

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019

Course Code: ME210

Course Name: METALLURGY AND MATERIALS ENGINEERING

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any three questions, each carries 10 marks.

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|---|---|-------|
| 1 | a) Obtain packing factor for FCC crystal structure. | (5) |
| | b) Copper has a FCC crystal structure, Determine the density if the atomic weight is 63.54 and atomic radius is 1.287Å. | (5) |
| 2 | a) Define the term polymorphism and allotropy. | (4) |
| | b) Define the term miller indices, Obtain the miller indices of a plane which intercepts at a, b/2, 3c in a simple cubic unit cell. | (6) |
| 3 | a) With a neat sketch, explain burgers circuit for screw dislocations. | (5) |
| | b) Differentiate between slip and twinning. | (5) |
| 4 | a) Describe the specimen preparation for a optical microscope. | (7) |
| | b) Why preparation of specimen is essential for microscopic examination. | (3) |

PART B

Answer any three questions, each carries 10 marks.

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|---|--|------|
| 5 | a) Distinguish between properties of Austenite and Marten site. | (6) |
| | b) State Hume-Rothery rules for substitutional solid solution. | (4) |
| 6 | a) Explain with neat sketch, The micro structure change during different heat treatment process. | (10) |
| 7 | a) State the purpose of alloying, Enumerate your answer by reference to three well known alloys. | (10) |
| 8 | a) List the properties, Composition and uses of high speed steels. | (6) |
| | b) List the advantages of alloying the steel. | (4) |

PART C

Answer any four questions, each carries 10 marks.

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| 9 | a) Explain Griffith theory of fracture. | (5) |
| | b) Distinguish between ductile and brittle fracture. | (5) |
| 10 | a) What is creep? Explain its different stages with neat sketch. | (10) |
| 11 | a) What are the factors that affect the fatigue strength of the materials? | (5) |
| | b) Briefly explain the effect of plastic deformation on crack propagation. | (5) |

- 12 a) What are the different types of composite? Give one application for each type. (10)
- 13 a) Explain the requisite properties of materials for nuclear applications. (6)
- b) What is mean by shape memory alloys? How it achieves the effect. (4)
- 14 a) Explain the different crystal structure of ceramics? (6)
- b) List out the features of super alloys. (4)
