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Question Paper Code:R2P04

B.E./B.Tech. DEGREE EXAMINATION, APRIL /MAY 2025

Second Semester

Biotechnology

R21UPH204 -BIOMATERIAL PHYSICS

(Regulations R2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL questions

PART A - (10 x 1 = 10 Marks)

1. A minimum ductility of ----- is required for dental implant. CO2- U
(a) 6% (b) 7% (c) 8% (d) 9%
2. ----- material is used for wound dressing applications. CO1- U
(a) Nylon (b) Silicon (c) Polymer (d) Biobrane
3. An ideal modulus of elasticity comparable to bone ----- should be selected for implantation. CO2- U
(a) 810 GPa (b) 18 GPa (c) 180 GPa (d) 81 GPa
4. 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
5. ----- is an ionized gas. CO1- U
(a) sol (b) gel (c) plasma (d) arc
6. ----- balls are allowed to rotate inside a container in ball milling process. CO1- U
(a) Iron (b) Tungsten (c) Tin (d) Lead
7. ----- is a type of elemental analysis based on excitation of electron of atom. CO1- U
(a) AAS (b) MS (c) NMR (d) FTIR

8. "Cuvette" is also known as ----- CO1- U
 (a) Source (b) Monochromator (c) Sample cell (d) Detector
9. A dental implant is also known as ----- CO2- U
 (a) texture (b) fixture (c) denture (d) mixture
10. ----- is present between the left atrium and left ventricle. CO2- U
 (a) Tricuspid valve (b) Pulmonary valve
 (c) Aortic valve (d) Mitral valve

PART – B (5 x 2= 10 Marks)

11. What are the types of Bio-ceramic materials? CO1- U
12. Write a short note on 316L stainless steel? CO1- U
13. Draw hysteresis loop for phase transition in shape memory alloys? (SmAs) CO2- U
14. Give the comparison of AAS and AES. CO2-U
15. What are the various types of 3D printing techniques? CO1- U

PART – C (5 x 16= 80 Marks)

16. (a) Explain the applications of biomaterials in the field of medicine. CO1 - U (16)
 (i) Orthopedic devices
 (ii) Wound dressing
 (iii) Dermatology
- Or
- (b) Discuss in detail about In-vitro and In-vivo Testing methods. CO1 - U (16)
17. (a) Give a detailed account of types of ceramic implant materials, properties and its applications. CO2-U (16)
- Or
- (b) Discuss briefly about the usage of alumina and carbon in CO2-U (16)
 implantation.
18. (a) Explain the synthesis of nanomaterial's using sol gel and ball CO1-U (16)
 milling techniques.
- Or
- (b) Discuss in detail the characteristics of shape memory alloys and CO1-U (16)
 applications of shape memory alloys

19. (a) Discuss in detail about the instrumentation of FTIR Spectroscopy. CO2-U (16)
Or
(b) Explain in detail about NMR Spectrometer. CO2-U (16)
20. (a) Write a Short notes on CO1-U (16)
i) Vascular Graft
ii) Stent
iii) Orthopedic plates
Or
(b) Write a Short notes on CO1-U (16)
1. Medical 3D cell printing
2. Active biomaterials for mechanobiology

