U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

December 2023 Supplementary Examinations

Programme: B.E. **Semester: III**
Branch: Mechanical Engineering **Duration: 3 hrs.**
Course Code: 22ME3PCMSM **Max Marks: 100**
Course: Material Science and Metallurgy

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may suitably be assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

UNIT - I

1	a)	With a neat figure, explain mechanisms responsible for plastic deformation.	**10**
	b)	Explain the typical stress-strain curve of a ductile material.	**10**

OR

2	a)	With a neat figure, explain recovery, recrystallization and grain growth.	**10**
	b)	With a simple schematic, explain the fatigue test for ferrous and non ferrous alloys and the resulting graph.	**10**

UNIT - II

3	a)	Explain Gibb's phase rule and Lever's rule.	**10**
	b)	Explain with a neat sketch the binary isomorphous phase diagram, along with its components.	**10**

OR

4	a)	With the help of neat figures, explain the different types of solid solutions.	**10**
	b)	Pure copper melts at 1085^0C and pure silver melts at 962^0C. They form eutectic solution at 779^0C with 71.9 % of silver. The solid solubility of silver in copper is at maximum of 8 % of silver at 779^0C and decreases to 0% at 300^0C. The solid solubility of copper in silver is at maximum of 91.2 % of silver at 779^0C and decreases to 0% at 300^0C. Assuming one solidus joining from 1085^0C with 0% of silver to 8.0 % of silver at 779^0C and similarly other starting at 100% silver at 962^0C and ending at 91.2% of silver at 779^0C. Assuming all the lines are straight, draw this phase diagram and show all the phases on it. Also carry out the interpretation of the phase diagram at eutectic point. Show the microstructure diagrams at the eutectic point and at points above and below the eutectic point.	**10**

UNIT - III

5	a)	Draw a neat iron-cementite phase diagram and explain the same.	**10**
	b)	Explain with a neat figure, the continuous cooling curves on TTT diagram.	**10**

UNIT - IV

6	a)	Explain with neat figures, Fick's laws of diffusion?	**10**
	b)	Explain with neat sketches any two surface hardening processes.	**10**

UNIT - V

7	a)	Explain stir casting and squeeze casting processes for manufacturing composites with relevant diagrams?	**10**
	b)	Explain with sketch, vacuum bag molding and spray forming process for composites manufacturing?	**10**

******