

CBCS SCHEME

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18MT32

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

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 stress strain curve. For mild steel and describe how the following properties can be obtained from the curve.
 - i) Yield strength
 - ii) Ductility
 - iii) Toughness
 - iv) Elastic modulus
 - v) Ultimate strength. (10 Marks)
- b. A 12.5mm diameter aluminum alloy test bar is subjected to a load of 204kg. If the diameter of the bar is 12.4mm at this load. Calculate Engineering stress, Engineering strain, True stress, True strain. (06 Marks)
- c. State and Explain Fick First law and Second law. (04 Marks)

OR

- 2 a. Explain S-N diagram for mild steel and Aluminium Alloy from R-R Moore Fatigue test and also explain Fatigue properties. (10 Marks)
- b. Write the difference between Slip and Twinning. (04 Marks)
- c. Derive an Expression for critically Resolved shear stress for slip in cristal structure. (06 Marks)

Module-2

- 3 a. With a neat sketch, explain procedure for construction of T-T-T diagram and also write cooling curves for 0.8%C Eutectoid steel. (12 Marks)
- b. With a neat sketch and Graph, explain JOMINY End Quench test. (08 Marks)

OR

- 4 a. Define ferrous and Non-ferrous metal and Explain copper and its alloy. (10 Marks)
- b. Briefly explain types of cast iron. (10 Marks)

Module-3

- 5 a. Derive an expression for critical radius and Activation Energy required for homogeneous Nucleation. (08 Marks)
- b. Explain Mechanism of solidification in pure metal and its alloy. (08 Marks)
- c. What is solid solution? Mention the types of solid solution. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Define phase diagram. With a neat sketch explain Binary phase diagram. (10 Marks)
b. State and explain the procedure for finding Gibb's phase and Lever Rule. (10 Marks)

Module-4

- 7 a. Write the classification of composite materials. (05 Marks)
b. With a neat sketch, explain the procedure of FRP's using Hand moulding technique. (10 Marks)
c. List the application of composite material. (05 Marks)

OR

- 8 a. Explain the production of FRP using spray UP process and Filament winding process. (10 Marks)
b. Explain the production of Metal Matrix Composites. (10 Marks)

Module-5

- 9 a. Define Smart materials. Explain the ER fluids and MR fluids and Its application in different mode. (10 Marks)
b. List and explain components of fibre optic sensors. (10 Marks)

OR

- 10 Explain the following :
a) Torque Sensors
b) Load cells
c) Force sensors
d) Accelerometer (20 Marks)

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