Register No.: ……………………….…   Name: ……………………………………………………

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

THIRD SEMESTER B.TECH DEGREE EXAMINATION (S), FEBRUARY 2023
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. What is polymorphism?
2. Define (a) Coordination number and (b) Atomic packing factor
3. Explain Vacancy diffusion.
4. With a neat diagram, explain Schottky defect.
5. Draw Pb-Sn Eutectic phase diagram.
6. What is hardenability?
7. Write three examples of non-ferrous alloys.
8. Explain the properties of Titanium.
9. With respect to the hysteresis behavior, state the difference between hard and soft magnetic materials.
10. Explain (a) Reflection and (b) Refraction.

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

MODULE I

11. Explain the procedure for determining Miller indices for a plane and direction   (14)

OR

12. Illustrate BCC & FCC crystal structures with the help of a cubic unit cell and calculate the Atomic Packing Factor (APF) for both these crystal structures.   (14)

MODULE II

13.   a)   Explain the steps involved in the preparation of specimen for metallographic examination. Name two Etchants.   (8)

       b)   Demonstrate the Frank-Read source theory of dislocation with neat sketch   (6)

OR

14. a) State and explain the Fick's first and second laws of diffusion. (8)
    b) With a neat sketch differentiate between Edge dislocation and Screw dislocation. (6)

MODULE III

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

OR

16. Draw the isothermal transformation diagram of eutectoid steel and then sketch and label the following. (14)
    (a) A time temperature path that will produce 100% pure fine pearlite
    (b) A time temperature path that will produce 100% pure coarse pearlite
    (c) A time temperature path that will produce 50% martensite and 50% bainite
    (d) A time temperature path that will produce 100% martensite

MODULE IV

17. a) Explain the properties, applications and limitations of (a) Aluminum and (b) Copper. (10)
    b) Explain the applications of composites in an aircraft. (4)

OR

18. a) What are composites? What is the need for the development of composites? (10)
    b) Explain the deformation characteristics of elastomers. (4)

MODULE V

19. Compare the thermal conductivity of metals, ceramics and polymers. (14)

OR

20. Why does the conductivity of a semiconductor change with impurity content? Compare this with the behavior of metallic conductors. (14)

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