Reg. No. : | | | | | | | | | | | | |

Question Paper Code: R2P04

B.E./B.Tech. DEGREE EXAMINATION, NOV 2025

Second Semester

Biotechnology

R21UPH204 - BIOMATERIAL PHYSICS

(Regulations R2021)

Duration: Three hours | Maximum: 100 Marks

PART A - (10 x 1 = 10 Marks)

1. -------- are used as biomaterials due to their high mechanical strength and biocompatibility. CO1- U

   (a) Ceramics (b) polymers (c) metals (d) composites

2. ------ refers to of a biological process occurring within a living organism, or in the living organism. CO1- U

   (a) In vitro (b) In vivo (c) Respiration (d) Metabolism

3. Ti-6Al-4V is an example of the ----------. CO1- U

   (a) alpha alloy (b) beta alloy

   (c) alpha-beta alloy (d) alpha-alpha alloy

4. Casting of titanium alloy is difficult due to high melting point of -------. CO2- U

   (a) 1700 °C (b) 2700 °C (c) 3700 °C (d) 4700 °C

5. --------- is an ionized gas. CO1- U

   (a) sol (b) gel (c) plasma (d) arc

6. Metallic glasses have ---------- structure. CO1- U

   (a) HCP (b) BCC (c) FCC (d) TCP

7. The UV and visible-light photons excite -------- electrons. CO1- U

   (a) core (b) valence (c) free (d) inner shell

8. The ------- molecule has a permanent net dipole moment. CO1- U

   (a) H_2O (b) H_2 (c) O_2 (d) N_2

9. IOLs were originally made of a rigid material called --------- CO2- U

(a) PMMA (b) PVC (c) copolymer (d) PTFE

10. --------- are used as filler material in breast implants. CO2- U

(a) saline solution (b) silica gel (c) composites (d) all of these

PART – B (5 x 2= 10 Marks)

11. Mention few applications of biomaterials. CO1- U

12. Write a short note on thermal properties of Implant materials? CO2- U

13. Distinguish between Austenite and martensite phase in SMA's? CO2- U

14. The transmittance of a $2x10^{-4}$ M solution of a substance was found to be 76.2% at a wavelength of 360nm, when placed in a cell of 1 cm length. Calculate A and ε. CO3-App

15. How the cells can response to mechanical forces? CO1- U

PART – C (5 x 16= 80 Marks)

16. (a) Discuss in detail about the classification of biomaterials. CO1- U (16)

Or

(b) Explain the general, mechanical and surface properties of biomaterials. CO1- U (16)

17. (a) Discuss in detail about the types of metallic implant materials. CO2- U (16)

Or

(b) Describe hydrogel and its applications. Mention its advantages and disadvantages. CO2- U (16)

18. (a) Give a detailed account of metallic glasses, their method of production, types, properties and applications. CO1- U (16)

Or

(b) What are nanomaterials? Describe any two methods of production of nanomaterials. Discuss the applications of nanomaterials. CO1- U (16)

19. (a) Determine the transmittance and absorbance of electromagnetic waves using of UV-Vis Spectroscopy. CO3-App (16)

Or

(b) Determine the amount of X-ray yield of gamma line spectra using PIXIE analysis. CO3-App (16)

20. (a) Explain in detail about the application of prosthetic and biological heart valves. CO1- U (16)

Or

(b) Discuss in detail about Intraocular lenses (IOLs). CO1- U (16)