**BIOLOGY**

For Class IX (marks 65)

**1. INTRODUCTION TO BIOLOGY**

1.1 Introduction to Biology

1.1.1 Definition of Biology

1.1.2 Divisions and Branches of Biology

1.1.3 Relation of Biology to other sciences

1.1.4 Quran instructs to reveal the study of Life

1.2 The Levels of Organization

**2. SOLVING A BIOLOGICAL PROBLEM**

2.1 Biological Method

2.1.1 Scientific problem, Hypotheses, Deductions and Experiments

2.1.2 Theory, Law and Principle

2.1.3 Data organization and Data analysis

2.1.4 Mathematics as an integral part of the Scientific Process

**3. BIODIVERSITY**

3.1 Definition and Introduction of Biodiversity

3.2 Aims and Principles of Classification

3.3 History of Classification Systems

3.3.1 Two-Kingdom Classification System

3.3.2 Three-Kingdom Classification System

3.3.3 Five-Kingdom Classification System

3.4 The Five Kingdoms

3.5 Binomial Nomenclature

3.6 Conservation of Biodiversity

**4. CELLS AND TISSUES**

**4**.1 Microscopy and the Emergence of Cell Theory

4.1.1 Light microscopy and Electron microscopy

4.1.2 History of the formulation of cell theory

4.2 Cellular Structures and Functions

4.2.1 Structures and Functions of cell Organelles

4.2.2 Relationship between cell Function and cell Structure

4.2.3 Difference between Prokaryotic and Eukaryotic cells

4.2.4 Relationship between cell Size and Shape and Surface Area to Volume ratio

4.3 Passage of Molecules Into and Out of Cells

4.4 Tissues (types of Plant Tissues and types of Animal Tissues)

**5. CELL CYCLE**

5.1 Cell Cycle (Interphase and Division)

5.2 Mitosis

5.2.1 Phases of Mitosis

5.2.2 Significance of Mitosis

5.3 Meiosis

5.3.1 Phases of Meiosis

5.3.2 Significance of Meiosis

5.4 Necrosis and Apoptosis

**6. ENZYMES**

6.1 Definition & Characteristics of Enzymes

6.2 Mechanism of Enzyme Action (Lock-n-Key Model)

6.3 Specificity of Enzymes

**7. BIOENERGETICS**

7.1 Introduction and the Role of ATP

7.2 Photosynthesis

7.2.1 Introduction and Equation

7.2.2 Role of Chlorophyll and Light

7.2.3 Limiting Factors in Photosynthesis

7.2.4 Adaptations in Leaf Structure for Photosynthesis

7.3 Respiration

7.3.1 Aerobic Respiration, Anaerobic Respiration

7.3.2 Mechanism of Respiration (Glycolysis, Krebs Cycle, Electron Transport Chain)

**8. NUTRITION**

8.1 Introduction

8.2 Nutrition in Plants

8.2.1 Nutrition and Nutrients (Plant Nutrients and Modes of Nutrition)

8.2.2 Mineral Nutrition in Plants (Role of Nitrates and Magnesium and effects of their deficiencies)

8.3 Nutrition in Man

8.3.1 Major Components of Food (Carbohydrates, Proteins and Fats)

8.3.2 Effects of Vitamins (A, C and E) in terms of their; sources, metabolic functions and deficiencies

8.3.3 Effects of Minerals (Calcium and Iron) in terms of their; sources, metabolic functions and deficiencies

8.3.4 Effects of Water and Dietary fibers in terms of their; sources and metabolic functions

8.3.5 Balanced Diet (Concept, Diet related to age, sex and activity)

8.3.6 Problems related to Nutrition

8.3.6.1 Protein Energy Malnutrition

8.3.6.2 Mineral Deficiency Diseases (Scurvy, Rickets, Night blindness)

8.3.6.3 Famine (Unequal distribution, Drought, Flooding, Increasing population)

8.4 Digestion in Man

8.4.1 Ingestion, Digestion, Absorption, Assimilation and Egestion

8.4.2 Identification and Functions of the main regions of human Alimentary Canal

8.4.3 Role of liver in digestion, glucose and amino acid metabolism and formation of urea

8.4.4 Absorption of Food (Structure of Villus, Role of capillaries and lacteals)

8.5 Disorders of Gut (Diarrhea, Constipation, Appendicitis, Threadworm diseases)

**9. TRANSPORT**

9.1 Introduction

9.2 Transport in Plants

9.2.1 Water and ion uptake (Structure and function of root hairs)

9.2.2 Transpiration

9.2.2.1 Introduction and Significance

9.2.2.2 Factors affecting the rate of Transpiration

9.2.3 Transportation of Food and Water

9.2.3.1 Pathway of water and food in stem

9.2.3.2 Structure and function of Xylem and Phloem

9.3 Transport in Man

9.3.1 Blood

9.3.1.1 Components of Blood and their Functions

9.3.1.2 Blood Groups and Blood Transfusion

9.3.1.3 Disorders of Blood (Leukemia and Thalassemia)

9.3.2 Human Heart

9.3.2.1 Structure of Heart

9.3.2.2 Functioning of Heart (Circulation through heart, Heartbeat, Heart rate)

9.3.3 Blood Vessels

9.3.4 General Plan of Human Blood Circulatory System

9.3.5 Cardiovascular Disorders (Atherosclerosis, Arteriosclerosis, Myocardial Infarction)

**RECOMMENDED REFERENCE BOOKS FOR CLASS IX**

 The question paper will be syllabus oriented. However, the following book is recommended for reference and supplementary reading:

 1. Biology

Developed by the Punjab Textbook Board, Lahore and

Published by PLD Publishers, Lahore