FEDERAL BOARD OF INTERMEDIATE AND SECONDARY EDUCATION
H-8/4, ISLAMABAD

NO.1-6/FBISE/RESH/CC/HSSC/1616

NOTIFICATION

It is notified for information of all concerned that revised curriculum 2006 in the subject of Biology at HSSC level shall stand implemented w.e.f. the academic session 2013-2015. Accordingly, the students to be admitted in class-XI in August 2013 and subsequently promoted to class-XII in August 2014 shall be examined in accordance with the revised curriculum in HSSC Part-I and Part-II examinations to be held in the years 2014 and 2015 respectively. Contents of syllabus of class XI are enclosed herewith.

2. The book to be published by National Book Foundation, Islamabad may be consulted for reference and supplementary material.

3. A copy of the curriculum 2006 in the subjects of Biology for class XI and model question paper are enclosed and also being hoisted on the FBISE’s website www.fbise.edu.pk for the benefit of all stakeholders.

(ZULFIQAR ALI RIZVI)
Director Research
Ph: 051-9250604

All heads of institutions affiliated with FBISE at HSSC level

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9. All GSO-I
10. Incharge, Website FBISE, Islamabad
11. Incharge, FBISE Sub-Office, Gilgit
12. All Sectional Heads of FBISE, Islamabad
Q.1 Insert the correct option i.e. A/B/C/D in the empty box opposite each part. Each part carries one mark.

i. Which one of the process is used to separate substances on the basis of densities?
   A. Chromatography  B. Centrifugation  C. Electrophoresis  D. Micro dissections

ii. Identify the marked part of the given diagram:

   A. Stroma  B. Gramum  C. Lamella  D. Thylakoid disc

iii. Which one of the following is a keto form of monosaccharides?

   CH₂OH  CH₂OH  CH₂OH  CH₂OH
   C=O  COH
   CH₂OH  CH₂OH  CH₂OH  CH₂OH
   A  B  C  D
iv. The unit of enzyme is:
   A. Apo enzyme        B. Holo enzyme
   C. Hecto enzyme      D. None of these

v. Sort out the Co-enzyme which is not responsible for transfer of electron during chemical reaction.
   A. NADH            B. ATP
   C. NADPH           D. FADH

vi. Which one of the following is correct molecular formula of chlorophyll-b:
   A. $\text{C}_{55}\text{H}_{72}\text{O}_{5}\text{N}_{4}\text{Mg}$  B. $\text{C}_{55}\text{H}_{72}\text{O}_{5}\text{N}_{3}\text{Mg}$
   C. $\text{C}_{55}\text{H}_{70}\text{O}_{6}\text{N}_{4}\text{Mg}$  D. $\text{C}_{55}\text{H}_{72}\text{O}_{4}\text{N}_{6}\text{Mg}$

vii. What is formed when acetyl CoA combines with Oxaloacetate (4C)?
   A. Isocitrate        B. Succinyl
   C. Citric acid       D. Fumarate

viii. The hollow coil of capsomers is called:
      A. Icosahedral      B. Helical
      C. Genome           D. Capsid

ix. Bacterial species having flagella distributed over the entire surface of the cell are called:
    A. Monotrichous   B. Peritrichous
    C. Amphitrichous  D. Lophotrichous

x. The protest kingdom is a polyphyletic group of organisms because:
    A. They do not share single common ancestor
    B. They do not share a single common character
    C. They are primarily aquatic
    D. They show common modes of nutrition
xi. The type of inflorescence in which spike bears unisexual flowers is called:
   A. Raceme    B. Corymb
   C. Catkin    D. Spike

xii. Which one of the following is not a characteristic of Aves:
   A. Body is streamlined and boat shaped
   B. They have two pairs of pantadactyl limbs
   C. Teeth are absent
   D. Hind limbs are modified to form wings

xiii. Which one of the followings promotes growth in the stem but inhibits growth of lateral buds.
   A. Gibberellins    B. Auxins
   C. Cytokinins      D. Abscisic acid

xiv. Incomplete and imperfect digestion is called:
   A. Dyspepsia    B. Obesity
   C. Ulcer        D. Anorexia

xv. The formation of a clotted mass of blood within a vessel or the heart during life is called:
   A. Atherosclerosis    B. Arteriosclerosis
   C. Embolism          D. Thrombosis

xvi. Which one of the following is not included in lymphatic system?
   A. Tonsils    B. Thyroid gland
   C. Spleen     D. Thymus gland

xvii. The bursa or B-cells are named after a digestive organ found in:
   A. Mammals    B. Fish
   C. Birds      D. Reptiles
Federal Board HSSC-I Examination
Biology Model Question Paper

Time allowed: 2.40 hours
Total Marks: 68

Note: Sections ‘B’ and ‘C’ comprise pages 1-3 and questions therein are to be answered on the separately provided answer book. Answer any fourteen parts from section ‘B’ and two questions from section ‘C’. Use supplementary answer sheet i.e., sheet B if required. Write your answers neatly and legibly.

SECTION – B
(42 marks)

Q.2 Attempt any FOURTEEN parts. The answer of each part should not exceed 3 to 4 lines. 

\[(14 \times 3 = 42)\]

i. Write two characteristics each of:
   a. Red algae   b. diatoms   c. Oomycotes 

ii. How HETEROGAMY is considered an adaptation in Bryophytes for life on land? 

iii. Complete the following table for the comparison of PROTEROSTOMES and DEUTEROSTOMES.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Proterostomes</th>
<th>Deuterostomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleavage</td>
<td></td>
<td></td>
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<tr>
<td>Fate of Blastopore</td>
<td></td>
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<tr>
<td>Coelom Formation</td>
<td></td>
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</tr>
</tbody>
</table>

iv. a. List the distinguishing features of prototheria. 
b. Name at least two animals belonging to Prototheria. 

v. Write down at least two major functional roles and deficiency symptoms of the following nutrients in plants:

vi. a. What would happen to the activity of intestinal enzymes if pH in the small intestine remains at 2? 
b. What is the role of bile in digestion? 

vii. a. What are the disadvantages of coronary bypass surgery? 
b. Why coronary bypass surgery is performed?
viii. Following is the diagram of a capillary network at tissue level in a vertebrate:

a. Name the labeled parts A, B, C and D. (2)
b. What is the significance of the part labeled as “B”? (1)

ix. Justify why physician prescribe antihistamine therapy to the patients with sunny nose or skin rashes? (3)

x. Following is the diagram of life cycle of land plant:

a. Name the processes labeled as “X” and “Y” in the diagram. (1)
b. What phenomenon is shown by the diagram? (1)
c. Name the structures indicated as “Z” in the diagram. (1)

xi. a. Differentiate between single staining and double staining. (1)
b. What are the roles of glycolipids and glycoproteins as cell surface makers? (2)

xii. Describe movement of cilia according to Bradford’s hypothesis. (3)

xiii. How would you distinguish between condensation and hydrolysis? (3)

xiv. a. Write the correct sequence of terminal seven amino acids in normal hemoglobin. (2)
b. How does the sequence of amino acid differ in sickle cell hemoglobin? (1)
xv. Give commercial uses of at least three enzymes. (3)
xvi. "Plants split water as a source of hydrogen releasing oxygen as byproduct". How was this determined? (3)
xvii. Compare CO₂ fixation in C₃ and C₄ plants. (3)
xviii. How a virus survives inside host cell, protected from immune system? (3)
xix. Define the tree methods by means of which genetic recombination take place in bacteria. (3)

SECTION – C
(Marks: 26)

Note: Attempt any TWO questions. All questions carry equal marks. (2 x 13 = 26)

Q.3  a. Draw and explain a diagram of the life cycle of a typical mushroom. (3+2)
     b. Compare dicots and monocots for the following features:
        1. Root  2. Stem  3. Leaf
        4. Flower  5. Seed  6. Relevant examples
     c. What are the evolutionary adaptations in platyhelminthes. (2)

Q.4  a. Explain the ascent of sap in plants through TACT mechanism. (6)
     b. Write a comprehensive note on the lymphatic system of man. (7)

Q.5  a. Elaborate the mechanism of Light Reaction in photosynthesis. (8)
     b. Explain the technique of electrophoresis. (5)
Federal Board HSSC-I Examination
Biology Practical Model Question Paper

Time allowed: 3 hours
Marks: 15

1. Answer the questions pertaining to material “A – D”.
   i. Measure the size of specimen “A” in micrometers. (½)
   ii. What is the purpose of the given chemical/equipment “B”. (½)
   iii. Identify the Slide “C” and give reason for identification. (½)
   iv. Name the animal “D” and assign it to its phylum. (½)

2. Describe the following of the specimen “E”:
   i. Scientific name and family of the plant (½ + ½ = 1)
   ii. Type of inflorescence and description of Flower (½)
   iii. Calyx (½)
   iv. Corolla (½)
   v. Androecium (½)
   vi. Gynoecium (½)
   vii. Floral Formula (½)
   viii. Floral Diagram (½)
   ix. L.S. of Flower (½)

3. Prepare a temporary mount of the material provided. Identify and draw a labelled sketch. (2)

   OR

   Perform the biochemical test for identification of the given material and write the results. (2)

4. Demonstrate and describe the experiment given by the examiner. (2)

5. Practical Note Book (2)

6. Viva Voce. (2)
1. CELL STRUCTURE AND FUNCTION
   1.1 Techniques used in Cell Biology
   1.2 Cell Wall and Plasma Membrane – The Boundary Wall
   1.3 Cytoplasm and Organelles
   1.4 Prokaryotic and Eukaryotic Cells

2. BIOLOGICAL MOLECULES
   2.1 Biological Molecules in Protoplasm
   2.2 Importance of Water (Importance in Protoplasm and in Environment)
   2.3 Carbohydrates
      2.3.1 Classification (Monosaccharides, Disaccharides and Polysaccharides)
      2.3.2 Role of Carbohydrates
   2.4 Proteins
      2.4.1 Structure of Proteins (Amino Acids and Peptide Linkages)
      2.4.2 Classification of Proteins (Globular and Fibrous Proteins)
      2.4.3 Role of Proteins
   2.5 Lipids
      2.5.1 Classification (Acylglycerols, Phospholipids, Waxes and Terpenes)
      2.5.2 Role of Lipids
   2.6 Nucleic Acids
      2.6.1 Structure of Nucleic Acids (Nucleotides and Phosphodiester Linkage)
      2.6.2 Classification (RNA and DNA)
      2.6.3 Role of Nucleic Acids and nucleotides (DNA, RNA, ATP and NAD)
   2.7 Conjugated Molecules (Glycolipids, Glycoproteins, Lipoproteins and Nucleoproteins)

3. ENZYMES
   3.1 Structure of Enzymes
   3.2 Mechanism of Enzyme Action
   3.3 Factors affecting the Rate of Enzymatic Action (Temperature, pH, Enzyme Concentration and Substrate Concentration)
   3.4 Enzyme Inhibition (Competitive and Noncompetitive Inhibitors)
   3.5 Classification of Enzymes

4. BIOENERGETICS
   4.1 Photosynthesis
      4.1.1 Role of Light
      4.1.2 Role of Photosynthetic Pigments – Absorption Spectrum and Action Spectrum
      4.1.3 Role of Carbon dioxide
      4.1.4 Role of Water
      4.1.5 Mechanism of Photosynthesis
   4.2 Cellular Respiration
      4.2.1 Aerobic and Anaerobic respiration
      4.2.2 Mechanism of Respiration
      4.2.3 Synthesis of ATP – Chemiosmosis and Substrate-level Phosphorylation
   4.3 Photorespiration

5. ACELLULAR LIFE
   5.1 Viruses - Discovery and Structure
   5.2 Parasitic Nature of Viruses
   5.3 Life Cycle of Bacteriophage
   5.4 Life Cycle of HIV
   5.5 Viral Diseases (Hepatitis, Herpes, Polio and Leaf curl virus disease of cotton)
   5.6 Prions and Viroids (Structure and examples of Diseases caused by them)

6. PROKARYOTES
   6.1 Taxonomy of Prokaryotes
   6.2 Archaea
   6.3 Bacteria; Ecology and Diversity
   6.4 Structure; Shape and Size of Bacteria
   6.5 Modes of Nutrition in Bacteria

1 of 7
6.6 Growth and Reproduction in Bacteria
6.7 Importance of Bacteria (Beneficial and Harmful bacteria)
6.8 The Bacterial Flora of Humans
6.9 Control of Harmful Bacteria

7. PROTISTS AND FUNGI
7.1 Protists – The Evolutionary Relationships
7.2 Major groups of Protists (protozoa, algae, myxomycota, oomycota)
7.3 General characteristics of Fungi
7.4 Diversity among Fungi (zygomycota, ascomycota, basidiomycota)
7.5 Importance of Fungi

8. DIVERSITY AMONG PLANTS
8.1 The Evolutionary Origin of Plants
8.2 Nonvascular Plants (General characteristics)
8.3 Seedless Vascular Plants (General characteristics)
8.3.1 Evolution of Leaf
8.4 Seed Plants
8.4.1 Evolution of Seed
8.4.2 Gymnosperms (General characteristics)
8.4.3 Angiosperms (General characteristics and Life cycle)

9. DIVERSITY AMONG ANIMALS
9.1 Characteristics of animals
9.2 Criteria for animal classification
9.3 Diversity in Animals
9.3.1 Invertebrates
9.3.2 Vertebrates

10. FORM AND FUNCTIONS IN PLANTS
10.1 Nutrition in Plants
10.2 Gaseous Exchange in Plants
10.3 Transport in Plants
10.3.1 Uptake of Water by Roots and Pathways
10.3.2 Ascent of Sap
10.3.3 Opening and Closing of Stomata
10.3.4 Translocation of Organic Matter
10.4 Homeostasis in Plants (Osmotic adjustments and Thermoregulation in Plants)
10.5 Support in Plants (Support in Herbaceous and Woody Plants)
10.6 Growth and Development in Plants
10.6.1 Tissues for Growth – Apical and Lateral Meristems
10.6.2 Primary and Secondary Growth
10.7 Growth Responses in Plants
10.7.1 Plant Growth Regulators (PRGs)
10.7.2 Geotropism and Phototropism
10.7.3 Photoperiodism
10.7.4 Vernalization

11. DIGESTION
11.1 Digestive System of Man
11.1.1 Alimentary Canal; Structural and Functional details
11.1.2 Role of Accessory Glands (Liver and Pancreas)
11.2 Disorders related to Digestive system and Food habits (Ulcer, Food Poisoning, Dyspepsia, Obesity, Anorexia Nervosa, Bulimia Nervosa)

12. CIRCULATION
12.1 Blood Circulatory System of Man
12.1.1 Heart
12.1.1.1 Structure of Heart
12.1.1.2 Passage of Blood through Heart
12.1.1.3 Heartbeat and its Control
12.1.1.4 Electrocardiogram
12.1.2 Blood Vessels (Arteries, Capillaries and Veins)
12.1.2.1 Vascular Pathway
12.1.2.2 Rate of Blood Flow in Blood Vessels
12.1.3 Blood Pressure and its Measurement

12.2 Cardiovascular Disorders
12.2.1 Thrombosis
12.2.2 Heart Problems
12.2.2.1 Causes and Diagnosis (Angiography)
12.2.2.2 Treatment (Coronary Bypass, Angioplasty, Open Heart Surgery) and Preventions
12.2.3 Hypertension (Causes, Related Diseases and Preventions)

12.3 Lymphatic System of Man

13. IMMUNITY
13.1 First Line of Defense (Skin, Digestive Tract, Air Passageway)
13.2 Second Line of Defense – The Nonspecific Defenses
13.2.1 Killing Cells of Blood
13.2.2 Protective Proteins
13.2.3 Inflammatory Response
13.2.4 Temperature Response
13.3 Third Line of Defense – The Specific Defenses
13.3.1 Inborn and Acquired immunity
13.3.2 Cell mediated and Antibody mediated immunity
13.3.3 Disorders of Immune system (Allergies, Autoimmune Diseases, Transplant Rejections)

LIST OF PRACTICALS

1. Cell Structure and Functions
   1. Use of graticule and micrometer to study stomata and cells
   2. Measuring the size of primary, secondary cell walls and middle lamella by micrometry
   3. Preparation and examination of the slides of animal and plant cells using differential staining

2. Biological Molecules
   4. Performing Benedict’s test for reducing sugars and confirmation of the presence of starch through Iodine test
   5. Confirmation of the presence of proteins through Biuret test
   6. Confirmation of the presence of lipids through Emulsion test
   7. Demonstration of the presence of nucleic acids in biological materials

3. Enzymes
   8. Performing of chemical test to demonstrate that enzymes are proteins
   9. Performing amylase test on starch with boiled amylase and un-boiled amylase in separate test tubes and confirmation through iodine test

4. Bioenergetics
   10. Extraction of the leaf pigments and their separation by paper chromatography

5. Acellular Life
   No Practical Activity

6. Prokaryotes
   11. Identification of bacteria from curd, mouth, or bacterial culture and observation of bacterial culture for different shapes and sizes
   12. Staining bacteria using Grams staining technique
   13. Preparation and observation of the temporary mount of root nodule bacteria
   14. Study of Nostoc, Oscillatoria and Anabaena from fresh or preserved material

7. Protists and Fungi
   15. Observation and drawing of representative members of each group of protists
   16. Observation and drawing labeled diagrams of the life cycle of black bread mold and Penicillium from fresh culture and prepared slides

8. Diversity among Plants
   17. Identification of the vegetative and reproductive structures of Marchantia and Funaria by examining the fresh or preserved material
   18. Identification of the vegetative and reproductive structures of a local fern and a Pinus and relate them with the concerned life cycles
19. Study of different types of inflorescence of *Cassia, Brassica, Achyranthus, Morus, Candytuft, Helianthus* and *Avena sativa*
20. Describing the flowers of *Rose, Cassia fistula, Solanum nigrum* and *Avena sativa*

9. **Diversity among Animals**
21. Classifying the given invertebrates into phyla and given chordates into classes by using classification key

10. **Form and Functions in Plants**
22. Demonstration of the evolution of CO₂ from leaf discs placed in dark and light, with the help of indicator (hydrogen carbonate)
23. Microscopic observation of the slide of LS of a dicot stem, identifying and drawing vessel element, vessel, and phloem sieve tubes
24. Locating annual rings in the log of a tree and calculation of the age of a plant by counting number of annual rings
25. Demonstration of phototropism, geotropism and thigmotropism in plants
26. Demonstration of the folding of leaf after touch in *Mimosa pudica*

11. **Digestion**
27. Tests to locate buds on tongue for detection of salt, sweet, sour and bitter taste
28. Microscopic observation of the villi, liver and pancreas from prepared slides

12. **Circulation**
29. Correlating the *lub-dub* sounds of the closing of heart valves with the monitoring of the heartbeat
30. Identification of the phases of heartbeat on a printed ECG and comparison of the ECG of a cardiac patient with that of a healthy man
31. Dissection of the heart of sheep and describing its internal structure
32. Differentiation of an artery and a vein by observing prepared slides
33. Measuring blood pressure by using sphygmomanometer

13. **Immunity**
34. Recognizing phagocytes and lymphocytes while observing prepared slides
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<td>Bell jar</td>
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<td>4</td>
<td>Blades (Safety razor)</td>
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<td>Burner (Bunsen)</td>
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<td>6</td>
<td>Burner (Spirit Lamp)</td>
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<td>Conical Flask</td>
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<td>8</td>
<td>Cotton Wool</td>
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<td>Differential air Thermometer</td>
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<td>Dissecting Board</td>
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<td>Dissecting Box</td>
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<td>Dissecting Tray</td>
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<td>Dropper</td>
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<td>Funnel 4” and 6” dm</td>
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<td>Inoculation Loop</td>
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<td>Light Source</td>
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<td>Magnifying Glass</td>
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<td>Measuring Cylinder</td>
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<td>Microscope (Compound: 10X eye piece, 4X, 10X and 40X objectives)</td>
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<td>Microscope (Dissecting)</td>
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<td>Microscope Cover Slip</td>
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<td>Stop Watch</td>
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<td>Syringe</td>
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<td>Test Tube Rack</td>
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<td>Tripod Stand</td>
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<tr>
<td>45</td>
<td>Cells of onion epidermis and <em>Hydrilla Leaf</em></td>
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<tr>
<td>46</td>
<td>Conjugation in <em>Paramecium</em></td>
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<tr>
<td>47</td>
<td>Mitosis and Meiosis in Onion root tip</td>
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<td>48</td>
<td>Nerve Cell</td>
<td>02</td>
</tr>
<tr>
<td>49</td>
<td>Rhizopus and Mushroom</td>
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<td>50</td>
<td>Section of Mammalian kidney</td>
<td>02</td>
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<td>Sections of animal tissues</td>
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<tr>
<td>52</td>
<td>Transverse Section of Artery, Vein and Capillary</td>
<td>02</td>
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<tr>
<td>53</td>
<td>Transverse Section of Human Small Intestine</td>
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