

CBCS SCHEME

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BME303

Third Semester B.E./B.Tech. Degree Examination, June/July 2024 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
Q.1	a.	List the three primary classifications of solid materials. Explain briefly the distinctive chemical features of each.	06	L2	CO1
	b.	Classify and briefly explain primary atomic bonds.	08	L2	CO1
	c.	Define unit cell of a crystal lattice. Name and sketch the various crystal structures (unit cells) commonly present in materials. Show the value of edge length (a).	06	L2	CO1
OR					
Q.2	a.	Explain the following terms related to crystal structure: (i) Size of unit cell (ii) Coordination number (iii) Atomic packing factors	06	L2	CO1
	b.	Determine the Atomic Packing Factor (APF) for FCC structure (Unit Cell).	08	L2	CO1
	c.	Classify and briefly explain crystal lattice imperfections.	06	L2	CO1
Module – 2					
Q.3	a.	Explain the term diffusion. State and briefly explain the various types of diffusion mechanisms.	08	L2	CO2
	b.	State and explain Fick's laws of diffusions.	08	L2	CO2
	c.	State and explain any two factors that influence diffusion process.	04	L3	CO2
OR					
Q.4	a.	Define the following : i) Phase ii) Phase diagram iii) Phase equilibrium iv) Solubility limit.	04	L2	CO2
	b.	Explain 'Lever rule' for the construction of phase diagram.	06	L2	CO2
	c.	Name and explain the three invariant reactions that take place in Fe-Fe ₃ C phase diagram.	10	L2	CO2
Module – 3					
Q.5	a.	Name and explain the various mechanisms by which the nucleation of solid particles in liquid metal occurs.	10	L2	CO3
	b.	Explain with suitable diagrams the process of precipitation hardening.	10	L2	CO3
OR					
Q.6	a.	Explain briefly the following heat treatment processes : (i) Annealing (ii) Normalizing (iii) Tempering (iv) Nitriding	16	L2	CO3
	b.	What do you understand by critical radius for nucleation?	04	L2	CO2
Module – 4					
Q.7	a.	Classify the various surface coating techniques used in surface engineering.	04	L1	CO4
	b.	Briefly explain Chemical Vapour Deposition (CVD).	10	L2	CO4
	c.	Write a note on Lubrication and binders.	06	L1	CO4
OR					
Q.8	a.	Briefly explain the powder-metallurgy process using flow chart.	08	L2	CO4
	b.	State and briefly explain the various methods of atomization processes used for preparing the metallic powder.	12	L2	CO4

Module – 5					
Q.9	a.	What is the Chemical Composition of grey cast iron? Show the microstructure by stating the various properties and uses of grey cast iron.	06	L2	CO5
	b.	Name the various alloying elements and their influence over steel alloys.	08	L2	CO5
	c.	How are copper alloys classified? Designate and state the properties and uses of copper alloys.	06	L2	CO5
OR					
Q.10	a.	How composite materials are classified. State their constituents used.	06	L2	CO5
	b.	Name and briefly explain the various types of fibers and matrix materials used for Fiber Reinforced Plastics (FRP).	08	L2	CO5
	c.	Explain the process of obtaining Material data.	06	L2	CO5
