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10NT32

Third Semester B.E. Degree Examination, Dec.2014/Jan.2015
Material Science and Engineering

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART - A

1 a. What is Fermi energy? Explain the Fermi dirac distribution function. **(10 Marks)**
b. Explain the quantum electron theory of metals. **(05 Marks)**
c. What are dilute magnetic semi conductors? Mention some of the applications. **(05 Marks)**

2 a. Explain the photo conductivity in insulating materials and variation with illumination. **(10 Marks)**
b. What is luminescence? Classify luminescence. **(06 Marks)**
c. Explain some of the applications of photoconductivity. **(04 Marks)**

3 a. What is Polarization? Explain the various types of polarization in dielectrics. **(10 Marks)**
b. What are magnetic bubbles? Explain the working, with a neat diagram. **(10 Marks)**

4 a. What are biomaterials? Explain the role of bio ceramics as implants. **(08 Marks)**
b. Explain the effect of physiological fluid on the properties of biomaterials. **(08 Marks)**
c. State the extra vascular and intravascular response towards implants. **(04 Marks)**

PART - B

5 a. Write a note on Brinell hardness and Vicker's hardness tests. **(06 Marks)**
b. What is 'fracture'? Write a brief note on the types of fractures. **(08 Marks)**
c. What are non – linear elastic properties? Explain briefly with the help of stress – strain curve. **(06 Marks)**

6 a. Write a note on line defects. **(08 Marks)**
b. Explain and classify grain boundary effects. **(04 Marks)**
c. Explain the effect and significance of imperfections on metal properties. **(08 Marks)**

7 a. Define the following : i) Phase transformation ii) Homogeneous nucleation iii) Heterogeneous nucleation and iv) Growth. **(04 Marks)**
b. Explain the kinetics of phase transformation. **(08 Marks)**
c. Explain briefly about spinodal decomposition. **(08 Marks)**

8 a. What are Ceramics? Explain the synthesis and processing of ceramics. **(10 Marks)**
b. Describe the characteristics of sintered ceramics. **(06 Marks)**
c. Explain the role of ceramics in cementation process. **(04 Marks)**

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