B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

April 2024 Semester End Main Examinations

Programme: B.E. **Semester:** III
Branch: Chemical Engineering **Duration:** 3 hrs.
Course Code: 22CY3ESMCA **Max Marks:** 100
Course: Materials Chemistry and Applications

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

			UNIT - I	*CO*	*PO*	**Marks**
1	a)		What are secondary bondings? Discuss dipole – dipole, and dipole – induced dipole interactions with examples.	*CO1*	*PO1*	**07**
	b)		Calculate the bond order of NO using molecular orbital theory. Compare bond strength of NO, NO^+ and NO^-.	*CO1*	*PO1*	**07**
	c)		Using band theory, explain the increased conductivity of semiconductors upon doping.	*CO1*	*PO1*	**06**
			UNIT - II			
2	a)		What are non-stoichiometric defects? Discuss the metal excess and metal deficient defects.	*CO2*	*PO2*	**07**
	b)		Define Braggs' law and explain the terms involved in it.	*CO1*	*PO1*	**07**
	c)		Calculate the distance between set of (i) {1 0 1} planes and, (ii) {1 1 1} planes in a cubic unit cell with a = 432 nm	*CO2*	*PO2*	**06**
			OR			
3	a)		Discuss the construction and working of scanning electron microscope. Elaborate on its applications.	*CO2*	*PO2*	**07**
	b)		A beam of X-rays of wavelength 0.71 Å is diffracted by {1 1 0} planes of rock salt (FCC) with lattice constant of 2.4 Å. Find the glancing angle for the first-order diffraction.	*CO2*	*PO2*	**07**
	c)		Explain the terms: lattice, motif and unit cell.	*CO1*	*PO1*	**06**
			UNIT - III			
4	a)		What are the functions of catalytic converter used in automobiles? Discuss the role of catalysts used in them.	*CO3*	*PO6*	**07**
	b)		Give examples of bifunctional catalysts. Explain the role of bifunctional catalyst in steam reforming.	*CO3*	*PO6*	**07**
	c)		Discuss the mechanism of acid catalyzed synthesis of Bis-phenol A.	*CO3*	*PO6*	**06**

			UNIT - IV			
5	a)		What is eutectic temperature? Sketch and discuss lead-tin phase diagram.	*CO2*	*PO2*	**07**
	b)		What is critical solution temperature? Explain phase diagram of phenol-water system.	*CO2*	*PO2*	**07**
	c)		With temperature-composition phase diagrams explain (i) high boiling azeotrope and (ii) low boiling azeotrope.	*CO2*	*PO2*	**06**
			OR			
6	a)		Discuss the steam distillation. What are its applications?	*CO3*	*PO6*	**07**
	b)		Discuss any one application of Nernst distribution law. A solid X is added to a mixture of benzene and water. After shaking well and allowing to stand, 20 mL of the benzene layer was found to contain 0.12 g of X and 100 mL of water layer contained 0.21 g of X. Calculate the value of distribution coefficient.	*CO3*	*PO6*	**07**
	c)		Discuss TTT transformation curves with an example.	*CO2*	*PO2*	**06**
			UNIT - V			
7	a)		Elaborate on the manufacture, composition and applications of soda glass.	*CO3*	*PO6*	**07**
	b)		Explain the composition, properties and applications of the common ferrous alloys.	*CO3*	*PO6*	**07**
	c)		With relevant examples discuss the classification of lubricants.	*CO3*	*PO6*	**06**

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