CBCS SCHEME

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BMR303

Third Semester B.E./B.Tech. Degree Examination, June/July 2024
Material Science

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 the following : i) Space lattice ii) Coordination number iii) APF	06	L1	CO1
	b.	Calculate the Atomic Packing Factor (APF) for BCC structure.	08	L3	CO1
	c.	Calculate the diffusion rate of carbon in iron at 700°C assuming the constants A = 4.9×10^{-5} m^2/s and E = 153.2 kJ/mol.	06	L3	CO1
		OR			
Q.2	a.	Differentiate between crystalline solids and non-crystalline solids.	06	L2	CO1
	b.	Classify the line imperfection in crystals. Explain with neat sketch.	10	L2	CO1
	c.	State and explain Fick's I and Fick's II law of diffusion.	04	L2	CO1
		Module – 2			
Q.3	a.	Explain with the help of stress-strain diagram, stiffness, yield strength, ductility and toughness.	10	L2	CO1
	b.	Deduce the relation between true strain and engineering strain.	04	L3	CO1
	c.	Differentiate the slip and twinning in plastic deformation.	06	L3	CO1
		OR			
Q.4	a.	What is creep? Explain three stages of creep with neat graph. Also explain why 2^{nd} stage is very important.	08	L3	CO1
	b.	Describe the fracture? Briefly explain the different types of fractures.	08	L2	CO1
	c.	What are factors affecting fatigue life?	04	L2	CO1
		Module – 3			
Q.5	a.	What is solid solution? With neat sketch explain different types of solid solution.	08	L2	CO1
	b.	With neat sketch explain the grain structure of cast metal.	06	L2	CO1
	c.	Compare homogeneous and heterogeneous nucleation.	06	L3	CO1
		OR			
Q.6	a.	Draw Fe – C equilibrium diagram and label all the fields. Also explain all the invariant reactions in system.	14	L2	CO1
	b.	State Gibb's phase rule and explain each term.	06	L1	CO1
		Module – 4			
Q.7	a.	Mention the composition, properties and uses of i) Grey cast iron ii) Titanium alloy iii) Al – Zn alloy	12	L1	CO1
	b.	Explain the control methods of corrosion.	08	L2	CO4
		OR			
Q.8	a.	Explain different forms of environmental degradation.	08	L2	CO4
	b.	Explain what are all materials used in machinery on board ship.	06	L2	CO2
	c.	Write a short note on: i) Intergranular corrosion ii) Pitting corrosion	06	L2	CO4
		Module – 5			
Q.9	a.	What is TTT diagram? Draw TTT diagram for an eutectoid steel and explain the various transformation product of austenite on cooling.	12	L2	CO4
	b.	Explain self secured joints and permanent joints.	08	L2	CO2
		OR			
Q.10	a.	Define and classification of heat treatment processes and explain any one heat treatment process.	12	L2	CO3
	b.	With neat sketch describe the Induction Hardening Process.	08	L2	CO3

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