

H1

02000MET296062201

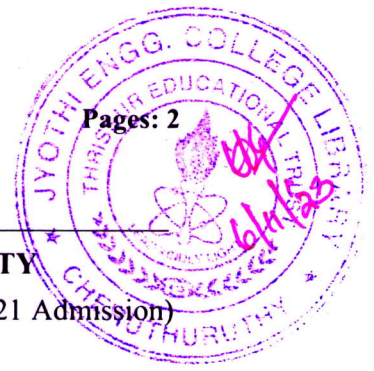
Pages: 2

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth Semester B.Tech (Honours) Degree Examination June 2023 (2021 Admission)



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

- | | | |
|----|--|---|
| 1 | Discuss the different types of dislocations in a crystal structure with sketches. | 3 |
| 2 | What are sub-boundaries? How does it influence creep deformation? | 3 |
| 3 | What are the essential characteristics of a high temperature material? | 3 |
| 4 | Show the temperature variation over the length of a gas turbine engine with the help of a diagram. | 3 |
| 5 | List the different possible phases in superalloy microstructure. | 3 |
| 6 | What do you understand about incipient melting? How does it influence superalloy functioning at high temperatures? | 3 |
| 7 | Explain pickling of Titanium. | 3 |
| 8 | What are the effects of Niobium addition to steel? | 3 |
| 9 | Write a brief note on TZM. | 3 |
| 10 | Write a note on Molybdenum alloying. | 3 |

PART B

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

Module -1

- | | | |
|----|---|----|
| 11 | a) Explain in detail about the process of solidification & crystallization of metals with necessary diagrams. | 10 |
| | b) Explain various stages of creep deformation with diagram. | 4 |
| 12 | a) Elaborate the structural peculiarities of high temperature deformation. | 8 |
| | b) Discuss dislocation generation by frank reed source. | 6 |

Module -2

- | | | |
|----|---|---|
| 13 | a) Explain the Larson-Miller approach for ranking of creep performance. | 8 |
| | b) Discuss the mechanism of freckle formation. | 6 |

- 14 Explain the VAR process in detail with neat diagrams. Mention its advantages and drawbacks. 14

Module -3

- 15 a) Write a short note on the Gamma prime phase. 7
b) Write a short note on Gamma double prime phase. 7
- 16 a) Discuss the importance of heat treatment in Super Alloy processing. 3
b) Write a note on cobalt base superalloys. 3
c) Briefly explain the importance and different types of carbide phases in superalloys. 8

Module -4

- 17 a) Explain in detail about the extraction and formation of Ti ingot. 8
b) Write a note on Titanium Forgings. 6
- 18 a) With neat sketch, explain how directionally solidified and single crystal superalloys are cast. 14

Module -5

- 19 Elaborate on maraging steels, its heat treatment, characteristics, applications and properties. 14
- 20 a) Explain the process of production of Molybdenum. 8
b) Explain briefly about Hume-Rothery phases. 3
c) Write a note on TZC. 3
