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Third Semester B.E. Degree Examination, Dec.2016/Jan.2017
Material Science and Metallurgy

Time: 3 hrs.

Max. Marks:100

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

PART – A

1 a. Define Unit cell, Co-ordination number. (04 Marks)
   b. Draw the FCC Lattice and calculate its atomic packing factor. (08 Marks)
   c. Explain Crystal imperfections with figures. (08 Marks)

2 a. Define Engineering Stress and Strain and True stress and strain. Find out the relationship between True strain and Engineering strain. (08 Marks)
   b. Define the following terms : i) Yield strength   ii)   Offset yield strength   iii) Ductility   iv) Ultimate strength   v)   Toughness. (08 Marks)
   c. Compare Plastic deformation by slip and twinning. (04 Marks)

3 a. Explain types of fractures with figures. (08 Marks)
   b. Draw the Creep curve and explain briefly. (06 Marks)
   c. Explain types of fatigue loading with examples. (06 Marks)

4 a. Define Solid solutions and explain different types of solid solutions with figures. (08 Marks)
   b. Explain the Mechanism of solidification. (05 Marks)
   c. Explain the Construction of phase diagram with figure. (07 Marks)

PART – B

5 a. Draw the Fe – Fe_3C Equilibrium diagram and label the phases. (10 Marks)
   b. Explain the construction of T.T.T diagram with figure and label it. (10 Marks)

6 a. Differentiate between Austempering and Martempering of steels. (06 Marks)
   b. Write a brief note on annealing and normalizing heat treatments process (06 Marks)
   c. Explain Carburizing and flame hardening in brief. (08 Marks)

7 a. Mention the composition, properties and application of malleable iron. (08 Marks)
   b. Briefly describe the properties and applications of α - Brasses and red brasses and mention their compositions. (06 Marks)
   c. Write a brief note on aluminium and its alloys. (06 Marks)

8 a. With a neat sketch, explain the production of Fibre – reinforced plastics (any one method). (10 Marks)
   b. Explain the advantages and applications of composite material. (10 Marks)

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