Monsoon Semester 2024 - 2025

BT1001E Biology for Engineers

Time: 180 Minutes | Maximum Marks: 50

(i) Answer all the questions.

(ii) Draw neat sketches wherever necessary.

Q. No.		Questions	Marks
1	a)	**In the context of lipid bilayers, the amphipathic nature of phospholipids:** a) Allows for the formation of a semi-permeable membrane b) Prevents water from entering the cell c) Creates strong covalent bonds between adjacent cells d) Enables easy protein synthesis across the membrane	1
	b)	**Determine the function of hydrophobic interactions in proteins' tertiary structures.** a) They form ionic bonds between charged side chains. b) They help the protein fold into a compact structure by excluding water. c) They form hydrogen bonds between polar side chains. d) They stabilize the primary structure.	1
	c)	**Name the organelle primarily responsible for the production of ATP in eukaryotic cells** a) Nucleus b) Mitochondrion c) Golgi apparatus d) Endoplasmic reticulum	1
	d)	**In cellular communication, signal transduction pathways are essential for:** a) Directly synthesizing proteins b) Relaying signals from the cell membrane to the nucleus c) Transporting molecules across the cell membrane d) Degrading proteins	1
	e)	**In neuronal communication, neurotransmitters are released from one neuron and bind to receptors on the next neuron. This type of communication is an example of:** a) Direct cell-to-cell contact b) Endocrine signaling c) Synaptic signaling d) Paracrine signaling	1
2	a)	**Identify the cause for stroke.** a) Blood flow to heart is blocked b) Blood flow to the brain is blocked c) Blood flow to the lungs is blocked d) Irregular heartbeat	1
	b)	**Predict the roundness nature of lens during the visualization of distant objects.** a) Less convex b) More convex	1

		c) More sphericity d) Less sphericity	
	c)	**P wave in ECG graph corresponds to** a) Depolarization of the atria b) Depolarization of the ventricles c) Represents the repolarization of the ventricles d) Depolarization of the atria and ventricles	1
	d)	**Indicate the correct target of National Policy on Biofuels 2018** a) Achieving 30% blending of ethanol in petrol by the year 2030 b) Achieving 20% blending of ethanol in petrol by the year 2030 c) Achieving 30% blending of biodiesel in petrol by the year 2030 d) Achieving 20% blending of biodiesel in diesel by the year 2030	1
	e)	**Identify the major part of *Jatropha curcas* plants which acts as major source of raw materials for biodiesel production** a) Root b) Stem c) Flower d) Seeds	1
3	a)	**Illustrate the working principle of Brain-Computer Interfaces in brief.**	2
	b)	**Distinguish pulmonary circulation and systemic circulation.**	2
	c)	**MRI scanning is safer than CT scanning. Justify this statement.**	2
	d)	**Explain the vision physiology process for a distant object**	2
	e)	**'The contractions of muscles in lungs affect breathing'. Justify the statement.**	2
4	a)	**Name any two genetically modified food crops and list out the key benefit associated with their genetic modification.**	2
	b)	**Describe any two mechanisms of antibiotic resistance by suitable example.**	2
	c)	**List out the four characteristics of a biosensor.**	2
	d)	**Classify secondary biofuels based on their feedstock source for production.**	2
	e)	**Outline the 5Rs of precision farming.**	2
5		**Each pair of alleles segregates independently during gamete formation. Justify this statement by doing a dihybrid cross between yellow-round seeds and green-wrinkled seeds.**	5
6		**Explain the theory of evolution by natural selection as proposed by Charles Darwin.**	5
7		**Illustrate the structure, physiology and anatomy of heart tissues using a neat diagram.**	5
8		**Differentiate between communicable and non-communicable diseases with suitable example.**	5