

1: The diversity of living world:

Taxonomic aids, keys, specimen management; a Systematic and binomial system of nomenclature; Classification of living organisms (five kingdom classification, major groups and principles of classification within each group); General description of monera, protozoa, fungi, algae, bryophytes.

2: Structural organisation in plants and animals:

Morphology, Anatomy and histology of angiosperms: Root, stem, leaf, flower, inflorescence, fruits and seeds, Tissues: Meristematic and permanent (epidermal, ground, vascular). Cambial activity, secondary growth, type of wood.

3: Structural and functional organization of cell:

Cell cycle, detailed study of Cell division (mitosis, meiosis); Cell death; Structure and function (metabolism) of carbohydrates, proteins, lipids and nucleic acids; Enzymology: Classification and nomenclature of enzymes; Structure; Mechanism of action.

4: Plant physiology:

Water relations: Properties of water, water in tissues and cells, Transport of water and solutes (food, nutrients, gases): Transport across cell membrane; soil-plant-atmosphere continuum; Minerals required by plant, their absorbable form, functions, deficiency symptoms, essentiality of mineral, N₂ metabolism, biological fixation; Cellular Metabolism: Gluconeogenesis, Glycogenesis and glycogenolysis, hormonal regulation; Oxidation of food, respiratory efficiency of various food components.

5: Human biology:

Morphology, Anatomy, Histology, Physiology, Control and Disorders of Digestion, Respiration, Body fluids and Circulation, Excretion, Skeleton system & muscle, Nervous; Physiology of high altitude.

6: Sexual Reproduction in Plants:

Plants: Structural details of angiospermic flower, development of gametophytes, pollination and its types, agencies of pollination, pollen-pistil interaction, fertilization, Artificial hybridization (emasculation and bagging) development of seed and fruit; Apomixis and Polyembryony; Self-incompatibility: Structural and biochemical aspects; methods to overcome incompatibility; Experimental Embryology;

7: Sexual Reproduction in Human:

Morphology, Anatomy, Histology and Physiology of reproduction; Neuro-endocrine control; Sexual behaviour in infancy, pre-adolescence, adolescence and of adult; Implantation, Pregnancy and Parturition; Mammary gland and Lactation; Infantile mammary gland, pubertal changes in the mammary gland.

8: Genetics:

Principles of Inheritance and Variation: Mendelian genetics, Inheritance of one gene, two genes, post mendelian inheritance; Recombination frequency, chromosomal theory of inheritance; Drosophila genetics, linkage and recombinations; Mutation: General properties of mutations ; Adaptation versus mutation ; molecular basis of gene mutation: DNA repair mechanisms; Pedigree analysis; Human karyotype-banding; genetic and environmental basis of sex determination, Y- and X-linked genes; Numerical and Structural abnormalities of human chromosomes and related syndromes; Human metabolic disorders.

9: Biology in Human welfare:

Health and disease; types of diseases, common diseases in humans; Immunology – Innate and Acquired immunity; Passive and active immunization; Organization and structure of lymphoid organ; Cells of the immune system and their differentiation; Lymphocyte traffic; Nature of immune response; Structure and Functions of antibodies: Antigen-Antibody interactions; Humoral immune response; Cell mediated immunity ; Immunological memory ; Auto-immunity; Allergies; HLA system in human: MHC haplotypes; Transplantation types and problems; Immunodeficiency disorders; etiology of HIV; types, genetics and biochemistry of cancer; Drugs and alcohol abuse, Addiction , drug dependence, ill effects, prevention, its abuse in adolescents and its management; Strategies for food production and enhancement: Animal husbandry, management of farm animals, breeding strategies (natural and artificial) and their types.

10: Principles of Biotechnology:

Genetic engineering tools and technique, the technique of separation and isolation of DNA, cloning vectors, electrophoresis, bioreactors, processing of its products. Tissue engineering; Cryopreservation; Fusion methods, detection and applications of monoclonal antibodies, DNA vaccines, Edible vaccines.; Application in agriculture: GMO for pest resistance, RNAi and dsRNA technology, Application in Medicine, genetically engineered products, gene therapy.

11: Ecology:

Organism and its environment, distribution of biomes, major physical factors and the physiological responses shown by organisms; Physical adaptation of plants and animals, rules governing adaptations; Population attributes and growth, logistic curves, Darwinian fitness; Population interactions and their theories; Ecosystem structure and functions, ecosystem productivity and standing crop, decomposition in nature, energy flow in GFC / DFC, ecological pyramids, succession of community; Nutrient cycle; ecosystem services; Biodiversity types and its patterns, importance of diversity, its loss and their causes, conservation strategies.