

BIOLOGY

(Senior Secondary Stage)

Objectives

The curriculum at the senior secondary stage should be disciplinary in its approach, with appropriate rigour and depth. Care should be taken not to make the syllabus heavy. The curriculum load should be rationalised to avoid the steep gradients between secondary and senior secondary syllabus, but this should not amount to making senior secondary syllabus only a slightly upgraded variant of secondary stage science. There should be strong emphasis on experiments, technology and investigative projects. The main objectives are :-

- To develop an understanding, based on observation, identification, classification and illustration drawn from life experiences, and physical, biological and cultural aspects of life.
- To know the facts and principles of Science and its applications consistent with the stage of cognitive development.
- Acquire the skills, and understand the methods and processes that lead to generation and validation of scientific knowledge.
- Relate to the environment (natural environment artifacts and people), local as well as global and appreciate the issues at the interface of science, technology and society.
- The depth should ensure that the student has a basic, if not rigorous, understanding of the subject.
- The teaching of the theoretical aspects and the experiments based on them should be closely integrated and dealt together.

EVALUATION

The following evaluation pattern should be followed for the senior secondary stage :-

1. **Recapitulation** : Daily version of the previous taught subject matter in the class.
2. **Periodic Tests** : Periodic tests should be taken after the completion of each topic.
3. **Regular Home Assignments** : Regular Home assignments should be given from time to time.
4. **Written Examination System** : Should be in terminal form, i.e.,
 - i) Ist Terminals will cover 40% of the syllabus.
 - ii) IInd Terminals will cover 80% of the syllabus.
 - iii) Annual Exams : Annual examination will cover the whole syllabus.

One practical should be performed in a week for each class.

Expected Outcome

After the completion of senior secondary stage the student will develop understanding based on observation, illustration and experimentation. He/She will be able to learn Biology by relating with day today life and expected to understand Biology better. Scientific vocabulary of the student expands and scientific temper is inculcated. He/She will be able to under the basic concepts, principles and laws of Biology. Problem solving and inference making skills will be developed. He/She will develop analytical skills and will be able to apply the learnt knowledge in understanding new and nobel situations. The learner will enjoy to learn the difficult topics with examples from everyday life.

Distribution of Marks
Class XII
Biology (Theory)

Unit	Topic	Marks
I	Physiology of Plants	20
II	Physiology of Animals	20
III	Genetics of Evolution	20
IV	Biology of Human Welfare	10

TOTAL:		70

Distribution of Marks
Class – XII
Biology (Practicals)

Unit	Topic	Marks
I	Core Experiments	20
II	Record of one Investigatory Project And viva based on the project	5
III	Class record and viva based on experiments	5

TOTAL:		30

Class – XI
Biology (Practicals)

1. Study of parts of Compound Microscope.
2. Study of specimens and identification with reasons :-
Bacteria, Oscillatoria, Spirogyra, Rhizopus, mushroom, yeast, Liverworts, moss, fern, Pinus, one monocotyledon, dicotyledon and lichens.
3. Study of characters of specimens and identification with reasons :-
Amoeba, Hydra, Liverfluke, Ascaris, Leech, Earthworm, Prawn, Silkworm, Honeybee, Snail, Star fish, Shark, Rohu, Frog, Lizard, Pigeon and Rabbit.
4. (a) To prepare a temporary mount of onion peel to study cell structure.
(b) Study of mitosis in onion root tip. And animal cell.
5. Study of meiosis in onion buds, and testis of grass hopper.
6. Study of guard cells, parenchyma, collenchyma, sclerenchyma xylem and phloem through temporary, permanent slides.
7. Study of different modification in root, stem and leaves.
8. Study and identify different types of inflorescences.
9. Study and describe six common flowering plants :
(Solanaceae, Brassicaceae, Fabaceae, Asteraceae, Liliaceae and Poaceae).
10. Study of T.S. dicot and monocot root and stem through temporary/permanent slides.
11. Test for starch, sugar, protein and fats from common food materials.
12. Study of squamous epithelium, muscle fibres, nerve cells.
13. Study of external morphology of earthworm, cockroach and frog through models.
14. Study of different soil samples for texture and moisture content.

15. Study the pH and water holding capacity and correlate with the kinds of plant found in them.
16. Study plants and animals found in dry conditions. Comment upon on their adaptations.
17. Collect water from different water bodies around you and study them for pH, clarity and presence of any living organisms.
18. Study of plant population density by quadrat method.

Class – XII
Biology (Practicals)

CORE EXPERIMENTS

1. To study Osmosis by potato osmometer.
2. To study plasmolysis in epidermal peel.
3. To study rate of transpiration in the upper and lower surface of leaves (comparison).
4. To study the effect of temperature on the permeability of cell membrane using beet root.
5. To study nitrogen fixing bacteria from root nodules of leguminous plant.
6. To separate plant pigments through paper chromatography.
7. To study pollen germination on a slide.
8. To study the effect of salivary amylase on starch.
9. To study the effect of pH on the activity of salivary amylase.
- 10.(a) To prepare and study blood smear (Human).
(b) To study of hemolysis and crenation in human blood.
11. To test the presence of urea, sugar, bile salts and albumin in urine.
12. To study mammalian cartilage, bone and muscles from prepared slide.
13. To study mammalian cell and T.S. of spinal cord.
14. To study human skeleton and different types of joints.

15. To study spermatogenesis and oogenesis (any stage) in mammals.
16. Preparation of acetocarmine stained onion root tip or another to study nucleic acids.

INVESTIGATORY PROJECTS

- 1.(a) Preparation of a three dimensional model of a plant or animal cell.
(b) Preparation of a model of DNA.
2. Determination of the essentiality of minerals for plant growth. Recording of deficiency symptoms.
3. Study of the effect of light and gravity on plant movement and the role played by them.
4. Comparative rates of pollen germination of various species in sugar solution.
5. Study of the effect of gibberellin on germination and shoot elongation.
6. Population survey to identify human phenotypic characters-rolling of tongue, tasting PTC, fused ear lobes, colour blindness etc.
7. Effect of antibiotics on micro-organisms.
8. Study of frequency of various blood groups in a population.
9. Effect of fertilizers on rate of germination, elongation of hypocotyl and the length of root.
10. Study of the competition between weeds and crops.