

Reg No.: _____

Name: _____

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

Course Code: ME309

Course Name: METALLURGY AND MATERIALS SCIENCE

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any three full questions, each carries 10marks.

- | | | Marks |
|---|---|-------|
| 1 | a) What are unit cells? | (2) |
| | b) What are crystals? Explain various crystal structure systems | (8) |
| 2 | a) What are slip and climb? Differentiate | (4) |
| | b) What are miller indices? Draw the following (110), (222), (011) and (123) in different unit cells. | (6) |
| 3 | a) Explain homogeneous crystallization mechanisms | (4) |
| | b) Define grains and grain boundaries. How is grain size determined? What is importance? | (6) |
| 4 | a) What Burgers vectors? How will you find out the burger vector in an edge dislocated system? | (4) |
| | b) What is a Frank Read Source? Explain the functioning. | (6) |

PART B

Answer any three full questions, each carries 10marks.

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|---|--|------|
| 5 | a) What are solid solutions | (2) |
| | b) Explain isomorphous systems with clearly naming a suitable system. Explain lever rule in the isomorphous system | (8) |
| 6 | Explain CCT diagram of eutectoid steel with TTT diagram | (10) |
| 7 | a) Explain carburizing and nitriding | (6) |
| | b) Differentiate hot working and cold working | (4) |
| 8 | a) Explain the effects of alloying elements on steel with suitable examples | (6) |
| | b) Write short notes on HSS and Nickel steel | (4) |

PART C

Answer any four full questions, each carries 10marks.

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| 9 | a) Explain Fatigue. What are the factors affecting Fatigue? | (6) |
| | b) Write short notes on stress raisers and stress concentrations | (4) |
| 10 | a) Explain trans and intergranular fractures | (6) |
| | b) Write short on fracture toughness and crack tip intensity | (4) |

- 11 What is creep? Explain creep curves and various creep mechanisms (10)
- 12 What are composites? Explain (10)
- 13 a) Write short notes on intermetallics and applications (3)
- b) Write short notes on smart materials (4)
- c) Discuss on nano materials (3)
- 14 a) What are biomaterials? (4)
- b) Explain ceramic structures (6)
