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

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FOURTH SEMESTER B.TECH DEGREE EXAMINATION (R), MAY 2023

(2020 SCHEME)

Course Code : 20MET296

Course Name: Materials in Manufacturing

Max. Marks : 100 **Duration: 3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. Write a brief note on primary and secondary bonding.
2. What do you understand about Levitin?
3. What are the characteristics of materials used at high temperatures?
4. What function does nickel serve as a high-temperature element in super alloys?
5. Explain the potential applications of superalloys?
6. Describe the effects of adding niobium to steel.
7. The most favorable growth direction for single-crystal superalloys is (100). What is the reason?
8. What are the applications of titanium aluminides?
9. Describe how molybdenum is produced.
10. What are the four Hume-Rothery factors?

PART B

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

MODULE I

11. a) Describe miller indices. (7)
    b) Elaborate on the basic mechanisms involved in plastic deformation. (7)

OR

12. Write a note with illustrations outlining the past and present state of atomic structure. (14)

MODULE II

13. How does Larson-Miller rank the performance of the creep? (14)

OR

14. Explain 1) Vacuum induction melting (VIM) and 2) Vacuum arc remelting (VAR) processes with neat figures. (14)

MODULE III

15. Illustrate the crystal structures and phases in Iron-Nickel-base superalloys. (14)

OR

16. Explain any three heat treatment processes for alloys. (14)

MODULE IV

17. How is Titanium produced? Explain the process with appropriate diagrams. (14)

OR

18. What are the characteristics and applications of niobium alloys? (14)

MODULE V

19. a) Explain Maraging steel production process and mention important production parameters. (7)
    b) What is cobalt free maraging steel and how does it differ from maraging steel? (7)

OR

20. Illustrate and explain Phase diagram of Magnesium and Lead. (14)

****