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
<u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> 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)   Cells can only arise from
         (a) Biomolecules   (b) Nucleus
         (c) Pre-existing DNA   (d) Pre-existing cell.

   (ii) DNA is a polymer of
         (a) Nucleotides   (b) Ribose sugar
         (c) Nitrogenous bases   (d) Phosphates.

   (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)   Cellulose is a polymer of
         (a) Sucrose   (b) Glucose
         (c) Lactose   (d) Fructose.

   (vi) Name the enzyme secreted by pancreas.
         (a) Pepsin   (b) Chymotrypsin
         (c) Trypsin   (d) Alcohol dehydrogenase.

   (vii) What is an apoenzyme?
         (a) It is a protein portion of an enzyme
         (b) It is a non-protein group
         (c) It is a complete, biologically active conjugated enzyme
         (d) It is a prosthetic group.

   (viii) Which of the following reaction is catalyzed by Lyase?
         (a) Breaking of bonds
         (b) Formation of bonds
         (c) Intramolecular rearrangement of bonds
         (d) Transfer of group from one molecule to another.

   (ix) Hotspot areas have
         (a) Low density of biodiversity   (b) Only endangered plants
         (c) High density of hot springs   (d) High density of biodiversity.

   (x)   Which of these biosensors use the principle of heat released or absorbed
         by a reaction?
         (a) Potentiometric biosensor   (b) Optical biosensors
         (c) Piezo-electric biosensors   (d) Calorimetric biosensors.

Group – B

2. (a) Discuss the function of the following cell organelles:
        (i) Mitochondria   (ii) Cytoplasm.

   (b) Differentiate between: Prokaryotic and eukaryotic cell.

   (c) Name the 4 important biomolecules of a cell.

                                             (3 + 3) + 4 + 2 = 12

3. (a) State the central dogma of molecular biology. How it has been modified?

   (b) What is nucleotide? Give a structural diagram of a nucleotide. What are the
        functions of a nucleotide?

                                             (3 + 2) + (2 + 3 + 2) = 12

Group – C

4. (a) What are lipids? What are its basic units?

   (b) Define protein and write down its function.

   (c) Draw general structure of an amino acid.

                                             (2 + 2) + 4 + 4 = 12

5. (a) What is cell cycle? What are its phases? What molecular event happens in
        each phase?

   (b) Differentiate between: simple and conjugate protein.

                                             (2 + 3 + 3) + 4 = 12

Group – D

6. (a) Define co-enzyme and co-factor.

   (b) Discuss the major properties of enzymes.

   (c) Explain the 'Lock and Key model' of enzyme action.

   (2 + 2) + 4 + 4 = 12

7. (a) Describe the different types of restriction enzymes with one example of each.

   (b) Explain the logic followed for the nomenclature of *Eco*RI.

   (c) Discuss the commercial applications of restriction enzymes.

   4 + 4 + 4 = 12

Group – E

8. (a) What are the main components of biodiversity?

   (b) What do you mean by alpha, beta and gamma diversity?

   (c) Explain the importance 'biodiversity hotspots'.

   2 + 6 + 4 = 12

9. (a) What is a Biosensor? Describe briefly the working principle of a biosensor.

   (b) Mention the different types of biosensor based on the sensor device.

   (c) Write a brief note on any non-invasive biosensor.

   (1 + 3) + 4 + 4 = 12