

**BIOLOGY/BIOLOGICAL STUDIES/BIOTECHNOLOGY/BIOCHEMISTRY-304**

**BIOLOGY/BIOLOGICAL  
STUDIES/BIOTECHNOLOGY/  
BIOCHEMISTRY**

**Syllabus for Class 12**

*Note:*

*There will be one Question Paper which will have 50 questions out of which 40 questions need to be attempted.*

## **BIOLOGY/BIOLOGICAL STUDIES/BIOTECHNOLOGY/BIOCHEMISTRY**

### **Unit I: Diversity in Living World**

What is living?; Biodiversity; Need for classification; Three domains of life; Taxonomy & Systematics; Concept of species and taxonomical hierarchy; Binomial nomenclature; Tools for study of Taxonomy– Museums, Zoos, Herbaria, Botanical gardens.

Five kingdom classification; Salient features and classification of Monera; Protista and Fungi into major groups; Lichens; Viruses and Viroids.

Salient features and classification of plants into major groups- Algae, Bryophytes, Pteridophytes, Gymnosperm, and Angiosperm (three to five salient and distinguishing features and at least two examples of each category); Angiosperms- classification up to class, characteristic features, and examples.

Salient features and classification of animals- non-chordate up to phyla level and chordate up to classes level (three to five salient features and at least two examples).

### **Unit II: Structural Organisation in Animals and Plants**

Morphology and modifications; Tissues; Anatomy and functions of different parts of flowering plants: Root, stem, leaf, inflorescence- cymose and racemose, flower, fruit, and seed (To be dealt with along with the relevant practical of the Practical Syllabus).

Animal tissues; Morphology, anatomy, and functions of different systems (digestive, circulatory, respiratory, nervous, and reproductive) of an insect (cockroach). (Brief account only)

### **Unit III: Cell Structure and Function**

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 (ultrastructure and function); Nucleus–nuclear membrane, chromatin, nucleolus.

Chemical constituents of living cells: Biomolecules–structure and function of proteins, carbohydrates, lipid, nucleic acids; Enzymes–types, properties, enzyme action.

Cell division: Cell cycle, mitosis, meiosis, and their significance.

### **Unit IV: Plant Physiology**

Transport in plants: Movement of water, gases, and nutrients; Cell to cell transport– Diffusion, facilitated diffusion, active transport; Plant – water relations– Imbibition, water potential, osmosis, plasmolysis; Long-distance transport of water– Absorption, apoplast, symplast, transpiration pull, root pressure, and guttation; Transpiration– Opening and closing of stomata; Uptake and translocation of mineral nutrients– Transport of food, phloem transport, Mass flow hypothesis; Diffusion of gases (brief mention).

Mineral nutrition: Essential minerals, macro and micronutrients, and their role; Deficiency symptoms; Mineral toxicity; Elementary idea of Hydroponics as a method to study mineral

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nutrition; Nitrogen metabolism – Nitrogen cycle, biological nitrogen fixation.

Photosynthesis: 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.

Respiration: 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.

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, ABA; Seed dormancy; Vernalisation; Photoperiodism.

### **Unit V: Human Physiology**

Digestion and absorption: Alimentary canal and digestive glands; Role of digestive enzymes and gastrointestinal hormones; Peristalsis, digestion, absorption, and assimilation of proteins, carbohydrates, and fats; Calorific value of proteins, carbohydrates, and fats (for box item not to be evaluated); Egestion; Nutritional and digestive disorders– PEM, indigestion, constipation, vomiting, jaundice, diarrhea.

Breathing and Respiration: 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.

Body fluids and circulation: Composition of the 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.

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.

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 in the relevant practical of Practical syllabus); Joints; Disorders of the muscular and skeletal system– Myasthenia gravis, Tetany, Muscular dystrophy, Arthritis, Osteoporosis, Gout.

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; Reflex action; Sensory perception; Sense organs; Elementary structure and function of eye and ear.

Chemical coordination and regulation: 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).

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