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B.E. (FULL TIME) DEGREE END SEMESTER EXAMINATIONS - APRIL / MAY 2014

MATERIALS SCIENCE AND ENGINEERING BRANCH
II SEMESTER - REGULATION 2012
ML 8201 – STRUCTURE AND PROPERTIES OF MATERIALS

Time : 3 Hours

Max. Marks : 100

ANSWER ALL QUESTIONS

PART – A (10 X 2 = 20 Marks)

1. Draw the BCC unit cell and find the number of atoms in it.
2. Define 'Glass Transition' temperature.
3. State Gibb's phase-rule.
4. What is pearlite?
5. How are steels classified?
6. What is the mechanism of thermal conductivity in metallic materials?
7. Name two crystal structures of ceramics.
8. What is a 'Cermet'?
9. How are polymers classified?
10. What are the defects in polymers?

PART – B (5 x 16 = 80 Marks)

11. i) Describe the mechanisms of polymerization. (8)
 ii) Briefly write about liquid crystal polymers and conductive polymers. (8)
- 12.a) i) State the Hume-Rothery rules for substitutional solid solution formation. (4)
 ii) Explain with sketches the different crystal imperfections. (12)
 (OR)
- b) i) Derive expressions for critical nucleus size and critical free energy change for homogeneous nucleation. (12)
 ii) Explain the differences between homogeneous nucleation and heterogeneous nucleation. (4)
- 13.a) Draw the isomorphous, peritectic and eutectic phase diagrams and label all regions in it.
 (OR)
- b) Draw the iron-iron carbide phase diagram and label all regions in it. Write down the three phase reactions in it.
- 14.a) i) Sketch the microstructures and write down the properties and uses of different cast irons. (12)
 ii) What are effects of Cr and W additions on steel? (4)
 (OR)
- b) i) Discuss briefly the factors which affect the electrical conductivity of metals. (8)
 ii) Write down the properties and uses of any two titanium alloys and copper alloys. (8)
- 15.a) i) How are glass ceramics arranged in atomic scale. (4)
 ii) Give the properties and uses of tungsten carbide and graphene. (12)
 (OR)
- b) i) Give the properties and uses of any one fiber reinforced composite and particle reinforced composite. (12)
 ii) State the law of mixtures in composites. (4)