Reg. No.																

Question Paper Code	13927

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Third Semester

Mechanical Engineering

20MEPC303 - ENGINEERING METALLURGY

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	Which of the following is not a name for phases present in a system of material in various conditions? (a) Interstitial diagram (b) Equilibrium diagram (c) Constitutional diagram (d) Phase diagram	1	K1	CO1
2.	Which one of the following combination of elements gives eutectic reaction? (a) Gold–silver (b) Copper–silver (c) Copper–nickel (d) Copper–zinc	1	K1	CO1
3.	For steel, which one of the following properties can be enhanced upon annealing? (a) Resilience (b) Hardness (c) Ductility (d) Toughness	1	K1	CO2
4.	The Purpose of normalizing is (a) To improve strength (b) To remove internal stresses (c) To increase hardness (d) To improve toughness	1	K1	CO2
5.	Phenomenon where ductile metals become stronger and harder when they are deformed plastically is called: (a) Cold working (b) Plastic deformation (c) Strain hardening (d) Dislocation density	1	K1	CO3
6.	In the first step of precipitation hardening, alloy is heated to ____temperature. (a) Recrystallization (b) Melting (c) Ageing (d) Homogenizing	1	K1	CO3
7.	White cast iron is characterized by its: (a) High ductility and toughness (b)High hardness and wear resistance (c) Low melting point and ease of casting (d) Corrosion resistance and machinability	1	K1	CO4
8.	Which of the following element is the primary constituent of ferrous alloys? (a) Copper (b) Carbon (c) Iron (d) Titanium	1	K1	CO4
9.	Which of the following is an example of a thermoplastic? (a) Acetal (b) Epoxide (c) Urethane (d) Melamine	1	K1	CO5
10.	The Charpy and Izod impact tests are mainly used to measure (a) Hardness (b) Ductility (c) Fracture toughness (d) Toughness	1	K1	CO6

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

		Marks	K – Level	CO
11.	Define Solid solution.	2	K1	CO1
12.	Why Iron- Iron Carbide diagram is important?	2	K1	CO1
13.	Recall the process in Stress relief annealing.	2	K1	CO2
14.	List the various types of case Hardening.	2	K1	CO2
15.	What is meant by precipitation hardening?	2	K1	CO3
16.	Define the term cold working.	2	K1	CO3
17.	Mention some of the commonly used alloying elements on steel.	2	K1	CO4
18.	Write the classification of steel.	2	K2	CO4
19.	List any four attractive characteristics of polymers.	2	K1	CO5
20.	Mention any four attractive properties of engineering ceramics.	2	K1	CO5
21.	Difference between ‘Slip and Twinning’.	2	K2	CO6

22.	Why impact specimens are notched?		*2*	*K1*	*CO6*

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Discuss the similarities and differences between substitutional and interstitial solid solution.	*11*	*K2*	*CO1*
		OR			
	b)	Draw Iron -Carbide equilibrium diagram and mark on it all salient temperature and composition fields.	*11*	*K2*	*CO1*
24.	a)	Write a short note on			
	(i)	Annealing process.	*6*	*K2*	*CO2*
	(ii)	Hardening process.	*5*	*K2*	*CO2*
		OR			
	b)	Draw a neat sketch of the Isothermal Transformation diagram for Eutectoid steel and explain the constructional procedure.	*11*	*K2*	*CO2*
25.	a)	In detail, explain the fiber strengthening process with suitable examples.	*11*	*K2*	*CO3*
		OR			
	b)	Discuss the various strengthening mechanisms followed for metallic materials.	*11*	*K2*	*CO3*
26.	a)	Discuss the various influences of alloying elements on steel.	*11*	*K2*	*CO4*
		OR			
	b)	Discuss the composition, properties and typical application of any four copper alloys.	*11*	*K2*	*CO4*
27.	a)	Describe the molecular structure, properties and application of the following polymeric materials. (i) PMMA (ii) PTFE (iii) PET (iv) Acryl nitride butadiene styrene.	*11*	*K2*	*CO5*
		OR			
	b)	Explain and give the advantages, limitations and applications of composite materials.	*11*	*K2*	*CO5*
28.	a)	Explain the mechanism of plastic deformation by slip and twinning with neat sketch.	*11*	*K2*	*CO6*
		OR			
	b)	Explain the testing procedure for hardness test and mention the advantages and limitations.	*11*	*K2*	*CO6*