

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
 Fourth Semester B.Tech (Hons) Degree Examination June 2022 (2020 Admn)



Course Code: MET296

Course Name: MATERIALS IN MANUFACTURING

Max. Marks: 100

Duration: 3 Hours

**PART A***(Answer all questions; each question carries 3 marks)*

Marks

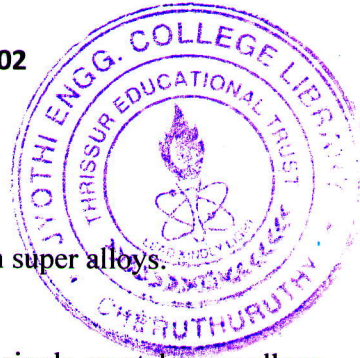
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|----|--|-----|
| 1  | Define slip.   | (3) |
| 2  | Define Dislocation.  | (3) |
| 3  | Why the super alloys used as high-temperature materials?       | (3) |
| 4  | What are white spots?  | (3) |
| 5  | What are the advantages of Nickel-base super alloys?           | (3) |
| 6  | Explain the ways and means to improve super alloy cleanliness. | (3) |
| 7  | What are the problems involved in machining Titanium?          | (3) |
| 8  | What are the applications of Niobium alloys?                   | (3) |
| 9  | Explain about the Hume-Rothery phases.                         | (3) |
| 10 | Write about the effect of molybdenum alloying on hot strength. | (3) |

**PART B***(Answer one full question from each module, each question carries 14 marks)***Module -1**

- |    |  |     |
|----|--|-----|
| 11 | a) What is Secondary bond? Classify.             | (7) |
|    | b) Explain about vacancy loops and helicoids.    | (7) |
| 12 | a) Explain about dislocation structure.          | (7) |
|    | b) Explain about dislocations inside sub grains. | (7) |

**Module -2**

- |    |   |      |
|----|---|------|
| 13 | a) Explain about Larson-Miller approach for the ranking of creep performance. | (7)  |
|    | b) Why Nickel is used as a high-temperature material? Justification.          | (7)  |
| 14 | a) Explain about Vacuum arc remelting with neat sketch.                       | (10) |
|    | b) List the advantages of improved cleanliness.                               | (4)  |



**Module -3**

- 15 Explain about heat treatment processes. (14)
- 16 Explain about the strengthening mechanisms in super alloys. (14)

**Module -4**

- 17 Explain about the mechanical behaviour of the single-crystal super alloys. (14)
- 18 Explain about the closed die forgings for the production of titanium. (14)

**Module -5**

- 19 a) Draw and explain the Copper-Zinc phase diagram. (8)
- b) What are Laves phases? Explain its properties. (6)
- 20 a) What is inter metallics? Write its properties and applications. (8)
- b) Explain about the austenite to martensite transformation. (6)

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