

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

THIRD SEMESTER B.TECH DEGREE EXAMINATION (Regular), DECEMBER 2022

MECHANICAL ENGINEERING

(2020 SCHEME)

Course Code : 20MET205

Course Name: Metallurgy and Material Science

Max. Marks : 100

Duration: 3 Hours

PART A

(Answer all questions. Each question carries 3 marks)

1. Differentiate between polymorphism and allotropy.
2. Explain long range and short range order, with reference to crystalline and amorphous materials.
3. Describe stacking fault, with a neatly labelled diagram.
4. Explain Fick's laws of diffusion.
5. Draw the phase diagram of water and mark the triple point.
6. Differentiate between Austempering and Martempering.
7. List any three alloying elements used to enhance the properties of steel.
8. Explain Bauschinger effect.
9. Compare transgranular and intergranular fracture.
10. What are superalloys. Give any two applications.

PART B

(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. Explain the concept of ductility of FCC and brittleness of BCC and HCP (14)
crystal structures with respect to slip systems.

OR

12. Write short notes on the mechanism of plastic deformation by slip and (14)
twinning with necessary diagrams.

MODULE II

13. Differentiate between edge and screw dislocations, with neatly labelled (14)
diagrams.

OR

14. Enumerate the steps involved in metallographic specimen preparation. (14)

MODULE III

15. Draw the Iron – Carbon phase diagram and mark all the phase fields. (14)

OR

16. With neatly labelled diagrams, explain Flame hardening and Induction hardening. (14)

MODULE IV

17. Explain the Hall-Petch equation. Describe any three strengthening mechanisms for alloys. (14)

OR

18. What is fatigue failure? (14)
Explain the various methods for protection against fatigue failure.

MODULE V

19. What are composite materials? Explain the classification with examples. (14)

OR

20. Define Creep. With a neatly labelled diagram, explain Creep test. (14)
