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Question Paper Code: 92004

B.E./B.Tech. DEGREE EXAMINATION, AUGUST 2021

Second Semester

19UPH204 – BIOMATERIAL PHYSICS

(Common to Biomedical & Bio technology branches)

(Regulation 2019)

Duration: 1.45 hrs

Maximum: 50 Marks

PART A (Answer Any Ten)

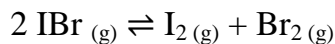
10*2 = 20 Marks

1. State Joule's law. CO1 – U
2. What are Coupled reactions? Give an example. CO1 – U
3. Calculate the standard free energy of a reaction at 300 K. The Gas Constant R and equilibrium constant value is given as $8.314 \text{ JK}^{-1}\text{mol}^{-1}$ and 0.91. CO2 – U
4. Differentiate Active and passive transport in cell membrane. CO1 – U
5. What is Ti based metals which are commonly used for biomedical implant? CO1 – U
CO1(U)
6. Write a short note on 316L stainless steel? CO1– U
7. Compare the corrosion resistance value for various Implant materials? CO5 –U
8. Give short notes on "Nitinol". CO1 – U
- 9 Define glass transition temperature in metallic glasses. CO1 – U
- 10 Draw hysteresis loop for phase transition in shape memory alloys? CO1 – U
- 11 Differentiate In-vivo and In-vitro assessment in biomaterials. CO5 – U
- 12 What are essential components in Nano sensors? CO1 – U
- 13 Calculate the numerical aperture of an optical fiber cable with a cladding index of 1.22 and a core index of 1.44? CO4 – U
- 14 Differentiate single mode and multimode fiber. CO6 – U
- 15 Why are optical fibers called as wave guides? CO1– U

PART B (Answer Any Three)

3*10 = 30 Marks

16. At a certain temperature, K_c is 4.13×10^{-2} for the equilibrium: CO2-App (10)



Assume that equilibrium is established at the above temperature by adding only $\text{IBr}_{(g)}$ to the reaction flask. What are the concentrations of $\text{I}_{2(g)}$ and $\text{Br}_{(g)}$ in equilibrium with 0.0124 moles/liter of $\text{IBr}_{(g)}$?

- 17 Investigate the usage of different classes of implant materials in the field of Biomedical engineering. CO5-App (10)
- 18 Derive the expression for (a) Gibb's free energy and (b) Numerical aperture of fiber CO1- Ana (10)
- 19 What are shape memory alloys? CO1- U (10)
- (a) Describe the characteristics of shape memory alloys.
 - (b) List out any four applications of shape memory alloys.
 - (c) Mention any two advantages and disadvantages of SMAs.
- 20 Compare the different types of optical fiber and select a suitable one for under water communication. CO6- Ana (10)