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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-eutecoid and hyper-eutecoid 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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