

Reg No.: _____

Name: _____

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

Course Code: ME210

Course Name: METALLURGY AND MATERIALS ENGINEERING (MC)

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any three questions, each carries 10 marks.

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|---|--|-------|
| 1 | a) Draw the following SC, BCC, FCC and HCP structure, Find out the effective number of atoms and co-ordination number for the above. | (10) |
| 2 | a) Explain about different imperfection in crystal. | (7) |
| | b) Describe the plastic deformation of metals. | (3) |
| 3 | a) Discuss the working principle, features and applications of SEM. | (7) |
| | b) Write short note on TEM. | (3) |
| 4 | a) List the mechanism of diffusion in solids and explain any two of them with neat sketch. | (5) |
| | b) Explain the solidification of solid in a metal mould. | (5) |

PART B

Answer any three questions, each carries 10 marks.

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|---|--|------|
| 5 | a) Draw and explain time-temperature transformation diagram with different cooling curves. | (6) |
| | b) What are the factors affecting hardenability. | (4) |
| 6 | a) What is a phase diagram? Explain the invariant reactions seen in a phase diagram | (10) |
| 7 | a) Explain briefly the theory of tempering. Why steel is tempered and how it is done? | (10) |
| 8 | a) Write in detail about properties and application of any two copper alloys. | (6) |
| | b) Differentiate between grey cast iron and white cast iron. | (4) |

PART C

Answer any four questions, each carries 10 marks.

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|----|---|------|
| 9 | a) With a neat sketch explain the procedure for fatigue testing and draw the S-N curve. | (10) |
| 10 | a) Explain the factors leading to crack propagation. | (5) |
| | b) Explain super plasticity with examples. | (5) |
| 11 | a) Brief upon the following | (10) |

- a) Brittle fracture
 - b) Creep
 - c) Residual stress
 - d) Fatigue limit
- 12 a) How composite materials are important in aerospace industry? What properties make them suitable for the above? (10)
- 13 a) Write short notes on (6)
- a) Smart materials
 - b) Biomaterials
- b) What is mean by glass ceramics? (4)
- 14 a) What is ductile to brittle transition? Discuss the factors affecting this phenomenon. (6)
- b) What are metal matrix composites? List the advantages. (4)
