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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third Semester B.Tech Degree Regular and Supplementary Examination December 2023 (2019 Scheme)

Course Code: RAT201

Course Name: PROCESSING AND PROPERTIES OF MATERIALS

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions. Each question carries 3 marks Marks

1	Define crystal, space lattice and unit cell.	(3)
2	What is miller indices? Write down its applications.	(3)
3	Explain Edge and Screw dislocations.	(3)
4	Explain Fick's first law of diffusion.	(3)
5	What is normalizing?	(3)
6	What is Phase? What are different types of phase diagram?	(3)
7	Illustrate the special features of copper alloys? Give an example.	(3)
8	What are the special characteristics of fibre materials?	(3)
9	How the light is getting reflecting from metal body?	(3)
10	Describe the term superconductivity?	(3)

PART B

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

Module 1

11	a)	What is mean by Atomic Packing Factor (APF)? Explain APF of BCC, FCC.	(7)
	b)	Distinguish between homogenous nucleation and heterogeneous nucleation	(7)
12	a)	Compare Polymorphism and allotropy.	(7)
	b)	Describe the procedure to obtain miller indices for crystal planes	(7)

Module 2

13	a)	What are the point defects? How they effecting the mechanical properties of materials?	(7)
	b)	Discuss the features of edge and screw dislocations in a crystal plane with neat sketches and mark its burger's vector.	(7)

14	a)	What is the Significance of high and low angle grain boundaries on dislocation? Explain with neat sketch.	(7)
	b)	Enumerate the driving force for grain growth and applications during heat treatment process. Explain with neat sketch.	(7)

Module 3

15	a)	With neat sketch explain TTT for a eutectoid iron– carbon alloy.	(7)
	b)	Describe laser hardening technique with neat sketch.	(7)
16	a)	What is the importance of Jominy end quench test in industries? Explain with neat sketch.	(7)
	b)	Describe the changes in microstructure with suitable sketch when cooled slowly from austenite to room temperature for eutectoid plane carbon steels.	(7)

Module 4

17	a)	What is composite? What are the characteristics of Polymer Matrix Composites (PMC), Metal Matrix Composites (MMC) and Ceramic Matrix Composites (CMC)?	(7)
	b)	What are the special features of nickel based alloy? Write two applications.	(7)
18	a)	What are the special features of titanium based alloy? Write two applications.	(7)
	b)	What are the factors that influence the mechanical properties of semi crystalline polymers	(7)

Module 5

19	a)	What are the thermal characteristics of a material? Explain.	(7)
	b)	What is the influence of temperature on magnetic behavior of materials? Explain with neat sketch.	(7)
20	a)	Explain magnetic Hysteresis. Compare soft and hard magnets based on the hysteresis.	(7)
	b)	What are the optical properties of electromagnetic radiation? Explain.	(7)

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