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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January 2024 Semester End Main Examinations

Programme: B.E. **Semester: VII**
Branch: Biotechnology **Duration: 3 hrs.**
Course Code: 19BT7DE5TEN **Max Marks: 100**
Course: Biomaterials and Tissue Engineering

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	CO	PO	Marks
1	a)		"Bioengineering Techniques Accelerate Stem Cell-Based Therapeutic Effects". Elaborate this statement with suitable examples.	*CO1*	*PO 1*	**06**
	b)		What kind of tissues can be repaired using tissue engineering? Elucidate on "cells as building blocks" in this aspect.	*CO 1*	*PO3*	**07**
	c)		Taking bone damage as an example, elaborate repair and regeneration techniques used in tissue engineering.	*CO 1*	*PO 2*	**07**
			UNIT - II			
2	a)		What are the ideal properties of a biomaterial? Write any two mechanical features of a biomaterial.	*CO 2*	*PO1*	**06**
	b)		What is the role of a scaffold? Based on what parameters is the best scaffold decided?	*CO 2*	*PO2*	**07**
	c)		Often modifications to the surface of a biomaterial system are required to maximize performance. Explicate the various methods of modifications.	*CO 2*	*PO3*	**07**
			UNIT - III			
3	a)		What is total artificial heart? Mention its chief components.	*CO 3*	*PO1*	**06**
	b)		Present a detailed description of artificial pancreas, including challenges involved.	*CO 3*	*PO2*	**07**
	c)		Tissue-based products (TBPs) are complex to regulate since many jurisdictions do not have an adapted legislation for these. Discuss a few of the key regulations that sponsors should follow until the product launch onto the market.	*CO 3*	*PO5*	**07**
			UNIT - IV			
4	a)		How are pluripotent, multipotent and unipotent stem cells different from each other? Give an overview on differentiation of totipotent stem cells.	*CO 4*	*PO2*	**07**

		b)	What is FACS? Elaborate its advantages in stem cell analysis.	***CO 4***	***PO2***	**06**
		c)	Embryonic stem (ES) cells have revolutionized the world of research in various fields including tissue engineering. What is the source of ES cells and how is their potency maintained while growth *in vitro*?	***CO 4***	***PO1***	**07**
			OR			
	5	a)	What are adult stem cells? List major stem cell markers used in regenerative medicine and tissue engineering.	***CO 4***	***PO2***	**06**
		b)	Elucidate the origin of cancer stem cells (CSCs). What are cancer stem cell biomarkers?	***CO 4***	***PO1***	**07**
		c)	What are the most common types of stem cells used in tissue engineering? Discuss the applications of stem cells in tissue regeneration strategies.	***CO 4***	***PO2***	**07**
			UNIT - V			
	6	a)	Elucidate on the following features of a scaffold: architecture, bioactivity and mechanical properties.	***CO 2***	***PO3***	**06**
		b)	Signify chitosan's potential as a natural polysaccharide for scaffold.	***CO 2***	***PO2***	**07**
		c)	Illustrate the method of stereolithography with the help of a schematic diagram.	***CO 2***	***PO3***	**07**
			OR			
	7	a)	What are the different scaffolding approaches in tissue engineering? Write about cyto and tissue compatibility of scaffolds.	***CO 2***	***PO2***	**06**
		b)	Exemplify pure collagen as a biological scaffold in tissue repair and regeneration.	***CO 4***	***PO1***	**07**
		c)	What is 3D bio printing? Illustrate the mechanism of fabrication involved.	***CO 2***	***PO3***	**07**

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