

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2025

B.Tech-VIII Semester (Open Elective)

COURSE 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

Q.No	Question	CO	Marks
Q1	(a) What is the primary reason for using titanium and its alloys in orthopedic and dental implants?	2	2
	(b) Explain how alloying affects the mechanical and corrosion properties of biomedical metals.		2
Q2	(a) Define ceramic biomaterials. Give two examples and their applications in the biomedical field.	3	2
	(b) Differentiate between bioinert, bioactive, and biodegradable ceramics with examples.		3
Q3	(a) Explain the processing steps involved in producing bioceramic implants.	4	2
	(b) What are calcium phosphate ceramics? Discuss their use in orthopedic and dental applications.		3
Q4	(a) Define polymeric biomaterials. Provide two examples used in biomedical applications. What are the desirable properties of polymeric biomaterials for biomedical use?	4	3
	(b) Differentiate between thermoplastics and thermosets with one biomedical example each.		2
Q5	(a) Explain how polymer structure (linear, branched, cross-linked) affects its properties and applications.	5	3

	(b) Discuss the role of PLGA (poly(lactic-co-glycolic acid)) in controlled drug delivery. How does its degradation rate affect drug release? Analyze the challenges associated with sterilizing polymeric biomaterials. How can these be overcome?		3
Q6	<p>(a) Define composite biomaterials. Give two examples used in biomedical applications. List three advantages of using composite biomaterials over single-phase materials.</p> <p>(b) Discuss the role of the matrix and reinforcement in a composite biomaterial. Compare mechanical properties of composite biomaterials with metals and ceramics used in implants.</p>	5	3
Q7	<p>(a) Evaluate the role of bioactive ceramic fillers (like hydroxyapatite) in improving the osteoconductivity of polymer matrices.</p> <p>(b) You are tasked with developing a composite for dental applications. What properties are critical, and which materials would you choose</p>	5	2