CBCS SCHEME

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

18MT32

Third Semester B.E. Degree Examination, July/August 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 diagram for mild steel specimen and define elastic limit, yield strength, ultimate strength and fracture strength. **(10 Marks)**

b. The diffusivity of zinc in copper is $4 \times 10^{-18} m^2/sec$ at 500°C and $5 \times 10^{-13} m^2/sec$ at 1000°C. Obtain the values of D_0 and Q and also find diffusivity at 300°C. **(10 Marks)**

OR

2 a. Explain plastic deformation by slip and twinning with neat sketches. **(10 Marks)**

b. With the help of a creep curve, explain the 3 stages in creep. **(10 Marks)**

Module-2

3 a. Briefly explain the TTT diagram for eutectoid steel. **(10 Marks)**

b. Explain pack carburizing and flame hardening. **(10 Marks)**

OR

4 a. Explain the properties, composition and application of any two types of castiron. **(10 Marks)**

b. Explain briefly the aluminium alloys and their applications. **(10 Marks)**

Module-3

5 a. Explain homogeneous and heterogeneous nucleation. Mention the difference between them. **(14 Marks)**

b. Describe Gibb's phase rule and define phase diagram. **(06 Marks)**

OR

6 a. Two metals A and B are used to form an alloy containing 75% A and 25% B. A melts at 600°C and B at 400°C. When alloyed together these metals form no compounds or solid solution, but form an eutectic at 40% A and 60% B. Assume that the liquidus lines are straight. The eutectic solidifies at 250°C. Draw the phase diagram for the alloy series and find.

i) The temperature at which the alloy start and completes solidification.

ii) Percentage of eutectic in the alloy at room temperature. **(10 Marks)**

b. With a neat sketch, explain three zones of cast metal structures. **(10 Marks)**

Module-4

7 a. Define composite materials and enumerate the classification of composites. **(10 Marks)**

b. Explain filament winding process with a neat sketch. **(10 Marks)**

OR

8 a. Explain the pultrusion process with a neat sketch. **(10 Marks)**

b. With a neat sketch, explain injection moulding process. **(10 Marks)**

Module-5

9 a. What are shape memory alloys and explain properties and applications of it. **(10 Marks)**

b. What are magneto rheological fluids? Describe its applications. **(10 Marks)**

OR

10 Write a short note on:

a. Pressure sensor b. Load cell

c. Torque sensor d. Accelerometer. **(20 Marks)**

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