BIOLOGY
(BIOT 2105)

Time Allotted : 2½ hrs **Full Marks : 60**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one from each group.

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

Group – A

1. Answer any twelve: **12 × 1 = 12**

Choose the correct alternative for the following

(i) Modern Cell Theory added the following point/points to the existing Cell theory
(a) All organisms are made up of cells
(b) The cell is the basic unit of life
(c) Cells can only arise from a pre-existing cell
(d) All of these

(ii) Nucleic acids are made up of
(a) Ribose sugar only
(b) Ribose sugar and nitrogenous bases
(c) Ribose sugar, nitrogenous bases and phosphates
(d) Phosphates and nitrogenous bases

(iii) Mitochondria is called "The Power House of Cell" because
(a) Most of the cellular energy is stored here
(b) Minimum number of ATP molecules are produced here
(c) Maximum number of ATP molecules are produced here
(d) Maximum number of ATP molecules are hydrolysed here

(iv) In the S phase of cell cycle
(a) The cell grows
(b) The cell organelles divide
(c) The nucleus divides
(d) The DNA divides

(v) Transfer of genetic information can take place only
(a) From DNA to RNA
(b) From DNA to protein
(c) From RNA to DNA
(d) All of these

(vi) Which of the following is produced with the combination of apoenzyme and coenzyme?
(a) Holoenzyme
(b) Enzyme-substrate complex
(c) Prosthetic group
(d) Enzyme-product complex.

(vii) Which of the following is the non-protein component of the enzyme?
(a) Cofactor (b) Activator
(c) Coenzyme (d) All of these.

(viii) Enzymes present in intestinal juice is
(a) Pepsin (b) Renin (c) Trypsin (d) Sucrase

(ix) The most important cause of loss of biodiversity today is
(a) habitat loss and fragmentation (b) over-exploitation
(c) alien species invasion (d) co-extinction

(x) Why biodiversity is of great scientific value?
(a) Because many species of plants and animals are the subjects of our research
(b) Because biodiversity can be use only in space
(c) Because biodiversity can only be useful for scientist
(d) Because biodiversity provides only few products that helps for humans.

Fill in the blanks with the correct word

(xi) One optically inactive amino acid is _____.

(xii) The only organelle present in both prokaryotic and eukaryotic cell is _____.

(xiii) Germ cells are produced by _____ cell division.

(xiv) _____ is a digestive enzyme that is found in saliva and reacts with carbohydrates in food to break them into simpler sugars.

(xv) _____ is an enzyme required in Bakery industry.

Group - B

2. (a) Discuss the structure and function of plasma membrane. Why it is called semi permeable? *[(CO1)(Discuss/LOCQ)]*
(b) How the ribosomes of prokaryotes and eukaryotes differ? *[(CO2)(Understand/LOCQ)]*
(c) What are transcription and translation? What is their significance? *[(CO2)(Apply/HOCQ)]*

(4 + 1) + 2 + 5 = 12

3. (a) What is the significance of central dogma? *[(CO2)(Analyse/IOCQ)]*
(b) What is genetic code? Mention any 4 characteristics of it. *[(CO2) (Remember/IOCQ)]*
(c) Which cellular organelle is involved in translation and how? *[(CO2)(Explain/IOCQ)]*

4 + (3 + 3) + 2 = 12

Group - C

4. (a) What is peptide bond? Define isoelectric point. *[(CO3)(Analyse/HOCQ)]*
   (b) What are essential amino acids? Give example. *[(CO3) (Remember/LOCQ)]*
   (c) Name the monomers of the following:
   Sucrose, Lactose and Maltose . *[(CO3)(Apply/IOCQ)]*

4 + 4 + 4 = 12

5. (a) Give one example of the following:
   (i) Monosaccharide
   (ii) Polysaccharide
   (iii) Saturated fatty acid
   (iv) Unsaturated fatty acid
   (v) Essential fatty acid. *[(CO3)(Memorize/LOCQ)]*
   (b) What are triglyceride and cholesterol? Mention their physiological function. *[(CO3)(Remember/IOCQ)]*
   (c) What are simple and conjugate proteins? *[(CO2)(Apply/HOCQ)]*

5 + 4 + 3 = 12

Group - D

6. (a) What do you mean by competitive and non-competitive enzyme inhibitors? *[(CO5)(Remember/LOCQ)]*
   (b) Discuss the main steps in an enzyme-catalysed reaction. *[(CO5)(Analyse/IOCQ)]*
   (c) Mention the nature of reactions catalysed by the following enzymes with one example of each:
   (i) Transferase
   (ii) Hydrolase
   (iii) Oxidoreductase
   (iv) Ligase. *[(CO5) (Remember/LOCQ)]*

4 + 4 + 4 = 12

7. (a) Compare between Type-I, Type-II and Type-III restriction enzymes. *[(CO5) (Compare/IOCQ)]*
   (b) What do you mean by 'palindrome sequences'? *[(CO5) (Remember/LOCQ)]*
   (c) Comment on the nomenclature of restriction enzymes with the example of *Eco*RI. *[(CO5) (Analyse/IOCQ)]*

4 + 4 + 4 = 12

Group - E

8. (a) Discuss on the concept of Biosafety and Biohazard. *[(CO6) (Analyse/IOCQ)]*
   (b) Write a note on Biodiversity hotspot with an example. *[(CO6) (Understand/LOCQ)]*
   (c) What do you mean by 'in-situ conservation' and 'ex-situ conservation'? *[(CO6)(Remember/LOCQ)]*

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

9. (a) Comment on the applications of a non-invasive biosensor in clinical analysis. *[(CO6) (Remember/LOCQ)]*

(b) Analyse the working principle of alcohol biosensor. *[(CO6) (Analyse/IOCQ)]*

(c) Explain the issues related to Bioethics with an example. *[(CO6) (Analyse/IOCQ)]*

4 + 4 + 4 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	41.66	45.84	12.50

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.*