

# BIOLOGY



**I. Diversity in the Living World****(Periods 30)**

**Chapter-1: The Living world: Biodiversity;** Need for classification, Taxonomy & Systematics; Binomial nomenclature; Concept of species and taxonomical hierarchy.

**Chapter- 2: Biological Classification:** Three domain of life, five kingdom classification; Salient features and classification of Monera; Protista and Fungi into major groups; Lichens; Viruses and Viroids.

**Chapter- 3: Plant Kingdom:** Salient Features and Classification of plants into major groups- Algae, Bryophytes, Pteridophytes and Gymnosperms.

**Chapter- 4: Animal Kingdom:** Salient features and classification of animals- non chordate up to phyla level and chordate up to classes level (3 to 5 salient features and at least two examples).

**II. Structural Organization in Plants and Animals****(Periods 20)**

**Chapter-5: Morphology of Flowering Plants:** Morphology and functions of different parts of flowering plants-Root, stem, leaf, inflorescence- cymose and racemose, flower, fruit and seed (To be dealt along with the relevant practical of the Practical Syllabus). Semi-technical description of a typical flowering plant; Family Solanaceae features and its economic importance.

**Chapter-6: Anatomy of Flowering Plants:** Tissue systems; Anatomy of Root, stem and leaf (Dicotyledonous and Monocotyledonous plants).

**Chapter-7: Structural Organisation in Animals:** Morphology, anatomy and functions of different systems (digestive, circulatory, respiratory, nervous and reproductive) of frog. (Brief account only).

**III. Cell Structure and Functions****(Periods 35)**

**Chapter- 8: Cell:** The Unit of Life - Cell theory and cell as the basic unit of life; Structure of prokaryotic and eukaryotic cell; Plant cell and animal cell; Cell envelope, cell membrane, cell wall; Cell organelles– structure and function; Endomembrane system- endoplasmic reticulum, Golgi bodies, lysosomes, vacuoles; mitochondria, ribosomes, plastids, microbodies; Cytoskeleton, cilia, flagella, centrioles (ultra structure & function); Nucleus–nuclear membrane, chromatin, nucleolus.

**Chapter - 9: Biomolecules:** Chemical constituents of living cells; structure and function of proteins, carbohydrates, lipids, nucleic acids; Enzymes– Types, properties, enzyme action.

**Chapter-10:** Cell Cycle and Cell division: Cell cycle, mitosis, meiosis and their significance.

**IV. Plant Physiology****(Periods 30)**

**Chapter-11: Photosynthesis in Higher Plants:** Photosynthesis as a means of Autotrophic nutrition; Where does photosynthesis take place; How many pigments are involved in Photosynthesis (Elementary idea); Photochemical and biosynthetic phases of photosynthesis; Cyclic and non-cyclic photophosphorylation; Chemiosmotic hypothesis; Photorespiration; C<sub>3</sub> and C<sub>4</sub> pathways; Factors affecting photosynthesis.



**Chapter-12: Respiration in Plants:** Exchange of gases; Cellular respiration – glycolysis, fermentation (anaerobic), TCA cycle and electron transport system (aerobic); Energy relations – Number of ATP molecules generated; Amphibolic pathways; Respiratory quotient.

**Chapter-13: Plant Growth and Development:** Seed germination; Phases of plant growth and plant growth rate; Conditions of growth; Differentiation, dedifferentiation and redifferentiation; Sequence of developmental process in a plant cell; Growth regulators–auxin, gibberellin, cytokinin, ethylene and ABA.

## V. Human Physiology

(Periods 45)

**Chapter-14:** Breathing and Exchange of Gases: Respiratory organs in animals (recall only); Respiratory system in humans; Mechanism of breathing and its regulation in humans– Exchange of gases, transport of gases and regulation of respiration, Respiratory volumes; Disorders related to respiration-Asthma, Emphysema, Occupational respiratory disorders.

**Chapter-15:** Body Fluids and Circulation: Composition of blood, blood groups, coagulation of blood; Composition of lymph and its function; Human circulatory system– Structure of human heart and blood vessels; Cardiac cycle, cardiac output, ECG; Double circulation; Regulation of cardiac activity; Disorders of circulatory system-Hypertension, Coronary artery disease, Angina pectoris, Heart failure.

**Chapter-16:** Excretory Products and their Elimination: Modes of excretion –Ammonotelism, ureotelism, uricotelism; Human excretory system–structure and function; Urine formation, Osmoregulation; Regulation of kidney function– Renin-angiotensin, Atrial Natriuretic Factor, ADH and Diabetes insipidus, Role of other organs in excretion; Disorders-Uraemia, Renal failure, Renal calculi, Nephritis; Dialysis and artificial kidney.

**Chapter- 17:** Locomotion and Movement: Types of movement – ciliary, flagellar, muscular; Skeletal muscle – contractile proteins and muscle contraction; Skeletal system and its functions (To be dealt with the relevant practical of Practical syllabus); Joints; Disorders of muscular and skeletal system- Myasthenia gravis, Tetany, Muscular dystrophy, Arthritis, Osteoporosis, Gout.

**Chapter- 18:** Neural Control and Coordination: Neuron and nerves; Nervous system in humans– central nervous system, peripheral nervous system and visceral nervous system; Generation and conduction of nerve impulse.

**Chapter –19:** Chemical Coordination and Integration: Endocrine glands and hormones; Human endocrine system- Hypothalamus, Pituitary, Pineal, Thyroid, Parathyroid, Adrenal, Pancreas, Gonads; Mechanism of hormone action (Elementary Idea); Role of hormones as messengers and regulators, Hypo-and hyperactivity and related disorders (Common disorders e.g. Dwarfism, Acromegaly, Cretinism, goiter, exophthalmic goiter, diabetes, Addison's disease).

Important: Diseases related to all the human physiology systems to be taught in brief.

## Reference:

Biology Textbook for Class XI, NCERT, Revised Edition, November 2022.



**I. Reproduction****(Periods 35)**

**Chapter- 1:** Sexual Reproduction in Flowering Plants: Flower structure; Development of male and female gametophytes; Pollination–types, agencies and examples; Outbreeding devices; Pollen-Pistil interaction; Double fertilization; Post fertilization events– Development of endosperm and embryo, Development of seed and formation of fruit; Special modes– apomixis, parthenocarpy, polyembryony; Significance of seed and fruit formation.

**Chapter- 2:** Human Reproduction: Male and female reproductive systems; Microscopic anatomy of testis and ovary; Gametogenesis- spermatogenesis & oogenesis; Menstrual cycle; Fertilisation, embryo development upto blastocyst formation, implantation; Pregnancy and placenta formation (Elementary idea); Parturition (Elementary idea); Lactation (Elementary idea).

**Chapter- 3:** Reproductive Health: Need for reproductive health and prevention of sexually transmitted diseases (STD); Birth control- Need and Methods, Contraception and Medical Termination of Pregnancy (MTP); Amniocentesis; Infertility and assisted reproductive technologies – IVF, ZIFT, GIFT (Elementary idea for general awareness).

**II. Genetics and Evolution****(Periods 45)**

**Chapter- 4:** Principles of Inheritance and Variation: Mendelian Inheritance; Deviations from Mendelism– Incomplete dominance, Co-dominance, Multiple alleles and Inheritance of blood groups, Pleiotropy; Elementary idea of polygenic inheritance; Chromosome theory of inheritance; Chromosomes and genes; Sex determination– In humans, birds, honey bee; Linkage and crossing over; Mendelian disorders in humans – Sex linked inheritance (Haemophilia and Colour blindness) and Autosome linked inheritance (Sickle cell anaemia, Phenylketonuria and Thalassemia); Chromosomal disorders in humans (Down's syndrome, Turner's and Klinefelter's syndromes).

**Chapter-5:** Molecular Basis of Inheritance: Search for genetic material and DNA as genetic material; Structure of DNA and RNA; DNA packaging; DNA replication; Central dogma; Transcription, genetic code, translation; Gene expression and regulation– Lac Operon; Genome and human genome project; DNA fingerprinting.

**Chapter-6:** Evolution: Origin of life; Biological evolution and evidences for biological evolution (Paleontological, comparative anatomy, embryology and molecular evidence); Darwin's contribution, Modern Synthetic theory of Evolution; Mechanism of evolution– Variation (Mutation and Recombination) and Natural Selection with examples, types of natural selection; Gene flow and genetic drift; Hardy-Weinberg's principle; Adaptive Radiation; Human evolution.

**III. Biology in Human Welfare****(Periods 25)**

**Chapter- 7:** Human Health and Disease: Pathogens; parasites causing human diseases (Malaria, Filariasis, Ascariasis, Typhoid, Pneumonia, common cold, amoebiasis, ring worm); Basic concepts of immunology–vaccines; Cancer, HIV and AIDs; Adolescence, drug and alcohol abuse.

**Chapter- 8:** Microbes in Human Welfare: In household food processing, industrial production, sewage treatment, energy generation and as biocontrol agents and biofertilizers.



## IV. Biotechnology and its Applications

(Periods 30)

**Chapter-9:** Biotechnology: Principles and Processes: Genetic engineering (Recombinant DNA technology).

**Chapter-10:** Biotechnology and its Applications: Application of Biotechnology in health and agriculture; Human insulin and vaccine production, gene therapy; Genetically modified organisms-Bt crops; Transgenic Animals; Biosafety issues– Biopiracy and patents.

## V. Ecology and Environment

(Periods 25)

**Chapter-11:** Organisms and Populations: Population- Population attributes–Growth, birth rate, death rate, age distribution; Population interactions–mutualism, competition, predation, parasitism and commensalism.

**Chapter- 12:** Ecosystem: Patterns, components; productivity and decomposition; Energy flow; Pyramids of number, biomass and energy.

**Chapter-13:** Biodiversity and Conservation: Concept of Biodiversity; Patterns of Biodiversity; Importance of Biodiversity; Loss of Biodiversity; Biodiversity conservation; Hotspots, endangered organisms, extinction, Red Data Book, biosphere reserves, National parks and sanctuaries.

**Reference:** Biology Textbook for Class XII, NCERT, Revised Edition, November 2022.

