Reg. No.												

Question Paper Code	12343

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2023

Third Semester

Mechanical Engineering

20MEPC303 - ENGINEERING METALLURGY

(Regulations 2020)

Duration: 3 Hours Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks, K-Level, CO
1.	What is eutectoid reaction?	*2,K1,CO1*
2.	How will you classify steels?	*2,K1,CO1*
3.	List any two factors that affect hardenability of steels.	*2,K1,CO2*
4.	Which type of case hardening has precise control of hardening depth?	*2,K1,CO2*
5.	Write the properties and applications of PEEK.	*2,K1,CO3*
6.	Define fiber strengthening.	*2,K1,CO3*
7.	Name the type of stainless steel used for manufacturing surgical tools.	*2,K1,CO4*
8.	What is phosphor bronze?	*2,K1,CO4*
9.	Define the terms slip and twinning.	*2,K1,CO5*
10.	Distinguish between brittle fracture and ductile fracture.	*2,K2,CO5*

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11.	a)	What is solid solution? Explain the Hume Rothery rules governing substitutional solid solution.	*13,K2,CO1*
		OR	
	b)	Draw Iron-Carbon equilibrium diagram and label all the phases. Also enumerate the properties of the following phase. (a) Ferrite (b) Austenite (c) Cementite.	*13,K2,CO1*
12.	a)	Draw, label all the phases and explain the Time-Temperature-Transformation (T-T-T) diagram.	*13,K2,CO2*
		OR	
	b)	Explain the steps involved in Plasma and Vacuum Hardening Process. List its advantages and disadvantages.	*13,K2,CO2*

13. a) What is polymerization? Explain addition polymerization and condensation polymerization with examples. *13,K2,CO3*

OR

b) Enumerate the strengthening mechanisms using Recovery, Recrystallation, Grain growth, Grain Size in Carbon steels. *13,K2,CO3*

14. a) Write Short notes on: *13,K2,CO4*
    (i) Maraging steels.
    (ii) Stainless steels.
    (iii) HSLA.

OR

b) What are the Classifications of Aluminium Alloy? Explain the Properties and Applications of any three types of Aluminum alloys. *13,K2,CO4*

15. a) Discuss the properties and typical applications of the following engineering Ceramics. (i) Al_2O_3 (ii) SiC (iii) Si_3N_4 *13,K2,CO5*

OR

b) Name the suitable materials for manufacturing the following items and list its advantages. *13,K2,CO5*
    (i) Bush.
    (ii) Furnace heating element.
    (iii) Lathe bed.
    (iv) Coins.
    (v) Girders for airship.
    (vi) Big end bearing.
    (vii) Turbine blades.

PART - C (1 × 15 = 15 Marks)

16. a) (i) Describe a tensile test to determine various tensile properties. *8,K2,CO6*
    (ii) Explain the procedure to conduct Compression test. *7,K2,CO6*

OR

b) Explain the following tests
    (i) Creep Test *8,K2,CO6*
    (ii) Torsion Test *7,K2,CO6*