CBCS SCHEME

USN | | | | | | | | | | |

18MT32

Third Semester B.E. Degree Examination, Jan./Feb. 2023
Material Science and Technology

Time: 3 hrs. Max. Marks: 100

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

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.

Module-1

1 a. Explain with neat diagram, plastic deformation by slip and twinning. **(12 Marks)**

b. Explain following with necessary graphs where necessary :
i) Stiffness
ii) Resilience
iii) Toughness
iv) Elasticity **(08 Marks)**

OR

2 a. State Fick's two laws of diffusion. List and explain how different factors affect diffusion? **(10 Marks)**

b. Explain with a neat diagram, fatigue test and explain how to draw S-N curve from it. Draw a sample S-N curve. **(10 Marks)**

Module-2

3 a. How would you construct TTT diagram explain with steps? **(10 Marks)**

b. Explain full annealing for hypo and hyper eutectoid steel with necessary graph state the applications. **(07 Marks)**

c. What factors affect the formation of martensite structure of the specimen in hardening process. **(03 Marks)**

OR

4 a. Explain Al-Cu alloys with composition, properties and applications. **(06 Marks)**

b. Enumerate Brasses and its types with composition, properties and uses. **(08 Marks)**

c. What is carburizing? What are the types of it? Explain pack carburizing with diagram. **(06 Marks)**

Module-3

5 a. Derive an equation for net energy change for critical radius in homogeneous nucleation. Also state its significance. **(10 Marks)**

b. Compare Homogenous and Heterogeneous nucleation. **(05 Marks)**

c. Explain briefly the types of Solid Solutions. **(05 Marks)**

OR

6 a. Explain briefly the rules governing formation of substitutional solid solution. **(05 Marks)**

b. With a neat phase diagram label and explain the different phases of Fe-C equilibrium diagram. **(10 Marks)**

c. Explain Gibb's Phase Rule. **(05 Marks)**

Module-4

7 a. Define Composite materials. What are the roles of its constituents in a composite? (10 Marks)

b. With the help of a neat diagram, explain the process parameters in Liquid Injection Molding process. State its advantages and disadvantages. (10 Marks)

OR

8 a. List and explain the types of reinforcement materials. (06 Marks)

b. What are the types of MMCs and explain them in brief. (06 Marks)

c. What are the applications of composite materials? (08 Marks)

Module-5

9 a. Explain with a neat diagram, how a piezoelectric material can be used as a transducer. (06 Marks)

b. What is pseudo-elasticity with respect to shape memory alloys and explain shape memory effect with an example. (08 Marks)

c. Explain magnetorheological fluids. (06 Marks)

OR

10 Write a short note on :

a. Accelerometers

b. Load Cells

c. Microphones

d. Fiber-optic sensor (20 Marks)

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