CBCS SCHEME

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21AU32

Third Semester B.E. Degree Examination, Dec.2023/Jan.2024
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. Define the following terms:
i) Unit cell ii) Space lattice iii) Coordination number iv) Atomic Packing Factor(APF) **(04 Marks)**

b. Derive an expression for APF for Body centered cubic structure. **(10 Marks)**

c. Discuss the factors affecting diffusion. **(06 Marks)**

OR

2 a. Draw the stress-strain diagrams for mild steel and discuss the various properties of material. **(10 Marks)**

b. List and explain the various crystal defects. **(10 Marks)**

Module-2

3 a. Discuss about the types of stresses induced in 2-D plane and give an expression for each type of stress. **(08 Marks)**

b. Differentiate between ductile and brittle fracture. **(12 Marks)**

OR

4 a. Describe the various stages of ductile fractures with necessary sketch. **(10 Marks)**

b. Define Creep. Explain the three stages of Creep. **(10 Marks)**

Module-3

5 a. List and explain various materials used in batteries. **(10 Marks)**

b. Give note on primary and secondary cells. **(10 Marks)**

OR

6 a. Explain the different types of Batteries with their specific application in automobile industry. **(10 Marks)**

b. Discuss about the fundamentals of Electrochemical super capacitors. **(10 Marks)**

Module-4

7 a. Give the significance of heat treatment in metals and list the various heat treatment processes. **(08 Marks)**

b. Explain the process of Annealing, its purpose and types. **(12 Marks)**

OR

8 a. What is the purpose of surface hardening? Explain any one surface hardening method with the help of sketch. **(10 Marks)**

b. Explain the properties and applications of
i) Malleable Iron ii) Spheroidal Graphite Iron. **(10 Marks)**

Module-5

9 a. Categorize copper alloys and list any 4 advantages and applications for each category. **(10 Marks)**

b. List the various Aluminium based alloys and brief in short about the composition and properties. **(10 Marks)**

OR

10 a. Define a composite. Classify composites based on Reinforcement and Matrix material used. **(10 Marks)**

b. List the various production methods of FRP. Explain any one method in detail. **(10 Marks)**

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