B B5805 Pages: 1

Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIFTH SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018

Course Code: ME309

Course Name: METALLURGY AND MATERIALS SCIENCE (AU)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any three full questions, each carries 10 marks Marks

1 a) Give the classification of crystal structures and its characteristics. (8)

b) Name the seven crystal systems in metallurgy. (2)

2 a) What do you understand by MILLER INDICES? Explain Miller indices for planes and Miller indices for directions. (5)

b) Explain the deformation of crystals with reference to slip and twinning. (5)

3 a) Name the different X-ray diffraction techniques and explain any one of them. (6)

b) Sketch the Scanning Electron Microscope and name the important parts. (4)

4 a) What is crystal imperfection? Classify and explain any one dislocation with neat sketch. (7)

b) Write the steps involved in preparation of the sample for metallographic examination. (3)

PART B

Answer any three full questions, each carries 10 marks

5 a) Sketch an Iron-Carbon diagram and indicating the important phases and reactions in detail. (8)

b) What are the stages in the mechanism of crystallization? (2)

6 a) Draw the TTT curve and explain about its principle of construction. (8)

b) Name the various surface heat treatment methods. (2)

7 a) Write a short note on cold working and hot working with a sketch. (8)

b) Mention about TMT. (2)

8 a) What is strain hardening? Discuss the mechanism of strain hardening. (7)

b) Define recovery, recrystallization and grain growth. (3)

PART C

Answer any four full questions, each carries 10 marks

9 What is the mechanism of fatigue? Draw the S-N curves for steel and explain how these curves are developed experimentally. (10)

10 a) Differentiate between ductile and brittle fracture. (7)

b) What is the protection that is given against fracture of materials? (3)

11 a) Name the different types of composites and explain any one of them with suitable examples. (8)

b) Name any four modern materials used in now days. (2)

12 a) Draw a typical "creep-test" curve, showing different stages of elongation for a long time high temperature creep test. State how the information is helpful to the designer. (8)

b) What is meant by maraging steel? (2)

13 a) What is meant by creep? and explain the mechanism of creep deformation. (8)

b) What are smart materials? (2)

14 a) What are the factors affectingfatiguestrength? (6)

b) What is DBTT? (4)

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