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

Question Paper Code:R2P04

B.E./B.Tech. DEGREE EXAMINATION, MAY 2024

Second Semester

Biotechnology

R21UPH204 - BIOMATERIAL PHYSICS

(Regulations R2021)

Duration: Three hours | Maximum: 100 Marks

PART A - (10 x 1 = 10 Marks)

1. A thickness of a single human hair is about _____ nm. **CO1-U**

   (a) 80 (b) 800 (c) 8000 (d) 80000

2. _____materials have interaction with surrounding bone and soft tissues. **CO1-U**

   (a) Bio active (b) Implant materials (c) Ceramics (d) Glass

3. The optimal pore size for bone ingrowth is in the range of ----------. **CO2- U**

   (a) 10 to 500 µm (b) 50 to 500 µm (c) 10 to 50 µm (d) 100 to 500 µm

4. -------- are used mainly as surface coatings for implants materials. **CO2- U**

   (a) Ceramics (b) Composites (c) Polymers (d) Carbon

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. In photoelectron spectroscopy, we discuss about -------- and -------- **CO1-U**

   (a) XPS & UPS (b) XRD & UV (c) NMR & MS (d) IR & AAS

8. ---------- is a branch of science which studies the interaction of electromagnetic radiation with matter. **CO1-U**

   (a) Mechanics (b) Optics (c) Spectroscopy (d) Photonics

9. A dental implant is also known as ---------- **CO2-U**

   (a) Texture (b) Fixture (c) Denture (d) mixture

10. --------- are widely used in bio printing cells for tissue/organ fabrication. **CO2-U**

(a) Collagens (b) Hard polymers (c) Hydrogels (d) all of these

PART – B (5 x 2= 10 Marks)

11. Write a short note on mechanical properties of biomaterials? **CO1-U**

12. What is Titanium alloy Ti_6Al_4V? **CO2- U**

13. Draw hysteresis loop for phase transition in shape memory alloys? **CO1-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-Ap**

15. Differentiate Stents and Shunts. **CO1-U**

PART – C (5 x 16= 80Marks)

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

Or

(b) Explain the electrical, thermal and optical properties of biomaterials. **CO1- U** (16)

17. (a) What is Titanium alloy Ti_6Al_4V? What are properties and uses of Ti_6Al_4V? **CO2-U** (16)

Or

(b) Give a detailed account on metallic implant materials, classification, properties and their applications. **CO2-U** (16)

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

Or

(b) Discuss in detail the characteristics of shape memory alloys and applications of shape memory alloys **CO1 - U** (16)

19. (a) Determine the amount of a particular metal in a plant sample tissues by Neutron activation analysis? **CO3-Ap** (16)

Or

(b) Determine the unknown amount of the substance which is mixed with isotopic labeled compounds by DIDA and IIDA techniques? **CO3-Ap** (16)

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

Or

(b) What are active biomaterials? Explain how the materials are used in mechanobiology. **CO1-U** (16)