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**Third Semester B.E./B.Tech. Degree Supplementary 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.	Define Material Science and Engineering. List eight commonly encountered engineering material.	04	L1	CO1
	b.	What are the three metal crystal structures? List five metals that have each of these crystal structures.	08	L1	CO1
	c.	What are imperfections? Explain different types of imperfections.	08	L2	CO1
OR					
Q.2	a.	Define Atomic Packing Factor (APF). Calculate APF for BCC structure.	08	L3	CO1
	b.	Platinum is FCC and has a lattice constant of 0.39239nm. Calculate a value for atomic radius of platinum atom in nanometer.	06	L2	CO1
	c.	Define and differentiate crystalline solids and amorphous solid.	06	L2	CO1
Module – 2					
Q.3	a.	State I and II Fick's law of diffusion.	04	L1	CO2
	b.	What is diffusion? Explain the factors affecting the diffusion.	06	L2	CO2
	c.	Draw of neat Iron Carbon equilibrium diagram and label all the phases. Write invariant reaction like eutectoid, eutectic and peritectic reactions.	10	L3	CO2
OR					
Q.4	a.	Discuss the Hume – Rothery rules for formation of solid solution.	04	L2	CO2
	b.	Explain the diffusion mechanism.	06	L2	CO2
	c.	Explain the eutectic system binary phase diagram for two metals completely soluble in liquid state but completely insoluble in solid state.	10	L2	CO2
Module – 3					
Q.5	a.	Define homogeneous and heterogeneous nucleation. Obtain an expression for critical radius of nucleus.	08	L3	CO3
	b.	What is heat treatment and mention the classification.	05	L1	CO3
	c.	With sketch explain flame hardening process.	07	L2	CO3
OR					
Q.6	a.	Explain strain hardening and solid state hardening process of strengthening of metals.	07	L2	CO3
	b.	Sketch and explain Annealing heat treatment process.	07	L2	CO3
	c.	What is hardenability? Discuss factors affecting hardenability.	06	L2	CO3
Module – 4					
Q.7	a.	Explain the Physical Vapour Deposition (PVD) process, in brief.	06	L2	CO4
	b.	List advantages and disadvantages of surface coating.	04	L1	CO4
	c.	With a flow diagram explain the operations involved in making powder metallurgy parts.	10	L2	CO4
OR					
Q.8	a.	Explain the characteristics of metal powder.	06	L2	CO4
	b.	What are the applications of powder metallurgy?	06	L1	CO4
	c.	Explain the Chemical Vapour Deposition (CVD) process with neat sketch.	08	L2	CO4

Module – 5					
Q.9	a.	Classify engineering materials. Explain them with example.	10	L2	CO4
	b.	Sketch and explain the fabrication of MMC's using Stir Casting process.	10	L2	CO3
OR					
Q.10	a.	Give a broad classification of composites.	06	L2	CO3
	b.	Discuss various applications of composites.	06	L2	CO3
	c.	Explain material selection process for various machine components.	08	L2	CO5

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