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

Autonomous Institute Affiliated to VTU

July 2023 Semester End Main Examinations

Program: B.E. **Semester: VI**
Branch: Biotechnology **Duration: 3 hrs.**
Course Code: 19BT6DE4BIM **Max Marks: 100**
Course: Biomaterials **Date: 19.07.2023**

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.

			CO	PO	Marks
		UNIT – I			
1	a)	What are biomaterials? Give examples and applications of biomaterials.	*CO1*	*PO1, PO2*	**06**
	b)	Biomaterials must combine chemical and mechanical features of the biological system in order to achieve the required functional results. Highlight the main properties which help to achieve this.	*CO1*	*PO1, PO2*	**06**
	c)	Depict some of the organic functional groups and the class of compounds needed for biomaterials.	*CO1*	*PO1, PO2*	**04**
	d)	Elaborate the relevance of protein adsorption on biomaterials and how it affects biomedical or physiological applications.	*CO1*	*PO1, PO2*	**04**
		UNIT – II			
2	a)	Indicate the following properties for metal implant materials and polymers: a) Types of bonds present b) Electrical conductivity c) Thermal conductivity d) Mechanical deformation e) Advantages and chemical stability	*CO2*	*PO1, PO2*	**05**
	b)	What are the applications of polymers, ceramics and composites as biomaterials for implantation?	*CO2*	*PO1, PO2*	**08**
	c)	What is the first reaction in the body when any foreign material is implanted? Elaborate on the host body response to biomaterials.	*CO2*	*PO1, PO2*	**07**
		UNIT – III			
3	a)	What are the different types of prosthetic valves? How is the optimal prosthetic valve selected in individual patient?	*CO3*	*PO1, PO2, PO5*	**08**
	b)	Illustrate the shapes of any two limb prostheses. Mention their properties.	*CO3*	*PO1, PO2, PO5*	**06**
	c)	Present the regulatory aspects related to tissue engineering.	*CO3*	*PO1, PO2, PO5*	**06**

			UNIT – IV			
	4	a)	With a diagram, represent course of cellular differentiation into tissues and organs in humans. What are the stages of a tissue-biomaterial interaction?	*CO3*	*PO1, PO2, PO5*	**05**
		b)	Elaborate on connective tissues with examples. What are the different types of muscle tissue found in the human body?	*CO3*	*PO1, PO2, PO5*	**07**
		c)	Elucidate the formation of clot and various factors affecting blood compatibility.	*CO3*	*PO1, PO2, PO5*	**08**
			OR			
	5	a)	Give a diagrammatic representation of blood flow in the heart along with all the different parts labelled.	*CO3*	*PO1, PO2, PO5*	**05**
		b)	What is ECM in connective tissue? What is ECM-driven communication?	*CO3*	*PO1, PO2, PO5*	**07**
		c)	What is the role of signalling factors in tissue engineering? Give an overview of the types of cell signalling pathways.	*CO3*	*PO1, PO2, PO5*	**08**
			UNIT – V			
	6	a)	Give examples of novel scaffolds in tissue engineering.	*CO4*	*PO2*	**05**
		b)	Collagen and lamin are very effective biological scaffolds. Justify emphasizing on the properties.	*CO4*	*PO2*	**07**
		c)	Why carbohydrates are well suited as biomaterials? List the biomedical applications of dextran and cellulose.	*CO4*	*PO2*	**08**
			OR			
	7	a)	What are scaffolds? Highlight the methods which are used for the synthesis of scaffolds.	*CO4*	*PO2*	**08**
		b)	What are the different ways by which porosity and other characteristics can be controlled and measured in scaffolds?	*CO4*	*PO2*	**06**
		c)	Elaborate on 3D printing which has revolutionized tissue engineering. Elucidate on stereolithography as an example.	*CO4*	*PO2*	**06**

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