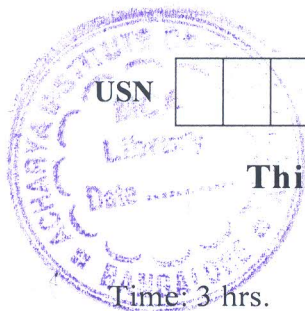


# CBCS SCHEME



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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 crystal 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 : (20 Marks)  
a) Torque Sensors  
b) Load cells  
c) Force sensors  
d) Accelerometer

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