Q. Code:606767

Reg. No. | | | | | | | | | | | | | |

B.E./ B.TECH. DEGREE EXAMINATIONS, MAY 2024

Second Semester

BT22101 – BIOLOGY FOR ENGINEERS

(Common to AE, BT, IT)

(Regulation 2022)

TIME:3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Distinguish the structure and function of prokaryotic and eukaryotic cells.	**2**
CO 2	Explains the usage of biological principles in engineering	**4**
CO 3	Integrate the concepts of biology with engineering through case studies.	**3**
CO 4	Describe the influence of biologically inspired materials/machine/devices on environment and society.	**4**
CO 5	Understand the regulations, ethics, security and safety of engineering applications.	**2**

PART- A (20x2=40Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	What are the fundamental principles that constitute the biochemical 'nuts and bolts', encompassing essential molecular processes, structural components, and biochemical pathways?	**1**	**2**
2.	State the processes underlying cardiac muscle contraction, electrical conduction, and the regulation of cardiac output.	**1**	**2**
3.	Examine the interconnected processes of photosynthesis and respiration.	**1**	**2**
4.	Show the step-wise stages of DNA replication.	**1**	**2**
5.	Reveal the underlying principle of motion capture systems, detailing how they accurately track and record the movement of objects or organisms in real-time.	**2**	**3**
6.	Elucidate how the lotus leaves inspired paint brushes enhances painting techniques and material efficiency.	**2**	**4**
7.	Relate blow fish inspiration and designing of vehicles.	**2**	**4**
8.	Mention the utilization of natural color inspiration in the development of nanophotonic crystals.	**2**	**3**
9.	Investigate the principles and applications in understanding the interactions between electromagnetic fields and biological systems.	**3**	**3**
10.	How do neuromorphic computing and artificial intelligence leverage principles inspired by biological neural systems to advance computational capabilities and cognitive functionalities in machines.	**3**	**3**

11.	Manipulate the main principle behind biocybernetics.	**3**		**3**
12.	Highlight the role of biotechnology in addressing challenges such as food production, waste recycling, and biomedical support for astronauts.	**3**		**3**
13.	Compare and contrast the merits and demerits of human cloning.	**4**		**4**
14.	Identify few e-wastes that harm our environment.	**4**		**3**
15.	Distinguish between somatic and genetic effects.	**4**		**3**
16.	What are the multifaceted impacts of chemical, nuclear, radiological, transportation, and e-waste hazards to the biodiversity?	**4**		**3**
17.	What are the potential health implications and regulatory measures aimed at mitigating risks associated with prolonged exposure of electronic gadgets?	**5**		**2**
18.	Discuss the regulations framed behind emerging gene technologies.	**5**		**2**
19.	State the significance of regulatory requirements for labeling medical devices in ensuring product safety, efficacy, and compliance with global healthcare standards.	**5**		**2**
20.	Identify the main sources of embryonic stem cell generation.	**5**		**2**

PART- B (5x 10=50Marks)

			Marks	CO	RBT LEVEL
21. (a)	**(i)**	Compare and contrast the structural and functional differences between prokaryotic and eukaryotic cells.	**(5)**	**1**	**2**
	(ii)	What are the different types of RNA molecules found in cells, and what are their respective functions within the cell's processes?	**(5)**	**1**	**2**
		(OR)			
(b)		Explain the various categories of plant hormones and their functions in regulating plant growth and development.	**(10)**	**1**	**2**
22. (a)		Discuss the application of biological principles in biomimicry, focusing on how the design of swimsuits inspired by sharkskin enhances swimming performance and efficiency.	**(10)**	**2**	**4**
		(OR)			
(b)		Explore the ways in which organisms utilize systems resembling a camera for tasks such as imaging, image recognition, and visual information processing, underscoring their importance in various biological functions.	**(10)**	**2**	**4**

23. (a)	**(i)**	Analyze why biofertilizer is playing a major role in agriculture.	**(5)**	**3**	**3**
	(ii)	Discuss the integration of microbial fuel cells (MFCs) in vehicles, exploring their potential as a sustainable energy source and their role in reducing greenhouse gas emissions in transportation systems.	**(5)**	**3**	**3**
		(OR)			
(b)		Examine a case study regarding workload ergonomics, system ergonomics, and information ergonomics, showcasing their respective impacts on enhancing human performance and well-being within a designated workplace or operational setting.	**(10)**	**3**	**3**
24. (a)	**(i)**	Compare and contrast man-made and technological hazards, examining their origins, impacts, and strategies for mitigation and management in various contexts, such as environmental, industrial, and societal.	**(5)**	**4**	**4**
	(ii)	Encompass a spectrum of potential impacts from immediate concerns to long-term ramifications of microwave radiation in various sectors.	**(5)**	**4**	**4**
		(OR)			
(b)		Analyze the challenges and risks associated with the improper disposal and recycling of e-waste, highlighting the environmental and health consequences.	**(10)**	**4**	**4**
25. (a)		Discuss the environmental and health considerations associated with nuclear plant operations and propose strategies to address potential risks in healthcare.	**(10)**	**5**	**2**
		(OR)			
(b)	**(i)**	Explore the principles behind 3D scanning technology and its capabilities in capturing detailed anatomical data.	**(5)**	**5**	**2**
	(ii)	Discuss why usage of cell phones is to be prohibited for young children.	**(5)**	**5**	**2**

PART- C (1x 10=10Marks)

(Q.No.26 is compulsory)

		Marks	CO	RBT LEVEL
26.	Discuss the ethical considerations and privacy implications surrounding the use of cameras and surveillance systems in various devices, analyzing the balance between security needs and individual rights in today's digital age.	**(10)**	**5**	**5**

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