



BHU PMT SYLLABUS for BIOLOGY (BOTANY AND ZOOLOGY):-

Unit : 1 Diversity in Living World

Biology – its meaning and relevance to mankind What is living; Taxonomic categories and aids (Botanical gardens, herbaria, museums, zoological parks); Systematics and Binomial system of nomenclature. Introductory classification of living organisms (Two-kingdom system, Five-kingdom system); Major groups of each kingdom alongwith their salient features (Monera, including Archaeobacteria and Cyanobacteria, Protista, Fungi, Plantae, Animalia); Viruses; Lichens Plant kingdom – Salient features of major groups (Algae to Angiosperms); Animal kingdom – Salient features of Nonchordates up to phylum, and Chordates up to class level.

Unit : 2 Cell : The Unit of Life ; Structure and Function

Cell wall; Cell membrane; Endomembrane system (ER, Golgi apparatus/Dictyosome, Lysosomes, Vacuoles); Mitochondria; Plastids; Ribosomes; Cytoskeleton; Cilia and Flagella; Centrosome and Centriole; Nucleus; Microbodies. Structural differences between prokaryotic and eukaryotic, and between plant and animal cells. Cell cycle (various phases); Mitosis; Meiosis. Biomolecules – Structure and function of Carbohydrates, Proteins, Lipids, and Nucleic acids. Enzymes – Chemical nature, types, properties and mechanism of action.

Unit : 3 Genetics and Evolution

Mendelian inheritance; Chromosome theory of inheritance; Gene interaction; Incomplete dominance; Co dominance; Complementary genes; Multiple alleles; Linkage and Crossing over; Inheritance patterns of hemophilia and blood groups in humans. DNA –its organization and replication; Transcription and Translation; Gene expression and regulation; DNA fingerprinting. Theories and evidences of evolution, including modern Darwinism.

Unit : 4 Structure and Function – Plants

Morphology of a flowering plant; Tissues and tissue systems in plants; Anatomy and function of root, stem(including modifications), leaf, inflorescence, flower (including position and arrangement of different whorls, placentation), fruit and seed; Types of fruit; Secondary growth; Absorption and movement of water (including diffusion, osmosis and water relations of cell) and of nutrients; Translocation of food; Transpiration and gaseous exchange; Mechanism of stomatal movement. Mineral nutrition – Macro- and micro-nutrients in plants including deficiency disorders; Biological nitrogen fixation mechanism. Photosynthesis – Light reaction, cyclic and non-cyclic photophosphorylation; Various pathways of carbon dioxide fixation; Photorespiration; Limiting factors . Respiration – Anaerobic, Fermentation, Aerobic; Glycolysis, TCA cycle; Electron transport system; Energy relations.

Unit : 5 Structure and Function - Animals

Tissues; Elementary knowledge of morphology, anatomy and functions of different systems of earthworm, cockroach and frog. Human Physiology – Digestive system - organs, digestion and absorption; Respiratory system – organs, breathing and exchange and transport of gases. Body fluids and circulation – Blood, lymph, double circulation, regulation of cardiac activity; Hypertension, Coronary artery diseases. Excretion system – Urine formation, regulation of kidney function Locomotion and movement – Skeletal system, joints, muscles, types of movement. Control and co-ordination – Central and peripheral nervous systems, structure and function of neuron, reflex action and sensory reception; Role of various types of endocrine glands; Mechanism of hormone action.

Unit : 6 Reproduction, Growth and Movement in Plants

Asexual methods of reproduction; Sexual Reproduction - Development of male and female gametophytes; Pollination (Types and agents); Fertilization; Development of embryo, endosperm, seed and fruit (including parthenocarpy and apomixis). Growth and Movement – Growth phases; Types of growth regulators and their role in seed dormancy, germination and movement; Apical dominance; Senescence; Abscission; Photoperiodism; Vernalisation; Various types of movements.

Unit : 7 Reproduction and Development in Humans

Male and female reproductive systems; Menstrual cycle; Gamete production; Fertilisation; Implantation; Embryo development; Pregnancy and parturition; Birth control and contraception.

Unit : 8 Ecology and Environment

Meaning of ecology, environment, habitat and niche. Ecological levels of organization (organism to biosphere); Characteristics of Species, Population, Biotic Community and Ecosystem; Succession and Climax. Ecosystem – Biotic and abiotic components; Ecological pyramids; Food chain and Food web; Energy flow; Major types of ecosystems including agroecosystem. Ecological adaptations – Structural and physiological features in plants and animals of aquatic and desert habitats. Biodiversity – Meaning, types and conservation strategies (Biosphere reserves, National parks and Sanctuaries) Environmental Issues – Air and Water Pollution (sources and major pollutants); Global warming and Climate change; Ozonedepletion; Noise pollution; Radioactive pollution; Methods of pollution control (including an idea of bioremediation); Deforestation; Extinction of species (Hot Spots).

Unit : 9 Biology and Human Welfare

Animal husbandry – Livestock, Poultry, Fisheries; Major animal diseases and their control. Pathogens of major communicable diseases of humans caused by fungi, bacteria, viruses, protozoans and helminths, and their control. Cancer; AIDS. Adolescence and drug/alcohol abuse; Basic concepts of immunology. Plant Breeding and Tissue Culture in crop improvement. Biofertilisers (green manure, symbiotic and free-living nitrogen-fixing microbes, mycorrhizae); Biopesticides (micro-organisms as biocontrol agents for pests and pathogens); Bioherbicides; Microorganisms as pathogens of plant diseases with special reference to rust and smut of wheat, bacterial leaf blight of rice, late blight of potato, bean mosaic, and root - knot of vegetables. Bioenergy – Hydrocarbon - rich plants as substitute of fossil fuels.

Unit : 10 Biotechnology and its Applications

Microbes as ideal system for biotechnology; Microbial technology in food processing, industrial production (alcohol, acids, enzymes, antibiotics), sewage treatment and energy generation. Steps in recombinant DNA technology – restriction enzymes, DNA insertion by vectors and other methods, regeneration of recombinants. Applications of R-DNA technology. In human health –Production of Insulin, Vaccines and Growth hormones, Organ transplant, Gene therapy. In Industry – Production of expensive enzymes, strain improvement to scale up bioprocesses. In Agriculture – GM crops by transfer of genes for nitrogen fixation, herbicide-resistance and pest-resistance including Bt crops.

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