

TECHNICAL ASSISTANT (Based on JIPMER-BMLT & UGC B.Sc. Biology Syllabus)

Anatomy

1. General Anatomy: Introduction to anatomical terms and organization of the human body. Tissues - Definitions, Types, characteristics, classification, location, functions and formation.
2. Systemic Anatomy: Musculoskeletal system: Bones – types, structure, Axial & appendicular skeleton. Bone formation and growth, Joints – classification and structure. Types and structure of muscles. Movements at the joints and muscles producing movements.
3. Nervous System: Structure of Neuroglia and neurones, Parts and classification, CNS - Structure of Brain and spinal cord and their functions, PNS - Cranial nerves and spinal nerves, ANS - Sympathetic and Parasympathetic
4. Cardiovascular System: Circulatory system - Structure of the Heart, Structure of Blood Vessels – arterial and venous system.
5. Lymphatic System: Gross and microscopic structure of lymphatic tissue.
6. Respiratory System: Parts, Nasal cavity and Paranasal air sinuses, trachea, Gross and microscopic structure of lungs, Diaphragm and Pleura.
7. Digestive System: Parts, Structure of Tongue, Salivary glands, stomach, Intestines, Liver, Pancreas.
8. Urinary System: Parts, structure of Kidney, Ureters, Urinary Bladder and Urethra.
9. Reproductive System: Parts of the system. Gross structure of both male and female reproductive organs.
10. Endocrine System: Gross structure of Pituitary, Thyroid, Parathyroid, Pancreas, Adrenal glands.
11. Special Senses: Structure of Skin, Eye, Nose, Tongue (Auditory and Olfactory apparatus)

Physiology

1. Blood: Components, haematocrit, ESR, blood volume measurements. RBC, WBC & platelet counts, names of developmental stages of RBC, functions and fate of RBC. Functions of WBC and platelets. Basis of blood coagulation. Blood groups – ABO & Rh
2. Muscle: Structure in brief, mechanism of muscle contraction, isotonic and isometric contractions, energy sources of muscle contractions, motor unit.
3. Gastro Intestinal Tract: Functional anatomy of G.I.T, functions of G.I secretions, principles of secretion and movements of GIT.
4. Kidney: Structure of Nephron, measurement and regulation of GFR, mechanism of urine formation. Clearance tests & values of insulin, PAH and urea clearance.
5. Endocrines: Names of endocrine glands & their secretions, functions of various hormones, Brief account of endocrine disorders.
6. Reproduction: Reproductive cycle in female including menstrual cycle, pregnancy, parturition, lactation. Male sex hormones and spermatogenesis. Basis of contraception.

7. Cardio Vascular System: Anatomy of heart, cardiac cycle, heart sounds, definitions of cardiac output, stroke volume, principles of measurements of cardiac output. ECG – methods of recording and ECG waves. Normal values of blood pressure, heart rate and their regulation in brief.
8. Respiration: Principles of respiration, respiratory muscles, lung volumes and capacities, collection and composition of inspired alveolar and expired airs. Transport of oxygen and carbon dioxide. Brief account of respiratory regulation. Definition of hypoxia, Cyanosis, asphyxia. Methods of artificial respiration.
9. Nerve, Central Nervous System: Structure of neuron, nerve impulse, myelinated and non-myelinated nerve. Brief account of resting membrane potential, action potential and conduction of nerve impulse. Neuro-muscle transmission. Various parts of nervous system, C.S.F., Functions of muscle spindle and motor tracts including reflexes , cutaneous receptors, joint receptors, sensory pathways. Ascending reticular formation, EEG, functions of cerebellum, basal ganglia, thalamus & hypothalamus, vestibular apparatus and functions.

Biochemistry & Biotechnology

1. Carbohydrates: Classification, configurations and conformations, sugar derivatives, structural and storage polysaccharides.
2. Amino acids: General properties, peptide bond, essential and non-essential amino acids.
3. Lipids: Classification, properties of lipid aggregates, biological significance.
4. Nucleic acid: Chemical structure and base composition, double helical structures, supercoiled DNA.
5. Enzymes: Nomenclature, apoenzyme and holoenzyme, substrate specificity, coenzymes, factors affecting enzyme activity, regulation of enzyme activity, enzyme inhibition, isozymes, ribozymes, abzymes.
6. Vitamins, water and fat soluble vitamins, deficiency and diseases.
7. General account of the chemical nature of living cells.
8. Cell theory, cell as basic unit of life.
9. Structure and organization of prokaryotic and eukaryotic cells. Cell organelles- structure, function and integration, micro bodies.
10. Cell division- mitosis and meiosis, Cell cycle, its regulation and cancer, Characteristic of cancer cells.
11. Major signaling pathways of eukaryotic cells.
12. Mendel's law of inheritance, Gene interactions. Sex determination, linkage, crossing over, recombination and gene mapping.
13. Chromosome structure and behaviour through the cell cycle, karyotype. Chromatin organization. Polytene and Lampbrush chromosome, Banding patterns in human chromosome, structural and numerical changes in chromosomes, hereditary defects.

Microbiology

1. General characteristics of microorganisms, structure of bacteria and viruses, bacterial growth - bacterial growth curve, factors affecting bacterial growth.

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2. Recombination in bacteria-transformation, conjugation and transduction, reproduction in bacteria, Bacterial diseases of humans, Food spoilage, food preservation.
3. Environmental microbiology- water pollution, treatment of water and sewage, biogeochemical cycles of elements in the environment.

Computer Applications and Bio-Statistics

1. Graphic and Diagrammatic representations. Classification and tabulation. Measures of central tendency and dispersion.
2. Introduction to probability, and distribution, sampling theory and errors. Tests of significance. Z, t, Chi square and F-test.
3. Analysis of variance. Correlation and regression.
4. Introduction to computers, hardware, storage and memory devises, input and output devises, file and folders concepts. File management , networks, printers, floppies, mouse, keyboard.
5. Different types of booting, operating systems-single user, multi-user and multi tasking operating systems with examples.
6. Internet and E-Mail. Important services provided by internet.