

CBCS SCHEME

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18MR32

Third Semester B.E. Degree Examination, Feb./Mar. 2022 Material Science

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 lattice : i) Unit cell ii) Space lattice iii) APF
iv) Co-ordination number. (08 Marks)
- b. With neat sketches, explain surface defects briefly. (06 Marks)
- c. Explain briefly the mechanical properties of a material in plastic range. (06 Marks)

OR

- 2 a. With neat sketches, explain cup and cone fracture. (06 Marks)
- b. Classify Crystal imperfections in crystal. Explain in detail line imperfections. (08 Marks)
- c. Draw the stress and strain curves for following materials :
i) Al ii) Cast Iron iii) Rubber. (06 Marks)

Module-2

- 3 a. What is Fatigue? Draw the S-N curves for Steel and Aluminum Alloys. (06 Marks)
- b. What is Stress Relaxation? Derive an expression for Stress Relaxation. (08 Marks)
- c. Sketch the Basic modes of fracture. List the difference between them. (06 Marks)

OR

- 4 a. Define Creep and explain typical Creep curve. (06 Marks)
- b. Explain Slip and Twinning with figures. (08 Marks)
- c. Explain the methods to improve Fatigue life. (06 Marks)

Module-3

- 5 a. State and explain Hume – Rothery Rules. (06 Marks)
- b. Explain the Homogeneous Nucleation. Discuss the significance of critical radius of nuclei. (08 Marks)
- c. Define Solid Solution. Explain the different types of Solid Solution. (06 Marks)

OR

- 6 a. Explain with sketches :
i) Eutectoid transformation ii) Peritectoid transformation. (06 Marks)
- b. Write short notes on Intermediate Phases. (06 Marks)
- c. Explain Level rule with an examples and Gibbi's Phase rule. (08 Marks)

Module-4

- 7 a. Draw Fe – C diagram and indicate the phase temperature and also write the invariant reaction. (08 Marks)
- b. Explain the Age hardening of Al - Cu - Alloy. (06 Marks)
- c. Draw TTT diagram for eutectoid steel and explain briefly. (06 Marks)

OR

- 8 a. Draw the CCC diagram and explain briefly for Plain Carbon Eutectoid Steel. (08 Marks)
b. Explain the following : i) Normalizing ii) Annealing. (06 Marks)
c. Give the detailed classification of heat treatment types. Explain Flame hardening with sketch. (06 Marks)

Module-5

- 9 a. Define Composite Material. Explain the role of matrix interface and reinforcement in a Composite Material. (08 Marks)
b. Write short notes on the following :
i) Al - Si Alloys ii) Titanium Alloys. (06 Marks)
c. What are the application of Composite Materials in Marine field. (06 Marks)

OR

- 10 a. Briefly explain the Composition properties and application of SG Iron. (06 Marks)
b. Explain with a neat sketch, the Pultrusion process. (06 Marks)
c. With neat sketch, explain Processing of Plastic by Sheet Moulding Compound (SMC) process. (08 Marks)

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