**M** **716A3** Total Pages: **2**

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# SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**THIRD SEMESTER B.TECH DEGREE EXAMINATION (Regular), DECEMBER 2022**

**(2020 SCHEME)**

**Course Code : 20MET285**

**Course Name: Material Science and Technology**

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

## PART A

***(Answer all questions. Each question carries 3 marks)***

1. Explain hydrogen bond with example.
2. Sketch (101) plane on a cubic unit cell.
3. Explain Bragg's law and list an application.
4. Explain the steps to determine the miller indices of directions.
5. Differentiate between ferrous and non-ferrous alloys. Cite 1 example each.
6. Discuss Hume Rothery rules for substitutional solid solution.
7. What are composite materials? Mention its constituents.
8. What are dielectric materials? Give two examples.
9. Differentiate Type I and Type II superconductors.
10. Discuss the working of a transistor. What are its applications?

## PART B

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

### MODULE I

11. Discuss the characteristics of Ionic, Covalent and Metallic bonds. Give examples. (14)

**OR**

12. Obtain the Atomic Packing Factor of FCC and BCC structures. (14)

### MODULE II

13. Illustrate Edge and Screw dislocation in reference with Burgers Vector. (14)

**OR**

14. What is Plastic Deformation? Compare Slip and Twinning with neat figures. (14)

### MODULE III

15. Sketch and explain the procedure for fatigue testing. Draw the S-N curve. (14)

**OR**

16. Enumerate on the factors which affect fatigue strength. How can fatigue life of a material be improved? (14)

**MODULE IV**

17. Describe Metal Matrix Composites. Explain the functions of matrix and reinforcement materials with the help of an example. (14)

**OR**

18. What are ferro electric materials? Explain their characteristics (14)

**MODULE V**

19. a) What are superconductors? Explain their characteristics and applications. Give examples. (8)
    b) Differentiate intrinsic and extrinsic semiconductors. Give applications for each. (6)

**OR**

20. a) Explain the process of manufacturing metallurgical grade silicon? Mention the applications (8)
    b) Discuss the applications of semiconductors. What are photon detectors? (6)

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