

## ICSE Biology Class 9 Syllabus

There is one paper of two hours duration of 80 Marks and Internal Assessment of Practical Work Carrying 20 Marks. The paper is divided into two sections: Section I (40 marks) and Section II (40 marks).

Section I (compulsory) contains short answer questions on the entire syllabus. Section II contains six questions. You are required to answer any four of these six questions.

### 1. Basic Biology

**(i) The cell**, a unit of life, protoplasm, basic difference between prokaryotic and eukaryotic cell; differences between an animal and a plant cell.

A basic understanding of the cell theory, structure of plant and animal cell with functions of various cell organelles. (Protoplasm, Cytoplasm, Cell Wall, Cell Membrane, Nucleus, Nucleolus, Mitochondria, Endoplasmic Reticulum, Ribosome, Golgi bodies, Plastids, Lysosomes, Centrosome and Vacuole). Difference between a plant cell and an animal cell should be mainly discussed with respect to cell wall, centrosome and vacuoles and plastids.

**(ii) Tissues:** Types of plant and animal tissues.

To be taught in brief with respect to location, basic structure and function, giving typical examples of their location so as to enable pupils to understand their role in different physiological processes in plants and animals.

### 2. Flowering Plants

**(i) Vegetative Propagation:** Artificial methods, advantages and disadvantages. Economic importance of artificial propagation, Hybridisation and Micro Propagation. Brief idea of Biotechnology and its applications role in medicine and industry.

The concept in brief with suitable examples.

Artificial methods: cutting, grafting and layering with examples. Advantages and disadvantages of vegetative reproduction to be discussed.

Economic importance of artificial propagation.

Hybridization: Meaning and benefits.

Micro Propagation: meaning, uses and limitations.

Brief idea of biotechnology (example - human insulin from E.coli. Applications of biotechnology: in medicine - penicillin, tetracycline; in industry (example - cheese, vinegar, yogurt, alcoholic beverages; synthesis of vitamins namely vitamin C; and enzymes - namely lipase).

**(ii) Flower:** Structure of a bisexual flower, functions of various parts.

A brief introduction to complete and incomplete flowers. Essential and nonessential whorls of a bisexual flower; their various parts and functions. Use of charts or actual specimens help enhance clarity of concepts.

Inflorescence and placentation (types are not required in both cases).

**(iii) Pollination:** self and cross-pollination.

Explanation, advantages and disadvantages of self and cross-pollination, agents of pollination and the characteristic features of flowers pollinated by various agents to be discussed.

**(iv) Fertilisation**

Events taking place between pollination and fertilisation should be discussed up to fusion of male gamete with egg cell in the embryo sac. Students should be familiar with the terms double fertilization and triple fusion. Fruit and Seed (definition) and significance of Fruit and Seed.

### 3. Plant Physiology

**(i) Structure of dicot and monocot seeds, Germination of seeds, types, and conditions for seed germination.**

Structure and germination of Bean seed and Maize grain. Differences between hypogeal and epigeal germination. Conditions for seed germination should be dealt with by experiments.

**(ii) Respiration in plants:** outline of the process, gaseous exchange.

A brief outline of the process mentioning the term Glycolysis, Krebs cycle and their significance. Reference to be made to aerobic and anaerobic respiration with chemical equations in each case. Experiments on gaseous exchange and on heat production.

#### 4. Diversity in living organisms / Eco systems

**(i) Understanding ecosystems** - Definition. Interaction between biotic and abiotic factors.

Biotic component consisting of producers, consumers, decomposers. Terms of food chain, food web, pyramid.

Brief account of Abiotic or nonliving components such as air, soil, water and climatic factors like sunlight, temperature, humidity and wind.

Only Forest Ecosystem with its flora and fauna to be taught.

**(ii) A brief outline of five Kingdom classification:**

Main characteristics of each kingdom with suitable examples Monera, Protista, Fungi, Plantae (Thallophyta, Bryophyta, Pteridophyta and Spermatophyta) and Animalia (Non-chordates from Porifera to Echinodermata and Chordates - all five Classes)

**(iii) Economic importance of Bacteria:**

Useful role of bacteria - medicine (antibiotics, serums and vaccines); agriculture; (nitrogen fixing, nitrifying and denitrifying bacteria) and industry (curing of tea, tanning of leather)

Harmful role of bacteria in spoilage of food, disease in plants and animals, bio-weapons, denitrification.

**(iv) Economic importance of Fungi:**

Useful role of Fungi in breweries, bakeries, cheese processing, mushroom cultivation (Processes of manufacture are not required in each case).

#### 5. Human Anatomy and Physiology

**(a) Nutrition:**

(i) Classes of food: balanced diet. Malnutrition and deficiency diseases.

Functions of carbohydrates, fats, proteins, mineral salts (calcium, iodine, iron and sodium), vitamins and water in proper functioning of the body to be discussed. Sources of vitamins their functions and deficiency diseases to be discussed. Students should be familiar with the term 'Balanced Diet'. Importance of cellulose in our diet should be discussed. Students should be taught about Kwashiorkor and Marasmus.

(ii) the structure of a tooth, different types of teeth.

Structure of a tooth to be discussed with the help of a diagram. Functions of different types of teeth must also be taught.

(iii) Digestive System: Organs and digestive glands and their functions (including enzymes and their functions in digestion; absorption, utilisation of digested food); tests for reducing sugar, starch, protein and fats.

Organs and their functions; functions of saliva; brief idea of peristalsis; digestion in various parts of alimentary canal. Tests for sugar, starch, protein and fats.

**(b) Movement and Locomotion:**

(i) Functions of human skeleton

(ii) Axial and Appendicular Skeleton

(iii) Types of joints - immovable, slightly movable and freely movable (hinge joint, ball and socket joint, gliding joint, pivot joint.)

**(c) Structure and functions of skin.**

Various parts of the skin and their functions to be taught with the help of diagrams; heat regulation, vasodilation, vasoconstriction to be explained.

**(d) Respiratory System:** Organs; mechanism of breathing; tissue respiration, heat production.

Differences between anaerobic respiration in plants and in man. Brief idea of respiratory volumes, effect of altitude on breathing and asphyxiation should be taught. Role of diaphragm and intercostals muscles in breathing must be explained to provide a clear idea of breathing process. Brief idea of gaseous transport and tissue respiration to be given.

## 6. Health and Hygiene

Cause of diseases:

(i) Bacteria - types of bacteria, bacterial control, three examples of diseases caused by bacteria e.g. Tuberculosis, Tetanus, Syphilis (Venereal disease).

(ii) Virus - nature of viruses, three examples of viral diseases e.g. Poliomyelitis, Mumps, Rabies, etc. Introduction to HIV, its outline structure and spread.

(iii) Parasites - two examples, roundworm, tapeworm and their control.

(iv) Brief idea of endemic, epidemic, pandemic, and sporadic.

(v) Hygiene: simple personal hygiene and social conditions affecting this. Disease carriers (vectors) flies, rats and cockroaches, contamination of water, waterborne diseases.

General idea of personal hygiene, public hygiene and sanitation, control of housefly, mosquitoes, cockroaches and rats (life history not required). Water borne diseases like cholera, dysentery and Hepatitis.

## 7. Waste generation and management

**(a) Sources of waste** - domestic, industrial, agricultural, commercial and other establishments.

Domestic waste: paper, glass, plastic, rags, kitchen waste, etc.

Industrial: mining operations, cement factories, oil refineries, construction units.

Agricultural: plant remains, animal waste, processing waste.

Municipal sewage: Sewage, degradable and non degradable waste from offices, etc. e-waste: brief idea about e-waste.

**(b) Methods of safe disposal of waste:** segregation, dumping, composting, drainage, treatment of effluents before discharge, incineration, use of scrubbers and electro static precipitators.

Segregation of domestic waste into biodegradable and non-biodegradable by households: sweeping from gardens to be converted to compost; sewage treatment plants.