Reg No.: _____ Name: _____

Jyothi Engineering College(Autonomous)

B. Tech Degree S2 (R) Examination, May 2026(2025 Scheme)

25MET205 - MATERIAL SCIENCE AND ENGINEERING

Total Mark: 60 **Total Time: 2hrs 30 min**

CO MARK

PART A

(Answer All Questions. Each question carries 3 marks)

1. What is Atomic Packing Factor? CO1 (3)
2. What are Bravais lattices? CO1 (3)
3. Why Frenkel defect is occurred in ionic crystals with cation displacement? CO2 (3)
4. Mention any two commonly used etchants and their compositions. CO2 (3)
5. Differentiate between hardness and tensile strength. CO3 (3)
6. Define yield strength and ultimate tensile strength. CO3 (3)
7. What are invariant reactions? How are they classified? CO4 (3)
8. What are the limitations of pure metals? Mention any three needs for alloying. CO4 (3)

PART B

(Answer any one full question from each module, each question carries 9 marks)

Module - 1

9. High magnification studies have shown that crystalline solids are grouped into seven crystal systems and fourteen Bravais lattices. Name the seven crystal systems and the fourteen Bravais lattices. CO1 (9)

OR

10. Draw the following directions and planes. CO1 (9)

a. [100] *b*. [010] *c*. [001]
d. (001) *e*. (100) *f*. (010)

Module - 2

11. With the help of suitable sketches explain point, line, surface and volume imperfections found in solid crystals. CO2 (9)

OR

12. What is meant by diffusion and diffusion couple? Explain the various mechanisms of diffusion. CO2 (9)

Module - 3

13. Describe the working principles of the Rockwell, Brinell, and Vickers hardness tests and explain their industrial applications. CO3 (9)

OR

14. Explain the creep test with a neat sketch. Describe its various stages and importance. CO3 (9)

Module - 4

15. Explain the Time–Temperature–Transformation (TTT) diagram with a neat sketch. CO4 (9)

OR

16. Explain the formation of austenite, pearlite, and ledeburite with the help of the Iron–Carbon equilibrium diagram. CO4 (9)

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