

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

**SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)**

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**FOURTH SEMESTER B.TECH DEGREE EXAMINATION (R), MAY 2024****(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. Discuss the steps for finding Miller indices?
2. Explain the expression to find the distance between parallel dislocations of same sign in a small angle boundary?
3. List any three applications of super alloys?
4. Define super alloys?
5. List any three phases in super alloys and mention its crystal structure?
6. Explain the effect of any two alloying elements on super alloy properties?
7. Define the term pickling of titanium?
8. Discuss any two superior features of single crystal super alloys?
9. Describe maraging steel?
10. Identify the difference between TZM and TZC?

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

11. a) Explain dislocation generation by Frank Reed source with a neat sketch? (8)
- b) Distinguish between characteristics of ionic bond and covalent bond? (6)

**OR**

12. a) Explain the mechanisms of plastic deformation in metals? (7)
- b) Explain atomic packing factor and discuss its importance? (7)

**MODULE II**

13. a) Explain Larson-Miller approach for ranking of creep performance? (8)
- b) Discuss any two applications of Electroslag Remelting? (6)

**OR**

14. a) Illustrate Nickel as a high temperature material? (6)  
b) Discuss two ways and means to improve super alloy cleanliness? (8)

**MODULE III**

15. Distinguish between wrought and cast super alloys? (14)

**OR**

16. Explain annealing and stress relieving heat treatment of a super alloy? (14)

**MODULE IV**

17. Explain the process of closed die forging for titanium alloy manufacturing? (14)

**OR**

18. a) Discuss the role of Niobium in steel making. (7)  
b) Explain any two characteristic and any two applications of Niobium alloys. (7)

**MODULE V**

19. a) Draw and explain the structures of  $MgCu_2$ ,  $MgZn_2$ ,  $MgNi_2$ . (9)  
b) Discuss any two applications of Maraging steel. (5)

**OR**

20. Draw and explain Magnesium-Lead phase diagram? (14)

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