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10ME/AU42A

Fourth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Material Science & Metallurgy

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. What is atomic packing factor? Calculate APF for FCC structure. (10 Marks)
b. What is diffusion? Write the Fick's first law of diffusion also benefits of diffusion. (06 Marks)
c. Write the difference between edge dislocation and screw dislocation. (04 Marks)
- 2 a. Explain the following:
(i) Secant modulus (ii) Tangent modulus (iii) Resilience. (06 Marks)
b. Explain with neat sketch of Vicker hardness test. (04 Marks)
c. A 12.5 mm dia aluminium alloy test bar is subjected to a load of 2 tons. If the dia of the bar is 12.4 mm at this load, calculate engineering stress and strain, true stress and true strain. Assume no change in volume. (10 Marks)
- 3 a. What is fracture? Explain different types of fracture. (04 Marks)
b. Explain with neat sketch of RR Moore fatigue test with S-N curve of mild steel and Al alloy. (10 Marks)
c. Explain different types of mechanism used in Creep. (06 Marks)
- 4 a. Write GIBB's phase rule, also write the phase and DOF. (04 Marks)
b. Explain with neat sketch of solid solution phase diagram for Ni-Cu. (06 Marks)
c. What is Nucleation? Explain briefly homogeneous and heterogeneous nucleation. (10 Marks)

PART – B

- 5 a. Draw the iron-carbon equilibrium diagram and explain briefly. (10 Marks)
b. With neat sketch, explain TTT diagram for hypo-eutectoid and hyper-eutectoid steel. (10 Marks)
- 6 a. Explain briefly Jominy-End quench test. (08 Marks)
b. Differentiate normalizing and annealing. (06 Marks)
c. Explain with neat sketch of flame hardening process. (06 Marks)
- 7 a. Explain with micro structure of different types of carbon steels. (10 Marks)
b. Write the characteristics, applications and types of Titanium alloys. (10 Marks)
- 8 a. What is composite material? Discuss the roles of the matrix and reinforcements in a composite material. (10 Marks)
b. What are the advantages, disadvantages and applications of composite materials? (10 Marks)

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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.