

JA YPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATIONS- 2026

B.Tech-VIII Semester (Open Elective)

CODE (CREDITS): 24B1WPH831 (03)

MAX. MARKS: 35

COURSE NAME: Biomaterials

COURSE INSTRUCTORS: Ragini Raj Singh

MAX. TIME: 2 Hours

Note: (a) All questions are compulsory.

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

(c) Use of calculator is allowed

Q.No	Question	CO	Marks
Q1	(a) Discuss the importance of titanium and its alloys in orthopedic and dental implant applications. Highlight the key properties responsible for their widespread use.	3	3
	(b) Analyze the effect of alloying elements on the mechanical strength, corrosion resistance, and biocompatibility of metallic biomaterials.		2
Q2	(a) Define ceramic biomaterials and explain their significance in biomedical engineering with suitable examples and applications	4	3
	(b) Differentiate between bioinert, bioactive, and biodegradable ceramics on the basis of their biological response and biomedical applications.		2
Q3	(a) Describe the major processing steps involved in the fabrication of bioceramic implants.	4	3
	(b) Explain the structure and properties of calcium phosphate ceramics and discuss their applications in orthopedic and dental fields.		2
Q4	(a) Define polymeric biomaterials and discuss the essential properties required for their biomedical applications with suitable examples.	5	3
			2

	(b) Differentiate between thermoplastic and thermosetting polymers with one biomedical application of each.		
Q5	(a) Explain how the structural arrangement of polymers (linear, branched, and cross-linked) influences their physical properties and biomedical applications. (b) Discuss the role of PLGA (poly(lactic-co-glycolic acid)) in controlled drug delivery systems. Analyze how its degradation behavior influences drug release kinetics and explain the challenges associated with sterilization of polymeric biomaterials.	5	3 ²
Q6	(a) Define composite biomaterials and discuss their advantages over single-phase biomaterials with suitable biomedical examples. (b) Explain the role of matrix and reinforcement phases in composite biomaterials. Compare the mechanical behavior of composites with metallic and ceramic biomaterials used in implants.	5	3 2