

# Biology

## Botany

1. **Microbiology** : Viruses, bacteria, plasmids, structure and reproduction, general account of infection and immunology, Microbes in agriculture, industry and medicine, and air, soil and water, control of pollution using microorganisms.
2. **Pathology** : Important plant diseases in India caused by viruses, bacteria, mycoplasma, fungi and nematodes. Modes of infection, dissemination, physiology and parasitism and methods of control, Mechanism of action of biocides, Fungal toxins.
3. **Cryptogams** : Structure and reproduction from evolutionary aspect, and ecology and economic importance of algae, fungi, bryophytes and pteridophytes, Principal distribution in India.
4. **Phanerogams** : Anatomy of wood, secondary growth, Anatomy of C3 and C4 plants, stomatal types. Embryology, barriers to sexual incompatibility, Seed Structure, Apomixis and Polyembryony, Palynology and its applications. Comparison of systems of classification of angiosperms, modern trends in biosystematics, Taxonomic and economic importance of Cycadaceae, Pinaceae, Genetales, Magnoliaceae, Ranunculaceae, Cruciferae, Rosaceae, Leguminosae, Euphorbiaceae, Malvaceae, Dipterocarpaceae, Umbelliferae, Asclepiadaceae, Verbenaceae, Solanaceae, Rubiaceae, Cucurbitaceae, Compositae, Gramineae, Palmae, Liliaceae, Musaceae and Orchidaceae.
5. **Morphogenesis** : Polarity, Symmetry and totipotency, differentiation and dedifferentiation of cells and organs, factors of morphogenesis, Methodology and applications of cell, tissues, organ and protoplast cultures from vegetative and reproductive parts, Somatic hybrids.

## Zoology

Non Chordata and chordata, Ecology, Ethology, Bio-Statistics and Economic zoology,

### Section-A : Non chordata and chordata

1. A general Survey classification and relationship of the various phyla
2. Protozoa : Study of the structure, blonomlca and life history Paramecium, monocyctis, malarial parasite, trypanosoma and Leishmania, Locomotion, nutrition and reproduction In protozoa.
3. Porifera : Canal system, Skeleton and reproduction.
4. Coelenterata : Structure and life history of Obelia and Aurelia. Polymorphism in Hydrozoa, coral formation, metagenesis, Phylogenetic relationship of cnidaria and acnidaria.
5. Helminthes : Structures and life history of Planaria, Fasciola, Taenia and Ascaris. Parasitic adaptation, Helminthes in relation to man.
6. Annelida : Nerieis, earthworm and leech; coelom and metamerism, modes of life in polychaetes.
7. Arthropods : Palaemon, Scorpion, cockroach, larval forms and parasitism in Crustacea, mouth parts, vision and respiration in arthropods, social life and metamorphosis in insects. Importance of Peripatus.
8. Mollusca : Unio Pila, oyster, culture and pearl formation, cephalopoda.
9. Echinodermata - General organization, larval forms and affinities of Echinodermata.
10. General organization and characters, outline classification and inter-relationship of protochordata, Pisces, Amphibia, Reptilia, Aves and Mammalia.

11. Neotony and retrogressive metamorphosis
12. A general study of comparative account of the various systems of vertebrates.
13. Locomotion, migration and respiration in fishes, structure and affinities of Dipnoi.

### **Section - B : Ecology, Ethology, Biostatics and Economic Zoology. Ecology:**

1. Environment: Abiotic factors and their role, Biotic Factor\* Inter and Intra-specific relations,
2. Animal: Organisation at population and community levels, ecological successions.
3. Ecosystem: Concept, components, fundamentals operation, energy flow, biogeo- chemical cycles, food and trophic levels.
4. Adaptation in fresh water, marine and terrestrial habitats.
5. Pollution in air, water and land.
6. Wild life in India and its Conservation.

### **Ethology**

7. General survey of various types of animal behaviour
8. Role of hormones and pheromones in behaviour
9. Chronobiology, Biological clock, seasonal rhythms, tidal rhythms.
10. Neuro-endocrine control of behaviour.
11. Methods of studying animals behaviour.

### **Bio Statistics**

12. Methods of sampling, frequency distribution and measures of central tendency, standard deviation, standard error and standard deviation, correlation and regression and Chi-square and t-test.

### **Economic Zoology**

13. Parasitism, commensalisms & host parasite relationship
14. Parasitic protozoan's helminthes and insects of man and domestic animals.
15. Insect pests of crops and stores products.
16. Beneficial insects.
17. Pisciculture and induced breeding.

**1. Cell Biology** : Scope and perspective general knowledge of modern tools and techniques in the study of cytology, Prokaryotic and eukaryotic cells, structural and ultrastructural details, functions of organelles including membranes, detailed study of mitosis and meiosis, numerical and structural variations in chromosome and their significance, study of polytene and lampbrush chromosomes structure, behaviour, and cytological significance.

**2. Genetics and Evolution** : Development of genetics and gene concept, structure and role of nucleic acids in protein synthesis and reproduction, Genetic code and regulation of gene expression, gene amplifications, mutation and evolution, Multiple factors, linkage and crossing over, methods of gene mapping, sex chromosomes and sexlinked inheritance, male sterility, its significance in plant breeding. Cytoplasmic inheritance, Elements of human genetics, standard deviation and Chi-square analysis, Gene transfer in microorganisms, Genetic engineering, Organic evolution, evidence, mechanism and theories.

**3. Physiology and Biochemistry:** Detailed study of water relations, Mineral nutrition and ion / transport, Mineral deficiencies, Photosynthesis - mechanism and importance, photosystems I and II, Photorespiration, Respiration and fermentation, of secondary metabolites, Pigments as photoreceptors, Photoperiodism, flowering. Growth substances, their chemical nature, role and applications in agri-horticulture. Agrochemicals, Stress physiology, Vernalisation, Fruit and seed physiology, dormancy, storage and germination of seed, parthenocarp, fruit ripening.

**4. Ecology :** Ecological factors, concept and dynamics of community, succession, concept of biospheres, Conservation of ecosystems, Pollution and its control, Forest types of India, Afforestation, deforestation and social forestry, endangered plants.

**5. Economic Botany :** Origin of cultivated plants, study of plants as sources of food, fodder and forage, fatty oils, wood and timber, fiber, paper, rubber, beverages, alcohol, drugs, narcotics, resins and gums, essential oils, dyes, mucilage, insecticides and pesticide

## **Zoology**

### **Section 'A': Cell Biology, Genetics, Evolution and systematics.**

**1. Cell Biology** - Structure and function of Cell and Cytoplasmic constituents, structure of nucleus, plasma membrane, mitochondria, golgibodies, endoplasmic reticulum and ribosomes, cell division, mitotic spindle and chromosome movements and meiosis. Gene structure and Function ; Watson-Crick model of DNA, Replication of DNA Genetic code, protein synthesis cell differentiation sex chromosomes and sex determination.

**2. Genetics: Mendelian** laws of inheritance, re-combination, linkage and linkage maps, multiple, alleles; mutation (natural and induced), mutation (and evolution, Meiosis, chromosome number and form, structural rearrangements; polyploidy, cytoplasmic, inheritance, regulation of gene expression in prokaryotes and eukaryotes, biochemical genetic, elements of human genetics; normal and abnormal karyotypes, genes and diseases, Eugenics.

**3. Evolution and systematics** - Origin of life history of evolution through Lamarck and his works. Darwin and his works sources and nature of organic variation, Natural selection, Hardy-Weinberg law, cryptic and warning, colouration mimicry, Isolation mechanism, and their role. Fauna, concept of species and sub species, principles of classification, zoological nomenclature and international code. Fossils, outline of geological eras phylogeny of horse, elephant, camel, .origin and evolution of man, principles and theories of continental distribution of animals, zoogeographical realms of the world.

### **Section 'B': Biochemistry, Physiology and Embryology**

**1. Biochemistry:** Structure of carbohydrates, lipids, amino acids, proteins and nucleic acids, glycolysis and krebs cycle, oxidation and reduction, oxidative phosphorylation, energy conservation and release, ATP, Cyclic AMP, saturated and unsaturated fatty acids, cholesterol, steroid hormones Types of enzymes, Mechanism of enzyme action immunoglobulins and immunity, Vitamins and co-enzymes; Hormones, their classification, biosynthesis and functions.

**2. Physiology** with special reference to animals, composition of blood, blood groups in man, coagulation, oxygen and carbon dioxide transport haemoglobin, breathing and its regulation nephron and urine formation, acid base balance and homeostasis, temperature regulation in man, mechanism of conduction along the axon and across synapse, neurotransmitters, vision, hearing and other receptors; types of muscles, ultrastructure and mechanism of contraction of skeletal muscle role of salivary glands, liver, pancreas and intestinal glands in digestion, absorption of digested food, nutrition and balanced diet of man, Mechanism of action of steroid and peptide hormones, role of hypothalamus, pituitary, thyroid, parathyroid, pancreas, adrenal, testis, ovary and pineal organs and their inter-relationships, physiology of reproduction in humans, hormonal control of development in man and insects, pheromones in insects and mammals.

**3.Embryology:** Gametogenesis, fertilization, types of eggs, cleavage, development upto gastrulation in branchiostoma, frog and chick, Fate maps of frog and chick; Metamorphosis in frog. Formation and fate of extra embryonic membrane in chick, Formation of amnion, allantois and types of placenta in mammals, function of placenta in mammals. Organisers, Regeneration, genetic, control of development, Organesis of central nervous system, sense organs heart and kidney of vertebrate embryos Ageing and its implication in relation to man.

**4. Minority Directorate Schemes –** Pre Matric, Post Matric, Merit-Cum-Means & Overseas Scholarship, Remedial Coaching, Incentives, Pre Matric and Post Martic Hostels & Morarji Desai Residential Schools/College.

**Director  
Directorate of Minorities  
Bangalore**