CBCS SCHEME

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18AU33

Third Semester B.E. Degree Examination, June/July 2024
Materials 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. With a neat sketches, explain Body Centered Cubic and Face Centered Cubic. **(10 Marks)**

b. Discuss the different types of Point Imperfections. **(10 Marks)**

OR

2 a. Define the following terms:
i) Ductility
ii) Toughness
iii) Yield strength
iv) True stress. **(10 Marks)**

b. Differentiate between slip and twinning with neat sketches. **(10 Marks)**

Module-2

3 a. Distinguish between brittle and ductile fracture with graphical representation. **(08 Marks)**

b. What do you understand by stress relaxation and elaborate with examples. **(06 Marks)**

c. Draw and explain S-N curve for steel and Aluminium alloy. **(06 Marks)**

OR

4 a. Explain the creep behavior of mildsteel with the help of a three stage creep curve. **(10 Marks)**

b. Discuss the effects of
i) Surface Roughness
ii) Stress Concentration on fatigue strength of metals. **(10 Marks)**

Module-3

5 a. Define solid solutions and explain different types of solid solution with figure. **(10 Marks)**

b. Compare Homogeneous and Heterogeneous nucleation with sketches. **(10 Marks)**

OR

6 a. Write a note on cooling curves. **(10 Marks)**

b. Explain following terms with respect to phase diagrams:
i) Eutectic
ii) Eutectoid
iii) Peritectic
iv) Peritectoid **(10 Marks)**

Module-4

7 a. Draw the TTT diagram for eutectoid steel and explain different microstructures. **(08 Marks)**

b. Define hardenability. Explain Joming End Quench test of measuring hardenability. **(06 Marks)**

c. Explain flame hardening and induction hardening process with suitable sketches. **(06 Marks)**

OR

8 a. Explain properties, composition and uses of Grey Cast Iron, S.G. Iron and Steel. **(10 Marks)**

b. Write short note on age hardening of :
i) Copper alloys
ii) Aluminium alloys **(10 Marks)**

Module-5

9 a. Write a short note on copper alloys. **(06 Marks)**

b. Explain the modification of Al-Si alloy. **(06 Marks)**

c. Discuss the composition, properties and types of α-Brasses and bronze. **(08 Marks)**

OR

10 a. What is Composite Materials? How it is classified? **(04 Marks)**

b. With a neat sketch, explain any one method of production of fiber reinforced plastic (polymer). **(08 Marks)**

c. Briefly discuss the advantages and applications of composites of materials. **(08 Marks)**

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