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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

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		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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