CBCS SCHEME

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18AU33

Third Semester B.E. Degree Examination, Jan./Feb. 2021
Material Science and Metallurgy

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Draw the FCC lattice and calculate its coordination number and explain atomic packing factors. **(10 Marks)**

b. Explain the following:
i) Flick's laws of diffusion
ii) Factors affecting diffusion. **(10 Marks)**

OR

2 a. Draw the Engineering Stress-strain diagram of mild steel and describe how the following properties can be obtained from the diagram:
i) Yield strength
ii) Elastic modulus
iii) Ductility
iv) Toughness. **(10 Marks)**

b. i) Explain linear and non linear property. **(05 Marks)**
ii) Differentiate between slip and twinning. **(05 Marks)**

Module-2

3 a. Differentiate between ductile and brittle fracture with neat graphical representation. **(10 Marks)**

b. With the help of a graph, explain three stages of creep. **(10 Marks)**

OR

4 a. Explain different types of fatigue loading, with an examples. **(10 Marks)**

b. What is Fatigue? Briefly explain fatigue testing and plot S-N curves for different materials. **(10 Marks)**

Module-3

5 a. What is Solidification? Explain:
i) Homogeneous and Heterogeneous nucleation
ii) Cast metal structure. **(10 Marks)**

b. List the types of solid solutions and explain the rules governing of formation of substitutional solid solution. **(10 Marks)**

OR

6 a. i) Deduce phase diagram. Explain its significance. **(05 Marks)**
ii) Write a short note on: i) Phase rule ii) Lever rule. **(05 Marks)**

b. Explain construction and interpretation of eutectic phase diagram. **(10 Marks)**

Module-4

7 a. With neat sketches, explain the following:
i) TTT curves ii) Normalizing **(10 Marks)**

b. Write a short note on:
i) Carburizing ii) Flame hardening **(10 Marks)**

OR

8 a. Briefly explain the structure, properties, composition and applications of grey cast iron. **(10 Marks)**

b. Briefly explain types of cast iron and its applications. **(10 Marks)**

Module-5

9 a. List the non-ferrous materials and briefly explain copper alloys. **(10 Marks)**

b. Enumerate the different uses of Aluminium alloys and explain the modification of Al-Si alloy. **(10 Marks)**

OR

10 a. What is Composite Material? How is it classified? **(10 Marks)**

b. Briefly discuss the advantages and applications of FRP and MMC. **(10 Marks)**

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