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10ME/AU32A/10MEA/AUA302

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019
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. Draw the unit cell of BCC and find out the effective number of atoms within the unit cell and atomic packing factor of BCC. (08 Marks)
- b. With sketches, explain edge and screw dislocations and compare them. (08 Marks)
- c. State and explain the Fick's laws of diffusion. (04 Marks)
- 2 a. Define and explain the linear and non – linear elastic behaviour of metals. (08 Marks)
- b. Explain the meaning of Resilience, Modulus of resilience and Toughness. (06 Marks)
- c. With neat sketches, explain the offset yield strength and ultimate tensile strength. (06 Marks)
- 3 a. Explain different types of fracture giving appearance of fracture in each case. (08 Marks)
- b. With the help of a creep curve, explain the mechanism of creep. (06 Marks)
- c. Write short notes on Fatigue properties and S – N diagram. (06 Marks)
- 4 a. With neat sketches, explain Homogeneous and Heterogeneous nucleation's (10 Marks)
- b. What is Solid Solution? Explain the Hume Rothery rules that governs the formulation of a substitutional solid solution. (06 Marks)
- c. Compare between Interstitial and Substitutional solid solution. (04 Marks)

PART - B

- 5 a. State and discuss lever rule with an example. (05 Marks)
- b. Draw a binary phase diagram for Cu – Ni and explain the solidification of 40% Ni alloy. (05 Marks)
- c. Draw iron carbon equilibrium diagram and label all the phases. Explain the solidification of hyper eutectoid steels. (10 Marks)
- 6 a. Superimpose continuous cooling curves on TTT diagram and describe the various transformed products of Austenite on cooling. (10 Marks)
- b. Describe Annealing, Normalizing, Hardening and Tempering processes. (10 Marks)
- 7 a. State the properties and uses of Grey cast iron, Malleable iron and SG iron. Indicate the microstructure of each of them. (10 Marks)
- b. Write the properties, compositions and uses of Copper alloys and Aluminium alloys. (10 Marks)
- 8 a. How are Composites classified? Explain the role of reinforcement and matrix material in composites. (10 Marks)
- b. Write briefly about FRP's and MMC's production. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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