CBCS SCHEME

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BME303

Third Semester B.E/B.Tech. Degree Examination, June/July 2026
Material Science and Engineering

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
1	a.	Differentiate between Crystalline and Non Crystalline solids.	5	L1	CO1
	b.	Explain Ionic and Metallic bonding with neat sketches.	5	L2	CO1
	c.	Describe the term Atomic Packing Factor and calculate APF for a BCC structure.	10	L3	CO1
		OR			
2	a.	Define : i) Crystal lattice ii) Unit cell iii) Co-ordination number iv) Miller indices v) Planar density.	5	L1	CO1
	b.	Differentiate between Edge and Screw dislocations.	5	L2	CO1
	c.	Apply the concept of crystal imperfections to explain i) Point defects ii) Surface defects.	10	L3	CO1
		Module – 2			
3	a.	Define Solid Solution. State Hume-Rothery rules for substitutional solid solutions.	5	L1	CO2
	b.	Explain Vacancy diffusion and Interstitial diffusion mechanisms with diagrams.	5	L2	CO2
	c.	Draw a neat sketch of the Iron-Carbon diagram and label all critical points.	10	L3	CO2
		OR			
4	a.	State Fick's First and Second law of diffusion.	5	L1	CO2
	b.	Describe the Gibb's phase rule and its importance in phase diagrams.	5	L2	CO2
	c.	Draw a neat, labelled diagram of typical Cu-Ni phase diagram and explain the different phase regions.	10	L3	CO2

		Module – 3			
5	a.	Define Homogeneous and Heterogeneous nucleation.	5	L1	CO3
	b.	Explain the process of Annealing with a neat sketch.	5	L2	CO3
	c.	Draw a schematic TTT diagram of eutectoid steel and label all the regions.	10	L3	CO3
		OR			
6	a.	Derive the expression for critical radius during Homogeneous nucleation.	10	L3	CO3
	b.	Define Heat treatment and list its objectives.	5	L1	CO3
	c.	Explain the working principle of Induction hardening and Flame hardening.	5	L2	CO3
		Module – 4			
7	a.	Define Surface Coating and list its objectives.	5	L1	CO4
	b.	Explain Electroplating and its advantages.	5	L2	CO4
	c.	Illustrate the complete Powder Metallurgy Process with a neat flow diagram.	10	L3	CO4
		OR			
8	a.	List advantages and disadvantages of Powder Metallurgy.	5	L1	CO2
	b.	Explain the working principle of Chemical Vapour deposition.	5	L2	CO2
	c.	Explain powder characteristics based on particle size and shape.	10	L3	CO2
		Module – 5			
9	a.	Explain the properties and applications of Copper, Brass and Bronze.	10	L3	CO5
	b.	Evaluate materials based on design requirements and performance.	10	L4	CO5
		OR			
10	a.	Classify Engineering Materials and explain the composition and applications of grey cast iron and steels.	10	L3	CO5
	b.	Evaluate how Material Selection Charts aid in choosing suitable materials.	10	L4	CO5

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