and thoracic vertebrae.

Abdomen and Pelvis

- Anterior abdominal wall and rectus sheath.
- Inguinal canal and hernia.

- Peritoneum and peritoneal recesses.
- Gastrointestinal tract: stomach, intestines, liver, gallbladder, pancreas, spleen.
- Portal circulation.
- Kidney, ureter, suprarenal glands.
- Posterior abdominal wall.
- Pelvic organs:
 - Urinary bladder.
 - Male reproductive organs.
 - Female reproductive organs.
 - Rectum and anal canal.

Perineum

- Superficial perineal pouch
- Deep perineal Pouch
- Ischioanal fossa.
- Blood vessels, nerves, and muscles of pelvis.
- Osteology: lumbar vertebrae, sacrum, male and female pelvis.

III. Gross Anatomy of Head and Neck, Neuroanatomy

Head and Neck

- Scalp and face.
- Parotid and submandibular regions.
- Cervical fascia and triangles of neck.
- Thyroid and parathyroid glands.
- Cranial cavity and meninges.
- Orbit and eyeball.
- Temporal, infratemporal, and pterygopalatine fossae.
- Oral cavity, tongue, palate, pharynx, tonsils, and larynx.
- Nasal cavity and paranasal sinuses.
- Ear.
- Cranial nerves with special emphasis on VII–XII nerves.
- Sympathetic trunk.
- Blood vessels and lymphatic drainage of head and neck.
- Temporomandibular and cervical joints.
- Osteology: skull, mandible, hyoid bone, and cervical vertebrae.

Neuroanatomy

- Gross anatomy of spinal cord.
- Medulla oblongata, pons, and midbrain.
- Cerebellum.
- Thalamus and hypothalamus.
- Limbic system.
- Cerebral hemispheres, sulci, gyri, and cortical areas.
- Basal ganglia and white matter tracts.
- Cranial nerves.
- Ventricular system and cerebrospinal fluid circulation.
- Blood supply of brain and spinal cord.
- Functional anatomy and cross-sectional anatomy of brain and spinal cord

IV. Microscopic Anatomy/Histology

General Histology

- Epithelial tissue.
- Connective tissue and cartilage.
- Bone and muscle tissue.

- lymphoid tissues.
- Cardiovascular system.
- Nervous tissue.
- Integumentary system.

Systemic Histology

- Respiratory system.
- Digestive system.
- Urinary system.
- Male and female reproductive systems.
- Endocrine glands.
- Placenta, umbilical cord, and mammary gland.
- Special sensory organs.
- Central nervous system.

V. Embryology and Developmental Anatomy, Genetics and Cytogenetics

Developmental Anatomy

Gametogenesis:

- Spermatogenesis and oogenesis.
- Fertilization and implantation.
- Early embryonic development.
- Formation of bilaminar and trilaminar germ discs.
- Gastrulation and neurulation.
- Development of extraembryonic membranes and placenta.
- Development of body systems and organogenesis.
- Development of gonads and reproductive organs.
- Fetal development and teratology.
- Congenital anomalies and developmental defects.
- Neural crest derivatives.
- Derivatives of ectoderm, mesoderm, and endoderm.

Genetics and Cytogenetics

- Principles of human genetics.
- Chromosomal structure and abnormalities.
- Numerical and structural chromosomal disorders.
- Aneuploidy, trisomies, and monosomies.
- Down syndrome, Turner syndrome, and Klinefelter syndrome.
- Karyotyping and cytogenetic techniques.
- Prenatal diagnosis using blood, bone marrow, and amniotic fluid samples.
- Molecular basis of genetic disorders.

Reference Books:

1. Gray's Anatomy – Susan Standring.
2. Clinically Oriented Anatomy- Keith L. Moore, Arthur F. Dalley and Anne M.R. Agur. Wolters Kluwer.
3. Human Anatomy - B.D. Chaurasia. CBS Publishers and Distributors.
4. Langman's Medical Embryology.
5. Inderbir Singh's Human Embryology.
6. Wheater's Functional Histology.
7. Textbook of Histology by Inderbir Singh's 8. Neuroanatomy - Richard S. Snell. Wolters Kluwer.
9. Human Genetics - Gangane. Elsevier Publications.
10. Textbook of clinical neuroanatomy - Vishram singh

Department of Biochemistry

I. Biomolecules

General aspects- classification, functions and properties of carbohydrates, lipids, amino acids, proteins and plasma proteins; Chemistry of hemoglobin and nucleic acids;

Enzymology and clinical enzymology.

II. Metabolism

Metabolism of carbohydrates, lipids, protein with inborn errors; Heme metabolism and its disorders; Electron transport chain and oxidative phosphorylation.

III. Nutrition

Calorific value of carbohydrates, lipids, proteins. Balanced diets and RDA, Specific dynamic action, basal metabolic rate. Biological values of proteins, nitrogen balance and common disorders of nutrition – under-nutrition - over nutrition - protein malnutrition and obesity. Fat soluble and water soluble Vitamins; Macro minerals and trace elements. Endocrinology and Immunology

IV. Molecular biology

Nucleic acid metabolism - Molecular biology- central dogma, replication in prokaryotes and eukaryotes, transcription in prokaryotes and eukaryotes and inhibition of transcription, translation and genetic codes, post translational modification, inhibition of translation in prokaryotes and eukaryotes. Regulation of gene expression in prokaryotes and eukaryotes. Recombinant DNA technology and cloning, PCR, blotting techniques, RFLP and its applications, Cancer biology

V. Clinical biochemistry

Organ function tests (Liver, kidney, cardiac, thyroid and pancreas.) Biochemical techniques – principle, component and applications of colorimetry and spectrophotometry, electrophoresis and SDS-PAGE. Principle, and applications of chromatography, HPLC and immunological techniques – ELISA. Acid-base balance and its disorders.

Reference Books:

1. Principles of Biochemistry. Ed. Lehninger, Nelson and Cox. CBS Publishers and Distributors.
2. Harper's Biochemistry. Ed. R. K. Murray, D. K. Granner, P.A. Mayes and V.W. Rodwell. Appleton and Lange, Stamford, Connecticut.
3. Textbook of Biochemistry with Clinical Correlations. Ed. Thomas M. Devlin, Wiley- Liss Publishers.
4. Practical Clinical Chemistry by Varley H.
5. Tietz Textbook of Clinical Chemistry and molecular diagnostics Ed Burtis and Ashwood. W.B Saunders Company.
6. Principles and techniques of Practical Biochemistry. Ed Keith Wilson and John Walker. Cambridge University Press

Department of Microbiology

I. General Microbiology & Immunology

History and scope of microbiology, Microbial taxonomy and classification, Prokaryotic cell structure and function, Bacterial growth and nutrition, Microbial metabolism, Sterilization and disinfection, Microscopy techniques, Culture media and cultivation methods, Microbial genetics, Gene regulation, Mutation and genetic recombination

Innate and adaptive immunity, Cells and organs of the immune system, Antigens and antibodies, Immunoglobulin structure and function, Complement system, Major histocompatibility complex (MHC), Hypersensitivity reactions, Autoimmune diseases, Immunodeficiency disorders, Vaccines and immunization, Immunological techniques (ELISA, Western blot, immunofluorescence)

II. Bacteriology

Gram Positive Bacteria-Staphylococcus, Streptococcus, Enterococcus, Bacillus, Clostridium, Corynebacterium, Listeria. Gram Negative Bacteria - Enterobacteriaceae, Vibrio, Pseudomonas, Haemophilus, Bordetella, Campylobacter, Helicobacter. Special Bacteria - Mycobacterium tuberculosis, Atypical mycobacteria, Spirochetes, Rickettsia, Chlamydia, Mycoplasma. Laboratory diagnosis, pathogenesis, treatment and prevention.

III. Virology

Structure and classification of viruses, Viral replication, Viral pathogenesis. DNA Viruses - Herpes virus, Adeno virus, Poxvirus, Papilloma virus, Hepatitis B virus. RNA Viruses - Influenza virus, Corona viruses, Retro viruses (HIV), Flavi viruses (Dengue), Rabies virus, Hepatitis viruses. Laboratory diagnosis of viral infections.

IV. Medical Mycology & Parasitology

Classification of fungi, Fungal morphology, Dermatophytes, Candida, Aspergillus, Cryptococcus, Mucorales, Dimorphic fungi, Laboratory diagnosis of fungal infections. Protozoa - Entamoeba histolytica, Giardia lamblia, Plasmodium species, Toxoplasma gondii, Leishmania. Helminths - Nematodes, Cestodes, Trematodes, Life cycle, pathogenesis, diagnosis and prevention.

V. Epidemiology, Clinical Microbiology & Antimicrobial Resistance

Principles of epidemiology, Transmission of infectious diseases, Outbreak investigation, Infection control, Hospital infection control committee, National health programs, Emerging and re-emerging infectious diseases, Zoonotic infections. Microbiome and human health, Vaccine development, Public health microbiology.

Collection, transport and Processing of clinical specimens in microbiology laboratory. For Respiratory infections, Urinary tract infections, Gastrointestinal infections, Bloodstream infections, Central nervous system infections, sexually transmitted infections, Hospital acquired infections and Molecular diagnostics in infectious diseases.

Classification and Mechanism of action of antibiotics, Antimicrobial susceptibility testing, MIC and MBC determination, Drugs resistance mechanism, Multidrug resistant organisms and Antibiotic stewardship programs.

Reference Books

1. Ananthanarayan and Paniker's Textbook of Microbiology
2. Jawetz, Melnick & Adelberg's Medical Microbiology
3. Prescott's Microbiology
4. Bailey & Scott's Diagnostic Microbiology
5. Mackie & McCartney Practical Medical Microbiology
6. Kuby Immunology

Department of Physiology

I. General Physiology, Cell Physiology, Blood & Immunology, Gastrointestinal Physiology

1. Cell structure and function, membrane transport, body fluid compartments, homeostasis, cell signaling and receptors.
2. Blood composition, hematopoiesis, hemoglobin, leukocyte physiology, immunity, homeostasis, coagulation, blood groups and transfusion.
3. Gastrointestinal motility, secretions, digestion, absorption, gastrointestinal hormones and clinical aspects of GI physiology.

II. Cardiovascular Physiology & Respiratory Physiology

1. Cardiac muscle physiology, conducting system, cardiac cycle, ECG, cardiac output, blood pressure regulation, circulation, coronary circulation and shock.
2. Mechanics of respiration, lung volumes and capacities, pulmonary ventilation, gas exchange, oxygen and carbon dioxide transport, regulation of respiration, hypoxia, pulmonary function tests and clinical

III. Renal Physiology, Endocrine Physiology & Reproductive Physiology

1. Renal blood flow, glomerular filtration, tubular functions, urine concentration, acid–base balance, RAAS, micturition and renal function tests.
2. Hormone classification, mechanisms of hormone action, pituitary, thyroid, adrenal, pancreatic and calcium-regulating hormones, endocrine disorders.
3. Male and female reproductive physiology, spermatogenesis, oogenesis, menstrual cycle, pregnancy, placental hormones and lactation.

IV. Neurophysiology, Nerve-Muscle Physiology & Special Senses

1. Membrane potential, action potential, nerve conduction, synaptic transmission, neuromuscular junction, skeletal and smooth muscle physiology, electromyography.
2. Central nervous system organization, reflexes, sensory and motor pathways, cerebellum, basal ganglia, hypothalamus, limbic system, sleep, learning, memory and higher cortical functions.
3. Physiology of vision, hearing, equilibrium, taste and smell.

V. Applied & Clinical Physiology

1. Clinical physiology of hematological, cardiovascular, respiratory, renal, endocrine and neurological disorders.
2. Exercise physiology, Electro Physiology, environmental physiology, stress, ageing and integrative physiology.
3. Recent advances in physiology, translational research and experimental physiology.

Reference Books:

1. Guyton and Hall Textbook of Medical Physiology – Primary textbook for all systems.
2. Ganong's Review of Medical Physiology – Concept-oriented and examination-focused.
3. Berne and Levy Physiology – Advanced physiological concepts.
4. Vander's Human Physiology – Integrative physiology.
5. Medical Physiology by Boron and Boulpaep
6. Principles of Neural Science
7. Review of Medical Physiology