

## 9. BIOLOGY (Code No. 044)

The present syllabus reinforces the ideas introduced in the lower classes while the students learn new concepts besides getting an exposure to contemporary areas of the subject. The syllabus also aims at emphasizing on the underlying principles that are common to both animals and plants as well as highlighting the relationship of biology with other areas of knowledge. The format of the syllabus allows a simple, clear, consequential flow of concepts without any jarring jumps. The syllabus also stresses on the connection of the study of Biology to real life problems, use of biological discoveries/innovations in everyday life - in environment, industry, health and agriculture. The updated syllabus also focuses on reducing the curriculum load while ensuring that ample opportunities and scope for learning and appreciating basic concepts of the subject continue to be available within its framework.

The prescribed syllabus is expected to

- promote understanding of basic principles of biology
- encourage learning of emerging knowledge and its relevance to individual and society
- promote rational/specific attitude to issues related to population, environment and development
- enhance awareness about environmental issues and problems and the appropriate solutions
- create awareness amongst the learners about variations amongst the living, and developing respect for the diversities and to appreciate that the most complex biological phenomena are also built on essentially simple processes.

It is expected that the students would get an exposure to various branches of Biology in the syllabus in a more contextual and friendly manner as they study its various units.

### COURSE STRUCTURE

Class XI (Theory)

One Paper

Time: 3 Hours

70 Marks

Unit	Marks
1. Diversity in living world	07
2. Structural organization in animals and plants	12
3. Cell: Structure and function	15
4. Plant physiology	18
5. Human Physiology	18
<b>Total</b>	<b>70</b>

#### I Diversity in Living World (25 Periods)

Diversity of living organisms

Classification of the living organisms (five kingdom classification, major groups and principles of classification within each kingdom).

Systematics and binomial System of nomenclature

Salient features of animal (non-chordates up to phylum level and chordates up to class level) and plant (major groups; Angiosperms up to class) classification, viruses, viroids, lichens Botanical gardens, herbaria, zoological parks and museums.

**II Structural Organisation in Animals and Plants (30 Periods)**

Tissues in animals and plants.

Morphology, anatomy and functions of different parts of flowering plants: Root, stem, leaf, inflorescence, flower, fruit and seed.

Morphology, anatomy and functions of different systems of earthworm cockroach and frog.

**III CELL: STRUCTURE AND FUNCTION (40 Periods)**

Cell: Cell theory; Prokaryotic and Eukaryotic cell, cell wall, cell membrane and cell organelles' (plastids, mitochondria, endoplasmic reticulum, Golgi bodies/dictyosomes, ribosomes, lysosomes, vacuoles, centrioles) and nuclear organization.

Mitosis, meiosis, cell cycle.

Basic chemical constituents of living bodies.

Structure and functions of carbohydrates, proteins, lipids and nucleic acids.

Enzymes: types, properties and function.

**IV Plant Physiology (40 Periods)**

Movement of water, food, nutrients and gases, water relations, mineral nutrition, Respiration, Photosynthesis, Plant growth and development.

**V Human Physiology (45 Periods)**

Digestion and absorption.

Breathing and respiration.

Body fluids and circulation.

Excretory products and elimination.

Locomotion and movement.

Neural control and coordination, chemical coordination and regulation.

***Recommended Textbook.***

Biology textbook for Class XI, Published by NCERT

**Practicals**

<b>Time: 3 Hours</b>	<b>Marks : 30</b>	<b>60 Periods</b>
1. Experiments and spotting		20 marks
2. Record of one investigatory project and Viva based on the project		5 marks
3. Class record and Viva, based on experiments		5 marks
		<b>30 marks</b>

### A. List of Experiments

1. Study and describe three locally available common flowering plants from each of the following families (Solanaceae, Fabaceae and Liliaceae) Types of root (tap or adventitious), stem (herbaceous/woody) leaf arrangement/shapes/venation/simple or compound).
2. Preparation and study of T.S. of dicot and monocot root and stem (only primary structure).
3. Study of osmosis by potato osmometer.
4. Study of plasmolysis in epidermal peels (e.g. Rhoen leaves).
5. Study of distribution of stomata in the upper and lower surface of leaves and calculate the stomatal index
 
$$\frac{\text{No of stomata}}{\text{no of stomata + no of epidermal cells}} \times 100$$
6. Comparative study of the rates of transpiration in the upper and lower surface of leaves.
7. Test for the presence of sugar, starch, proteins and fats in suitable plant and animal materials (e.g., wheat, potato, groundnut, milk or other such suitable materials)
8. To separate chlorophyll pigment through paper chromatography.
9. To study the rate of respiration in flower buds and germinating seeds.
10. To study effect of salivary amylase on starch.
11. To test the presence of urea, sugar, albumin and bile salts in urine sample (simulated samples may be used).

### B. Study/observation of the following (spotting)

1. Study parts of a compound microscope.
2. Study of the specimens and identification with reasons-Bacteria, *Oscillatoria*, *Spirogyra*, *Rhizopus*, Mushroom, Yeast, Liverwort, Moss, Fern, Pines, one monocotyledon and one dicotyledon and one lichen.
3. Study of specimens and identification with reasons-Amoeba, Hydra, Liverfluke, Ascaris, Leech, Earthworm, Prawn, Silkworm, Honeybee, Cockroach, Snail, Starfish, Shark, Rohu, Frog, Lizard, Pigeon and Rabbit.
4. Study of the diversity in shape and size of cells in different plant and animal tissues (e.g., palisade, parenchyma, collenchyma, sclerenchyma, xylem, phloem, squamous epithelium, muscle fibres and mammalian blood smear) through temporary/permanent slides.
5. Study of mitosis in onion root tip cells.
6. Study of different modifications in root, stem and leaves.
7. Study and identify different types of inflorescences.
8. Study of imbibition in seeds/raisins.
9. Observation and comments on the experimental set up on:
  - a. Anaerobic respiration
  - b. Phototropism
  - c. Apical bud removal
  - d. Suction due to transpiration
10. To study human skeleton and different types of joints.