

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2023

Subject Code:3170418

Date:16-12-2023

Subject Name:Biomaterials

Time:10:30 AM TO 01:00 PM

Total Marks:70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		Marks
Q.1	(a) What is biomimetic nanotechnology and give its applications in biomedical research.	03
	(b) Explain the surface properties of biomaterials and their significance in biological applications.	04
	(c) Analyze the role of nano motors derived from bacterial sources (E. coli) in nanotechnology, detailing their mechanisms and potential applications in biomedical research.	07
Q.2	(a) Explain the properties of spider silk as a biomaterial and its potential bio-applications.	03
	(b) Discuss two characterization methods for nanobiomaterials and their importance in determining material properties.	04
	(c) Evaluate the importance biological materials in the development of innovative adhesive technologies.	07
	OR	
	(c) Evaluate the potential applications of protein and glyco-lipid nanotechnology in targeted drug delivery systems	07
Q.3	(a) Explain the concept of nano printing of DNA, RNA, and proteins in biochip applications	03
	(b) Compare the structural and functional properties of Collagen and Carbon Nanotubes.	04
	(c) Recall the primary components of nano motors derived from mammalian sources (Myosin family) and discuss their significance in targeted drug delivery systems in nanotechnology.	07
	OR	
Q.3	(a) Describe the significance of Gecko feet in biomaterials and applications in adhesive technology.	03
	(b) Analyze the role of nanotechnology in tissue engineering with its example.	04
	(c) List and briefly describe four different biopolymers synthesized from simple biological monomers, emphasizing their specific uses in biomedical or industrial contexts	07

Q.4	(a)	Define the concept of biodegradable polymers with example	03
	(b)	Compare and contrast two different biological methods used for synthesizing nanomaterials	04
	(c)	Explain the role of plants and microbes as nanofactories in sustainable nanomaterial synthesis.	07
OR			
Q.4	(a)	Explain the primary function of DNA nanotechnology in the development of biochips at the nano scale	03
	(b)	Illustrate two examples of biodegradable polymers commonly used in biomedical applications, highlighting their respective properties and advantages in the field.	04
	(c)	Discuss the role of nanotechnology in advancing Tissue Engineering & Organ Printing, highlighting the significance of nanostructures in fabricating biomimetic scaffolds and promoting tissue regeneration.	07
Q.5	(a)	Explain the significance of both bulk and surface properties of biomaterials.	03
	(b)	Evaluate the use of Poly (lactic-co-glycolic acid) (PLGA) in drug delivery systems.	04
	(c)	Compare and contrast the structural and functional properties of Collagen and Hydrogel in tissue engineering and wound healing applications. Discuss their specific roles, highlighting their compatibility, and potential synergies in biomedical research.	07
OR			
Q.5	(a)	Explain the concept of Lab-on-a-Chip (LOC) devices and their significance in biomedical research	03
	(b)	Explain the roles of proteins and glyco-lipids in nanotechnology, highlighting their nano-applications.	04
	(c)	Evaluate the importance of plants and microbes as nanofactories for biomaterial production in the context of sustainable nanomaterial synthesis, emphasizing their environmental implications and potential applications in biomedical research.	07
