

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FOURTH SEMESTER B.TECH DEGREE EXAMINATION (Regular), JULY 2022**(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 effect of grain size on material properties.
2. Explain the process of crystallization.
3. What are Frickles with relation to materials?
4. Describe the broad classification of super alloys.
5. List any 6 applications of super alloys.
6. Why nickel is used for high temperature applications?
7. Explain the effects of adding niobium to steel.
8. What are the effects of forging temperature and forging pressure on Ti alloys?
9. List and explain any three properties of Maraging steel.
10. Where is 100% pure titanium used?

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

11. Explain the following with neat diagrams
 - a) Edge dislocation (7)
 - b) Screw dislocation (7)

OR

12. Find the Atomic Packing Factor (APF) of SC, BCC and FCC (14)

MODULE II

13. Draw a clear diagram to describe the electroslag remelting process. List the benefits of electroslag remelting as well. (14)

OR

14. Describe the reasons for the development of super alloys as high temperature alloys. (14)

MODULE III

15. Write short notes on the following variants (14)
 - (i) Fe-Ni based super alloys

- (ii) Ni based super alloys
- (iii) Co based super alloys

OR

16. Write short notes on the following (14)
- (i) Solid solution strengthening
 - (ii) Precipitation strengthening
 - (iii) Carbide and boride phases

MODULE IV

17. Describe how single crystal super alloys are produced. Draw neat diagrams. (14)

OR

18. Describe how defects are formed during directional solidification and how heat is transferred. (14)

MODULE V

19. Draw and explain Cu-Zn phase diagram (14)

OR

20. a) With clear sketches, explain the structures of $MgCu_2$, $MgZn_2$, and $MgNi_2$. (7)
- b) What are the different reactions in austenite in maraging steel (7)
