

# Biology Syllabus

There is one paper of 3 hours duration divided into two parts.

Part I (20 marks) consists of compulsory short answer questions, testing knowledge, application and skills relating to elementary/fundamental aspects of the entire syllabus.

Part II (50 marks) is divided into three Sections A, B and C. You are required to answer two out of three questions from Section A (each carrying 5 marks), two out of three questions from Section B (each carrying 10 marks) and two out of three questions from Section C (each carrying 10 marks). Therefore a total of six questions are to be answered in Part II.

## SECTION A

### 1. Diversity of Life

- (i) Taxonomy and phylogeny, three domains of life; taxonomical hierarchies, binomial nomenclature.
- (ii) Five-kingdom classification: salient features, characteristics and examples.
- (iii) Morphology and anatomy of different systems of cockroach (digestive, respiratory, circulatory, excretory, nervous and reproductive).

## SECTION B

### 2. Plant Physiology

- (i) Mineral nutrition: macronutrients and micronutrients (role and deficiency symptoms); criteria for essentiality of elements, hydroponics; nitrogen nutrition in plants.
- (ii) Plant growth: phases of growth, growth rate, measurement of growth, factors affecting growth, role of growth regulators, seed dormancy and germination, apical dominance, senescence and abscission.
- (iii) Photomorphogenesis in plants.

### 3. Multicellularity: Structure and Functions of Plants and Animals

- (i) Plant Tissues: types of plant tissues: Meristematic: Classification of Meristematic tissue. Permanent Tissues: Structure and function of simple tissues (parenchyma, collenchyma and sclerenchyma) and complex tissues (xylem and phloem), types of vascular bundles.

(ii) Animal Tissues: epithelial; connective; muscular; nervous (location, structure and function).

(iii) Nutrition (human): Calorific value of carbohydrates, proteins and fats, Organs of digestive system (histology of individual organs not required), digestive process and disorders of the digestive system.

(iv) Respiration (human): Organs of respiratory system, breathing mechanism (inspiration and expiration), pulmonary gas exchange, transport of respiratory gases, pulmonary air volumes and lung capacities. Disorders of the respiratory system.

(v) Circulation: closed and open vascular systems, structure of human heart, cardiac cycle, systemic and pulmonary circulation, portal system, arterial blood pressure, origin and conduction of heart beat, blood vessels (structure with the help of diagrams and adaptation), lymphatic system. ABO groups, coagulation of blood. Disorders of the Circulatory system.

(vi) Excretion: ammonotelism, ureotelism, uricotelism, structure of human kidney (L.S.), structure of nephron, role of skin and lungs in excretion, physiology of urine formation, counter current system; functions of the kidney; homeostasis. Disorders of the excretory system.

(vii) Endocrine System (human): hormones of pituitary, pineal, thyroid, parathyroid, pancreas, adrenal glands and gonads; mechanism of hormone action; effect of hyposecretion and hypersecretion, feedback mechanism.

(viii) Nervous System (human): Central, autonomic and peripheral, structure of brain and spinal cord, reflex action, transmission of nerve impulse, saltatory conduction; sense organs (eye and ear). Receptors (mechanoreceptor, chemoreceptor, photoreceptor and thermoreceptors).

(ix) Locomotion: joints, structure of skeletal muscle, sliding filament theory of muscle contraction, red and white muscles, summation, tetanus and rigor mortis. Disorders of muscular and skeletal system.

## **SECTION C**

### **4. Units of Life**

(i) Biomolecules: Outline classification and functions of Carbohydrates, proteins, lipids and nucleic acids.

(ii) Enzymes: General properties, classification, mechanism of enzyme action, factors affecting enzyme activity.

(iii) Cell membranes: fluid mosaic model, membrane transport, passive and active transport, exocytosis and endocytosis. Facilitated diffusion.

(iv) Cell structure: structure and functions of nucleus, mitochondria, plastids, endoplasmic reticulum, golgi complex, lysosomes, ribosomes, microfilaments, microtubules, cilia, flagella and centrioles (ultra structure and function); Cell wall, vacuoles and cell inclusions. Prokaryotic cell and eukaryotic cell - a comparison.

(v) Cellular respiration: aerobic and anaerobic, fermentation, glycolysis, Krebs' cycle, oxidative phosphorylation and respiratory quotient. Amphibolic pathway.

(vi) Cell reproduction: cell cycle, mitosis and meiosis.

## **5. Organisms and Environment**

(i) Ecosystem: biotic and abiotic components, Productivity and decomposition, food chain, trophic levels, food webs, ecological pyramids, niche, biogeochemical cycles.

(ii) Pollution: Air, water and soil pollution and their control. Greenhouse effect and ozone depletion.