BIOLOGY
(BIOT 2105)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) Genes are present in
(a) Nucleus (b) DNA (c) Nucleoid (d) All of the above.

(ii) RNA is a polymer of
(a) Ribonucleotides (b) Deoxyribonucleotides
(c) Ribose sugar (d) Nitrogenous bases.

(iii) Plasma membrane contains
(a) Phospholipids (b) Proteins (c) Both (a) and (b) (d) none.

(iv) Phase of cell cycle when DNA polymerase is active
(a) G1 (b) G2 (c) S (d) M.

(v) When a threatened plant needs urgent measures to save it from extinction, the desirable approach is
(a) In-situ conservation (b) Ex-situ conservation
(c) Cyropreservation (d) Biopreservation.

(vi) What is the nature of an enzyme?
(a) Vitamin (b) Lipid (c) Carbohydrate (d) Protein.

(vii) The enzyme minus its coenzyme known as
(a) Apoenzyme (b) Metalloenzyme (c) Isoenzyme (d) All of these.

(viii) Restriction enzymes are isolated from
(a) Virus (b) Fungi (c) Protozoa (d) Bacteria.

(ix) Which of these is a suitable ex-situ conservation method?
(a) National Park (b) Wildlife Sanctuary
(c) Sacred Groves (d) Seed Bank.

(x) Global warming can be controlled by
(a) increasing solid waste (b) reducing water wastage
(c) burning human-generated waste (d) reducing fossil fuel consumption.

Group- B

2. (a) Who proposed modern cell theory? What are its postulates? [(CO1)(Remember/IOCQ)]
   (b) Why mitochondria is called the power house of a cell? [(CO1)(Analyze/IOCQ)]
   (c) What is the function of ribosome? [(CO1)(Understand/LOCQ)]
   4 + 4 + 4 = 12

3. (a) What are DNA and RNA? Differentiate between them based on the following factors:
   (i) Nitrogenous bases
   (ii) Location
   (iii) Function
   (iv) Type of sugar. [(CO2)(Remember/LOCQ)]
   (b) What are the two steps of Central Dogma of life? Define them. [(CO2)(Understand/LOCQ)]
   (2 + 4) + (2 + 4) = 12

Group - C

4. (a) What are essential fatty acids? Why they are called so? [(CO3)(Remember/IOCQ)]
   (b) Define protein and write down its function. Draw general structure of an amino acid. [(CO3)(Analyze/IOCQ)]
   (3 + 3) + (3 + 3) = 12

5. (a) What are the two types of cell division? Where they take place? What are its different phases? [(CO4)(Design/HOCQ)]
   (b) What is mitosis and decipher its significance in cell division process. [(CO4)(Justify/LOCQ)]
   (2 + 2 + 2) + 6 = 12

Group - D

6. (a) Evaluate the applications of enzymes in different industrial sectors. [(CO5)(Evaluate/HOCQ)]
   (b) Discuss the role of prosthetic group and co-enzyme on enzyme action. [(CO5)(Analyze/IOCQ)]
   (c) Give an overview of classification of enzymes according to International Enzyme Commission. [(CO5)(Remember/LOCQ)]
   4 + 4 + 4 = 12

7. (a) Give a comparative analysis between mirror-like palindrome and inverted-repeat palindrome. [(CO5)(Compare/HOCQ)]
   (b) Evaluate the molecular mechanism of action of restriction enzymes. [(CO5)(Evaluate/HOCQ)]
   (c) Comment on the significance of RFLP technique in forensic science. [(CO5)(Analyze/IOCQ)]
   4 + 4 + 4 = 12

Group - E

8. (a) What is a biosensor? What are the principal components of a biosensor?
[(CO6)(Illustrate/IOCQ)]

(b) Describe the working principle of any one type of biosensor with a diagram.
[(CO6)(Understand/LOCQ)]

(c) Comment on the applications of 'wearable biosensors'. [(CO6)(Understand/LOCQ)]

(2 + 2) + 6 + 2 = 12

9. (a) Comment on the advantages and disadvantages of Bioremediation.
[(CO6)(Criticize/HOCQ)]

(b) What do you mean by Bioattenuation and Biostimulation?
[(CO6)(Remember/LOCQ)]

(4 + 4) + (2 + 2) = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	39.58	33.33	27.08

Course Outcome (CO):

After completion of the course, the students will be able to:

1. Understand the basic structure and function of cells and cellular organelles.
2. Understand the fundamental concepts of DNA, RNA and central dogma of cells.
3. Characterize the different types of proteins, lipids and carbohydrates.
4. Analyze the mechanism of inheritance of characters through generations.
5. Understand and implement the working principles of enzymes and their applications in biological systems and industry.
6. Design and evaluate different environmental engineering projects with respect to background knowledge about bioresources, biosafety and bioremediation.

*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question