Bhartiya Shiksha Board

BIOLOGY (Class XI)

Subject code- 160

Total Periods=204 (Theory 170 + Practical 34)

UNIT I: BIOLOGY AROUND US AND OUR INDIGENOUS

Chapter 1. Role and scope of Biology

Important biological processes and their applications in daily life; Careers related to biology.

Chapter 2. Origin and development of Ayurveda

Contributions of Maharishi Charaka and Sushruta

UNIT II: ORGANISATION OF THE LIVING WORLD - BIOLOGICAL CLASSIFICATION

Chapter 3. Biological Classification

Three domains of life; Taxonomy and Systematics; Concept of species and Taxonomical hierarchy; Binomial Nomenclature; Five kingdom classification; Salient features of the five kingdoms -Monera, Protista, Fungi, Plantae and Animalia, and classification of Monera, Protista, and Fungi into major groups; Lichens, Viruses and Viroids.

Tools for study of taxonomy- Museums, zoological parks, Herbaria, Botanical gardens. -

Chapter 4. Plant Kingdom

Salient features (including alternation of generations and life cycles) and classification of major groups of plants - Algae, Bryophyta, Pteridophyta, Gymnospermae and Angiospermae (three to five salient and distinguishing features and at least two examples from each category); Angiosperms- classification up to class, characteristic features, examples.

Chapter 5. Animal Kingdom

Salient features and classification of major groups of animals - non-chordates up to phyla level and chordates up to class level (three to five salient features and at least two examples from each category).

UNIT III: STRUCTURAL ORGANISATION IN PLANTS AND ANIMALS

Chapter 6. Flowering Plants Morphology

Morphology, functions, major types and modifications of root, stem, leaf and inflorescence, structure of flower, fruit, seed, description of a typical flowering plant & Study of some important families: Brassicaceae, Solanaceae, Fabaceae, Asteraceae, Liliaceae, Poaceae.

Chapter 7. Flowering Plants Anatomy

Anatomy and functions of different parts of root, stem and leaf.

Chapter 8. Structural Organization in Animals

Animal tissues - epithelial, muscular, connective and nervous tissues and their functions; anatomy including digestive, respiratory, nervous and reproductive systems of an insect (cockroach) and frog (elementary level).

UNIT IV: CELL CHEMISTRY AND CELL DIVISION

Chapter 9. Molecules of life

Chemical constituents of living cells - Biomolecules, Structure and function of proteins, carbohydrates, lipids, nucleic acids, enzymes - types, properties, enzyme action, enzymes in technology

Chapter 10. Cell Cycle and Cell Division

Cell cycle, mitosis, meiosis and their significance

UNIT V: PHYSIOLOGY OF PLANTS AND ANIMALS

Chapter 11. Mineral Nutrition

Essential minerals, macro- and micronutrients and their role, deficiency symptoms in plants and animals, mineral toxicity, elementary idea of hydroponics as a method to study mineral nutrition in plants; nitrogen metabolism in plants and animals.

Chapter 12. Energy pathways

Regulation of breathing and respiration in animals, transport of gases, Exchange of gases, detailed structure of mitochondria, cellular respiration in animals and plants - glycolysis, fermentation, TCA cycle and electron transport system, aerobic and anaerobic respiration, chemiosmotic hypothesis, energy relations - number of ATP molecules generated; amphibolic pathways, respiratory quotient.

Chapter 13. Trapping the sun‘s energy - Photosynthesis

Photosynthesis as a means of autotrophic nutrition, site of photosynthesis, detailed structure of chloroplast, pigments involved in photosynthesis (elementary idea), photochemical and biosynthetic phases (C3) of photosynthesis, cyclic and non-cyclic photophosphorylation, Photorespiration, C4 pathway, CAM-do you know; Factors affecting photosynthesis.

Chapter 14. Plant Growth and Development

Seed germination, phases of plant growth and plant growth rate, conditions of growth, differentiation, dedifferentiation and redifferentiation, Sequence of developmental processes in a plant cell; growth regulators - auxins, gibberellins, cytokinin’s, ethylene, ABA; seed dormancy; vernalisation, photoperiodism.

Chapter 15. Digestion and Absorption in Human

Alimentary canal and digestive glands, role of digestive enzymes and gastrointestinal hormones; peristalsis, digestion, absorption and assimilation of proteins, carbohydrates and fats, calorific values of proteins, carbohydrates and fats, egestion, nutritional and digestive disorders - PEM, indigestion, constipation, vomiting, jaundice, diarrhoea; yoga asanas to improve digestion.

Chapter 16. Transport of Materials

Movement of water, gases and nutrients; cell to cell transport, diffusion, facilitated diffusion, active transport, plant-water relations, imbibition, water potential, osmosis, turgor pressure, wall pressure, plasmolysis; long distance transport of water and minerals - absorption/uptake, apoplastic and symplastic movement, transpiration pull, root pressure and guttation; transpiration and its significance, opening and closing of stomata; transport of food/photosynthates, source and sink, phloem transport, mass flow hypothesis.

Transport in human - composition of blood, blood groups, coagulation of blood, composition of lymph and its function; human circulatory system - structure of human heart and blood vessels; cardiac cycle, cardiac output, ECG; double circulation; regulation of cardiac activity; disorders of circulatory system - hypertension, coronary artery disease, angina pectoris, heart failure. Pranayama for healthy heart

UNIT VII: ECOLOGY

Chapter 17. Organisms and Populations

Organisms and environment; habitat and niche; abiotic factors (temperature, water, light), responses to abiotic factors; populations attributes - sex ratio, pyramid (age distribution), population density; population growth (natality, mortality, emigration, immigration); growth models; ecological adaptations - morphological, physiological and behavioural in response to stresses; population interactions with examples- mutualism, competition, predation, parasitism, commensalism, amensalism

Chapter 18. Ecosystem

Ecosystem- structure and function, productivity, decomposition, energy flow, function and services, ecological pyramids (energy, number, biomass); biogeochemical / nutrient cycles – gaseous, sedimentary (graphic representation of carbon, nitrogen and phosphorous cycles); ecological succession, types - hydrach , xerarch; ecological services.

Practicals

Part : A: List of Experiments

1. Study and description of three locally available common flowering plants, one from each of the families Solanaceae, Fabacceae and Liliaceae (Poaceae, Asteraceae, Malvaceae or Brassicaceae can be substituted in case of particular geographical location) including dissection and display of floral whorls, anther and ovary to show number of locules (floral formulae and floral diagrams). Types of root (tap and adventitious); stem (herbaceous and woody); leaf (arrangement, shape, venation, simple and compound).

2. Preparation and study of T.S. of dicot and monocot roots and stems (primary).

3. Study of osmosis by potato osmometer.

4. Study of plasmolysis in epidermal peels (e.g. Rheo leaves).

5. Study of distribution of stomata in the upper and lower surface of leaves.

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. Detection in suitable plant and animal materials.

8. Separation of plant pigments through paper chromatography.

9. Study of the rate of respiration in flower buds/leaf tissue and germinating seeds.

10. To study the effect of temperature and pH on the activity of salivary amylase.

11. Study the plant population density by quadrat method.

12. Study the plant population frequency by quadrat method

13. Two plants and two animals (models/virtual images) found in xeric conditions. Comment upon their morphological adaptations.

14. Two plants and two animals (models/virtual images) found in aquatic conditions. Comment upon their morphological adaptations.

15. Collect and study soil from at least two different sites and study them for texture, moisture content, pH and water holding capacity. Correlate with the kinds of plants found in them.

16. Collect water from two different water bodies around you and study them for pH, clarity and presence of any living organism.

17. Study the presence of suspended particulate matter in air at two widely different sites.

B: Study/observation of the following (spots)

1. Study of organisms through specimens/slides/models and their identification with reasons - any one type of bacteria, cyanobacteria (*Oscillatoria)*, algae (*Spirogyra)*, fungi (*Rhizopus*, mushroom, yeast), lichens, any one liverwort, moss, fern, gymnosperm (pine), monocotyledonous plant, dicotyledonous plant and one lichen.

3. Study of virtual specimens/slides/models and identification with reasons - Amoeba, *Hydra*, liver fluke, *Ascaris*, leech, earthworm, prawn, silkworm, honeybee, snail, starfish, shark, rohu, frog, lizard, pigeon and rabbit.

4. Study of tissues and diversity in shapes and sizes of animal cells - squamous epithelium, muscle fibre and mammalian blood smear- through temporary/permanent slides.

5. Study of mitosis in onion root tip cells and meiosis in plant cells (onion buds) or animals cells (grasshopper) from permanent slides.

6. Study of different modifications in roots, stems and leaves.

7. Study and identification of different types of inflorescence (cymose and racemose).

8. Study of imbibition in seeds/raisins.

9. Observation and comments on the experimental set up for showing: a) Fermentation, b) Phototropism, c) Effect of apical bud removal

10. Study of external morphology of cockroach through virtual images/models.