

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
ROBOTICS AND AUTOMATION
(2020 SCHEME)****Course Code: 20RBT201****Course Name: Processing and Properties of Materials****Max. Marks: 100****Duration: 3 Hours****PART A*****(Answer all questions. Each question carries 3 marks)***

1. Explain polymorphism and allotropy (give examples).
2. Compare homogeneous and heterogeneous nucleation.
3. Describe Schottky defect with a neat diagram.
4. What is Fick's second law of diffusion.
5. State the Hume – Rothery rule for substitutional solid solutions.
6. Write short note on hardenability.
7. What are the limitations of Titanium?
8. List any three applications of non-ferrous alloys.
9. "Metals are typically better thermal conductors than ceramic materials". Give proper reasoning for the aforesaid statement.
10. Explain mobility of free electron.

PART B***(Answer one full question from each module, each question carries 14marks)*****MODULE I**

11. a) Compute Atomic Packing Factor for a FCC crystal structure. (6)
- b) Differentiate between slip and twinning (Neat diagram is mandatory). (8)

OR

12. a) What are miller indices? Draw the following planes (110),(011) & (100). (8)
- b) The yield strength of mild steel with an average grain size of 0.05mm is 138Mpa. The yield strength of same steel with a grain size of 0.007mm is 276Mpa. What will be the grain size of same steel with a yield stress of 207Mpa? (6)

MODULE II

13. a) Distinguish between edge and screw dislocations. (8)
b) With a neat diagram, explain the Frank-Read source theory of dislocation. (6)

OR

14. a) Describe steps involved in preparing a sample for metallographic examination. (10)
b) Explain interstitial and substitutional diffusion in solids. (4)

MODULE III

15. Draw an Iron-carbon equilibrium diagram and explain any three invariant reactions in it. (14)

OR

16. a) Explain the following heat treatments
(i) Annealing (12)
(ii) Normalizing
(iii) Spheroidizing.
b) What is a CCT diagram? (2)

MODULE IV

17. a) Write short notes on the properties, applications and limitations of aluminium alloys. (12)
b) What is a hybrid composite? (2)

OR

18. a) Explain the classification of composite materials. (8)
b) What are the applications of composite materials. (6)

MODULE V

19. Explain the reasons for the difference in electrical conductivity for metals, semiconductors and insulators in terms of electron energy band structure. (14)

OR

20. Describe the phenomena of magnetic hysteresis and explain why it occurs for ferromagnetic and ferrimagnetic materials. (14)
