Reg. No.												

Question Paper Code	12859

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024

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.	Draw a typical cooling curve of pure metal and a solid solution.	2	K1	CO1
2.	State Gibb's phase rule?	2	K1	CO1
3.	Define critical cooling rate.	2	K2	CO2
4.	"Austempering is different from other hardening treatments". Explain the statement. ?	2	K2	CO2
5.	List the important properties of HSLA.	2	K1	CO4
6.	Name the industrially important copper alloys.	2	K1	CO4
7.	Define the term "degree of polymerisation"?	2	K1	CO5
8.	What are Sialons? State their applications.	2	K1	CO5
9.	What is creep? Draw a typical creep curve and show different creep stages on it.	2	K1	CO6
10.	Define endurance limit in a fatigue test.	2	K1	CO6

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

			Marks	K – Level	CO
11.	a)	Draw Fe-Fe_3C phase diagram and label all the phases. Discuss the structural transformation while cooling from liquid to solid.	13	K2	CO1
		OR			
	b)	What is solid solution? Explain the Hume Rothery rules governing substitutional solid solution. Draw isomorphous phase diagram.	13	K2	CO1
12.	a)	Draw Time-Temperature-Transformation (T-T-T) diagram and label all the phases. Also enumerate any four objectives of heat treatment. of steel.	13	K2	CO2
		OR			
	b)	Describe the process of carbonitriding. Differentiate between carburizing and carbonitriding.	13	K2	CO2

13. a) Explain the Composition, Properties and uses of any four bearing Alloys. *13 K2 CO4*

OR

b) Explain Age Hardening of Al-Cu with the help of a Phase Diagram. *13 K3 CO4*

14. a) Discuss the structure and applications of any four thermoplastic and any four thermosetting plastic materials. *13 K2 CO5*

OR

b) List the important engineering ceramics and its applications. Discuss the properties and applications of Si_3N_4 and SiC. *13 K2 CO5*

15. a) Explain the different types of mechanical properties and mechanism of plastic deformation by slip and twinning. *13 K2 CO6*

OR

b) Draw neatly the stress-strain diagram of a ductile material and discuss the salient mechanical properties and features of the curve along with their physical significance. *13 K2 CO6*

PART - C (1× 15 = 15 Marks)

16. a) Explain the principle and procedure of Jominy end quench test with a diagram. Also sketch the graph hardness Vs distance from quenched end. *15 K2 CO3*

OR

b) Illustrate the Reinforced Composite Materials Used in 3D Printing. *15 K3 CO3*