

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.*

- |  | Marks |
|--|-------|
| 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 (10)  
make them suitable for the above?
- 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 transmission? Discuss the factors affecting this (6)  
phenomenon.
- b) What are metal matrix composites? List the advantages. (4)

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