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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third Semester B.Tech Degree Examination December 2020 (2019 Scheme)

Course Code: MET205

Course Name: METALLURGY AND MATERIAL SCIENCE

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions. Each question carries 3 marks Marks

1	Compare covalent bonds with Ionic bonds.	(3)
2	Define atomic packing factor. Calculate the APF for a BCC structure.	(3)
3	Compare scanning electronic microscope (SEM) with Transmission electron microscope (TEM).	(3)
4	What is diffusion in Solids? State and explain the Fick's law of diffusion.	(3)
5	Compare CCT diagram with TTT diagram for an eutectoid iron carbon alloy.	(3)
6	With a neat sketch describe the Jominy end quench test.	(3)
7	How does the carbon content effect the properties of carbon steel?	(3)
8	Which are the important properties associated with high speed steel?	(3)
9	What is the composition of Maraging steels? Where do Maraging steel find application?	(3)
10	Which are the common types of ceramics?	(3)

PART B

Answer any one full question from each module. Each question carries 14 marks

Module 1

11	What is plastic deformation? Describe the slip and twinning modes of plastic deformation with simple sketches.	(14)
12	What are the miller indices? Explain the procedure for obtaining miller indices for any crystallographic plane with a suitable example.	(14)

Module 2

13	(a) Define dislocations. (4 marks) (b) With the help of simple sketches differentiate between edge dislocation and screw dislocation. (10 Marks)	(14)

14 (a) Describe the steps involved in preparing a sample for metallographic examination. (5 marks) (14)

(b) Why is metallographic etching done? Describe the main metallographic etching process. (9 marks)

Module 3

15 (a) What is the difference between hardness, hardening process and hardenability? (6 marks) (14)

(b) What is surface hardening? Compare induction hardening process with surface diffusion hardening process. (8 marks)

16 With the help of an iron carbon diagram explain the eutectoid, eutectic and peritectic reaction of iron carbon alloy system. (14)

Module 4

17 (a) What is the strengthening of metals? Why is strengthening carried out? (4 marks) (14)

(b) Compare solid solution hardening with age hardening. (10 marks)

18 (a) Differentiate between hot and cold working? (4 marks) (14)

(b) Compare phase transformation hardening with strain hardening. (10 marks)

Module 5

19 (a) Discuss the composition, properties and applications of Metal Matrix Composites and Ceramic Matrix Composites. (8 marks) (14)

(b) Define superplasticity. Why superplasticity is needed and what are its areas of applications? (6 marks)

20 (a) Define creep and sketch the creep curve. (7 marks) (14)

(b) Describe the mechanism of creep. (7 marks)

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