

CBCS SCHEME

USN

--	--	--	--	--	--	--	--	--	--

21ME33

Third Semester B.E. Degree Examination, Dec.2023/Jan.2024

Material Science and Engineering

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Clearly differentiate between Crystalline solids and Amorphous solids. (06 Marks)
- b. What is meant by atomic packing factor? Find the atomic packing factor for hexagonal close packed unit cells. (08 Marks)
- c. Explain clearly the classification of voids. (06 Marks)

OR

- 2 a. Explain the crystal structure analysis using X-ray diffraction method. Also define Bragg's law. (08 Marks)
- b. Explain different types of point imperfections with neat sketches. (06 Marks)
- c. Differentiate between edge dislocation and screw dislocations. (06 Marks)

Module-2

- 3 a. Explain different types of solid solutions with sketches. Also explain Hume Rothery Rules for formation of solid solution. (10 Marks)
- b. State and explain Fick's laws of diffusion. Also explain factors affecting diffusion. (10 Marks)

OR

- 4 a. Explain with a neat sketch solid solution phase diagram. (08 Marks)
- b. Draw the iron-carbon diagram and label all the phases, temperatures and invariant points on it. (08 Marks)
- c. Explain the Gibb's phase rule. (04 Marks)

Module-3

- 5 a. Define homogeneous nucleation. Derive the expression for critical radius and activation energy in homogeneous nucleation. (10 Marks)
- b. Explain the mechanism of plastic deformation by slip and twinning. (10 Marks)

OR

- 6 Explain the following : (20 Marks)
 - a. Annealing
 - b. Normalising
 - c. Hardening
 - d. Tempering

Module-4

- 7 a. With a neat sketch, explain the physical vapor deposition technique. (08 Marks)
- b. Discuss the different surface coating materials used for different applications. (06 Marks)
- c. With a neat sketch, explain the electro deposition method of coating metal surfaces. (06 Marks)

21ME33

OR

- 8 a. Explain briefly the production of metal powders. (10 Marks)
b. Explain with neat sketches the different compacting techniques. (10 Marks)

Module-5

- 9 a. Write a brief note on general procedure used in design. (06 Marks)
b. Briefly discuss the factors influencing the selection of suitable material for design. (06 Marks)
c. Discuss the important mechanical properties of engineering materials. (08 Marks)

OR

- 10 a. Draw the stress-strain curve for mild steel and explain the salient points. (08 Marks)
b. Briefly explain codes and standards in design. (06 Marks)
c. Briefly discuss the selection of manufacturing methods. (06 Marks)
