

BIOLOGY

Course Structure

Units	Topics	Marks
I	Diversity of Living Organisms	7
II	Structural Organisation in Plants & Animals	11
III	Cell: Structure and Function	15
IV	Plant Physiology	17
V	Human Physiology: Section A & Section B	10+10
Total		70

Course Syllabus

Unit I: Diversity of Living Organism

Chapter 1: The Living World

- What is living?
- Biodiversity
- Need for classification
- Three domains of life
- Taxonomy and systematics
- Concept of species
- Taxonomical hierarchy
- Binomial nomenclature
- Tools for study of taxonomy:
 - Museums
 - Zoological parks
 - Herbaria

- Botanical gardens

Chapter 2: Biological Classification

- Five kingdom classification
- Salient features and classification of Monera, Protista and Fungi into major groups:
 - Lichens
 - Viruses
 - Viroids

Chapter 3: Plant Kingdom

- Salient features and classification of plants into major groups:
 - Algae
 - Bryophyta
 - Pteridophyta
 - Gymnospermae
 - Angiospermae

(Three to five salient and distinguishing features and at least two examples of each category)

- Angiosperms:
 - Classification up to class
 - Characteristic features and examples

Chapter 4: Animal Kingdom

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

Unit II: Structural Organisation in Animals and Plants

Chapter 5: Morphology of Flowering Plants

- Morphology and modifications: Tissues

Chapter 6: Anatomy of Flowering Plants

- Anatomy and functions of different parts of flowering plants:
 - Root
 - Stem
 - Leaf
 - Inflorescence
 - Flower
 - Fruit
 - seed

Chapter 7: Structural Organisation in Animals

- Animal tissues
- Morphology
- Anatomy and functions of different systems of an insect (Cockroach):
 - Digestive System
 - Circulatory System
 - Respiratory System
 - Nervous System
 - Reproductive System

Unit III: Cell Structure and Function

Chapter 8: Cell-The Unit of Life

- Cell theory and cell as the basic unit of life
- Structure of:
 - Prokaryotic cell
 - Eukaryotic cell
- Plant cell and animal cell
- Cell envelope:
 - Cell membrane
 - Cell wall
- Cell organelles - structure and function:
 - Endomembrane system
 - Endoplasmic reticulum
 - Golgi bodies
 - Lysosomes
 - Vacuoles
 - Mitochondria
 - Ribosomes
 - Plastids
 - Microbodies
 - Cytoskeleton
 - Cilia
 - Flagella
 - Centrioles (ultrastructure and function)
 - Nucleus
 - Nuclear membrane
 - Chromatin
 - Nucleolus

Chapter 9: Biomolecules

- Chemical constituents of living cells
- Biomolecules
- Structure and function of:
 - Proteins
 - Carbohydrates
 - Lipids
 - Nucleic acids
 - Enzymes
 - Types
 - Properties
 - Enzyme action

Chapter 10: Cell Cycle and Cell Division

- Cell cycle
- Mitosis
- Meiosis
- significance

Unit IV: Plant Physiology

Chapter 11: Transport in Plants

- Transport in plants
- Movement of:
 - Water
 - Gases
 - Nutrients
- Cell to cell transport:
 - Diffusion

- Facilitated diffusion
- Active transport
- Plant-water relations:
 - Imbibition
 - Water potential
 - Osmosis
 - Plasmolysis
- Long distance transport of water:
 - Absorption
 - Apoplast
 - Symplast
 - Transpiration pull
 - Root pressure
 - Guttation
- Transpiration:
 - Opening and closing of stomata
- Uptake and translocation of mineral nutrients:
 - Transport of food
 - Phloem transport
 - Massflow hypothesis
- Diffusion of gases

Chapter 12: Mineral Nutrition

- Essential minerals
- Macro- and micronutrients and their role
- Deficiency symptoms
- Mineral toxicity
- Elementary idea of hydroponics as a method to study mineral nutrition
- Nitrogen metabolism
- Nitrogen cycle

- Biological nitrogen fixation

Chapter 13: Photosynthesis in Higher Plants

- Photosynthesis as a mean of autotrophic nutrition
- Site of photosynthesis:
 - Pigments involved in photosynthesis (elementary idea)
- Photochemical and biosynthetic phases of photosynthesis
- Cyclic and non-cyclic photophosphorylation
- Chemiosmotic hypothesis
- Photorespiration
- C3 and C4 pathways
- factors affecting photosynthesis

Chapter 14: Respiration in Plants

- Exchange of gases
- Cellular respiration:
 - Glycolysis
 - Fermentation (anaerobic)
 - TCA cycle
 - Electron transport system (aerobic)
- Energy relations - number of ATP molecules generated
- Amphibolic pathways
- Respiratory quotient

Chapter 15: 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:
 - Auxin
 - Gibberellin
 - Cytokinin
 - Ethylene
 - Aba
- Seed dormancy
- Vernalisation
- Photoperiodism

Unit V: Human Physiology

Section: A

Chapter 16: Digestion and Absorption

- Alimentary canal and digestive glands
 - Role of digestive enzymes
 - Gastrointestinal hormones
- Peristalsis
- Digestion
- Absorption and assimilation of:
 - Proteins
 - Carbohydrates
 - Fats
- Calorific values of:
 - Proteins
 - Carbohydrates
 - Fats;
- Egestion;

- Nutritional and digestive disorders:
 - PEM
 - Indigestion
 - Constipation
 - Vomiting
 - Jaundice
 - Diarrhoea

Chapter 17: Breathing and Exchange of Gases

- Respiratory organs in animals (recall only)
- Respiratory system in humans
- Mechanism of breathing and its regulation in humans:
 - Exchange of gases
 - Transport of gases
 - Regulation of respiration
 - Respiratory volume
- Disorders related to respiration:
 - Asthma
 - Emphysema
 - Occupational respiratory disorders

Chapter 18: Body Fluids and Circulation

- Composition of blood
 - Blood groups
 - Coagulation of blood
- Composition of lymph and its function
- Human circulatory system:
 - Structure of human heart
 - 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

Section B: Human Physiology

Chapter 19: Excretory Products and Their Elimination

- Modes of excretion
 - Ammonotelism
 - Ureotelism
 - Uricotelism
- Human excretory system
 - Structure
 - Function
- Urine formation
 - Osmoregulation
- Regulation of kidney function
 - Renin – angiotensin
 - Atrial natriuretic factor
 - ADH and diabetes insipidus
- Role of other organs in excretion
- Disorders
 - Uraemia
 - Renal failure

- Renal calculi
- Nephritis
- Dialysis and artificial kidney

Chapter 20: Locomotion and Movement

- Types of movement
 - Ciliary
 - Flagellar
 - Muscular: skeletal muscle-contractile proteins and muscle contraction
- Skeletal system and its functions
- Joints
- Disorders of muscular and skeletal system:
 - Myasthenia gravis
 - Tetany
 - Muscular dystrophy
 - Arthritis
 - Osteoporosis
 - Gout

Chapter 21: Neural Control and Coordination

- Neuron and nerves
 - Nervous system in humans
 - Central nervous system
 - Peripheral nervous system
 - Visceral nervous system
- Generation and conduction of nerve impulse
- Reflex action
- Sensory perception
- Sense organs

- Elementary structure and functions of eye and ear

Chapter 22: Chemical Coordination and Integration

- Endocrine glands and hormones
- Human endocrine system:
 - Hypothalamus
 - Pituitary
 - Pineal
 - Thyroid
 - Parathyroid
 - Adrenal
 - Pancreas
 - Gonads
- Mechanism of Hormone Action (elementary Idea)
- Role of hormones as messengers and regulators
- Hypo - and hyperactivity and related disorders
 - Dwarfism
 - Acromegaly
 - Cretinism
 - Goiter
 - Exophthalmic Goiter
 - Diabetes
 - Addison's disease