

Bioscience and Engineering

BTech Midsem Examination, Monsoon Semester 2024-25, 07.10.2024; 10 am – 12 noon

Subject: BT1001E Biology for Engineers, Time: 2 hrs, Total Marks: 30

Answer All Questions (Draw diagrams wherever necessary)

Q. No.	Questions	Marks
1 (a)	Identify the macromolecule that constitute the cell wall of bacteria (a) Lipid and Carbohydrate (b) Protein and Carbohydrate (c) Lipid and Protein (d) None of the above	1
(b)	Haemoglobin is a fully folded quarternary structure with 4 subunits – two identical α chains and two identical β chains. If one gene one polypeptide hypothesis is true, predict how many genes are involved in the haemoglobin synthesis (a) 1 (b) 2 (c) 3 (d) 4	1
(c)	Assume that the egg is subjected to treatment that breaks all the hydrogen bonds. Estimate which of the following structural level of egg protein remains unaffected. (a) Primary Structure (b) Secondary Structure (c) Tertiary Structure (d) Quarternary Structure	1
(d)	Identify the storage polysaccharide in animals that possess the structure similar to that of amylopectin. (a) Glycogen (b) Glucose (c) Cellulose (d) Starch	1
(e)	Predict the DNA binding proteins from the following. (a) Histones (b) Chromatin (c) Peptide (d) Both A and B	1
2 (a)	Select the metabolic pathway that is common to both fermentation and cellular respiration of a glucose molecule? (a) Citric acid cycle (b) Oxidative phosphorylation (c) Glycolysis (d) Reduction of pyruvate to lactate	1

(b)	Predict the type of cell division that occurs in prokaryotic cells. (a) Mitosis (b) Meiosis (c) Binary fission (d) Cytokinesis	1
(c)	In a bacterial cell the sticky feature is due to (a) Cell wall (b) Flagella (c) Glycocalyx (d) Nuclear membrane	1
(d)	Select the first step of an enzymatic reaction (a) Change in the conformation of the enzyme (b) Production of an enzyme-substrate complex (c) Release of product from the enzyme (d) Binding of the substrate to the enzyme	1
(e)	Meiosis has evolutionary significance because it results in (a) Genetically similar daughter cells (b) Four daughter cells (c) Diploid daughter cells (d) Equational division	1
(3.)	Discuss the role of activator and repressor proteins in transcriptional regulation.	2
4.	List the various components of an endomembrane system in the cell and define its functions.	2
5.	'Meiotic cell division result in the formation of haploid cells'. Justify the above statement in brief.	2
6.	'The formation of universe is by big bang theory'. Justify the above statement.	2
7.	Provide a brief explanation of Miller-Urey experiment to describe the origin of life on earth with a diagrammatic representation	4
8.	Compare the structure of a typical prokaryotic bacterial cell and a eukaryotic animal cell with a suitable diagram.	4
9.	Explain the central dogma of molecular biology with a neat schematic diagram.	4