U.S.N.										

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

Autonomous Institute Affiliated to VTU

February / March 2025 Semester End Main Examinations

Programme: B.E. **Semester: I / II**

Branch: Computer Science Engineering Stream **Duration: 3 hrs.**

Course Code: 22CY1BSCCS / 22CY2BSCCS **Max Marks: 100**

Course: Applied Chemistry for Computer Science Stream

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

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	*CO*	*PO*	Marks
1	a)	Apply the electrochemical theory to elucidate the mechanism of corrosion of iron with relevant reactions.	*CO1*	*PO1*	**7**
	b)	Electroless plating of copper is used in the manufacturing of double-sided printed circuit boards (PCBs). Describe with plating bath composition and reactions.	*CO1*	*PO1*	**7**
	c)	A concentration cell is constructed with two copper rods immersed in copper sulfate solutions of 0.1 M and 0.5 M concentrations. Give cell representation, cell reactions and calculate EMF at 303 K.	*CO2*	*PO2*	**6**
		OR			
2	a)	Describe the construction and working principle of a pH electrode and its application in pH determination.	*CO1*	*PO1*	**7**
	b)	Apply the electrochemical theory to predict the type and mechanism of corrosion when zinc is in contact with iron.	*CO2*	*PO2*	**7**
	c)	A 5.5 kg of iron metal piece of density 7.9 g/cm^3 with area 10.5 in^2 was submerged in sea water for 5.5 years. Weight of the remaining metal is found to be 1.7 kg. Calculate corrosion penetration rate (CPR) in mil per year (mpy) and mm per year (mmpy) given K = 534.	*CO2*	*PO2*	**6**
		UNIT - II			
3	a)	Illustrate the construction, and working principle of quantum dot sensitized solar cell. Analyze the disadvantages of using quantum dots in solar cells.	*CO3*	*PO7*	**7**
	b)	With a neat sketch, construct Lithium-ion battery. Illustrate its working with reactions.	*CO3*	*PO7*	**7**

		c)	A 0.85 g of coal sample containing 5.5 % hydrogen when burnt in Bomb calorimeter, rises the temperature of water from 27^{o}C to 31^{o}C. Calculate the gross calorific value (GCV) and net calorific value (NCV) of the coal sample. Given that, the mass of water taken in calorimeter is 1.5 kg, water equivalent of calorimeter is 0.25 kg, Specific heat of water is 4.187 kJ/kg/^{o}C, and Latent heat of steam is 2454 kJ/kg.	*CO2*	*PO2*	**6**
			OR			
	4	a)	Justify: biodiesel is a sustainable fuel. Describe the production of biodiesel from vegetable oils.	*CO3*	*PO7*	**7**
		b)	Compare primary, secondary and reserve batteries with an example for each.	*CO1*	*PO1*	**7**
		c)	Discuss the objectives of reformation of petrol with reactions.	*CO1*	*PO1*	**6**
			UNIT - III			
	5	a)	Define Tg. Analyze the influence of (i) intermolecular forces, and (ii) molecular mass on Tg of polymers.	*CO2*	*PO2*	**7**
		b)	Discuss the synthesis and conducting mechanism of Polyacetylene. Mention its applications.	*CO2*	*PO2*	**7**
		c)	In a polymer sample, 20% of molecules have molecular mass 15000 g/mol, 35% molecules have molecular mass 25000 g/mol, remaining 45% molecules have molecular mass 20000 g/mol, calculate the number average, weight average molecular mass and polydispersity index (PDI) of the polymer. Comment on the homogeneity of the polymer.	*CO2*	*PO2*	**6**
			OR			
	6	a)	Discuss the synthesis, degradation and uses of biodegradable polymer, polyglycolic acid.	*CO3*	*PO7*	**7**
		b)	Describe the synthesis, properties and applications of Kevlar fiber. Mention the unique properties of Composite materials.	*CO2*	*PO2*	**7**
		c)	Explain the synthesis and applications of (i) Butyl rubber, and (ii) PMMA.	*CO1*	*PO1*	**6**
			UNIT - IV			
	7	a)	Briefly describe the different types of electronic memory materials with an example for each.	*CO1*	*PO1*	**7**
		b)	What are photoactive materials? Illustrate the transitions involved on absorption of light by photoactive materials using Jablonski diagram.	*CO1*	*PO1*	**7**
		c)	Discuss the working principle and applications of QLED.	*CO3*	*PO7*	**6**
			OR			

	8	a)	Describe the types of electronic memory devices based on the principle of working.	*CO1*	*PO1*	**7**
		b)	Outline the classification of liquid crystals and their applications.	*CO1*	*PO1*	**7**
		c)	Discuss the working principle, construction and applications of OLED.	*CO3*	*PO7*	**6**
			UNIT - V			
	9	a)	Explain the construction, working principle and applications of potentiometric sensor.	*CO5*	*PO1,2*	**7**
		b)	Discuss the sources, composition and ill effects of e-waste.	*CO1*	*PO1*	**7**
		c)	25 cm^3 of water sample when titrated requires 16.2 cm^3 of 0.025M EDTA solution. Another 25 cm^3 of same water sample was boiled for about 30 minutes and filtered in to a conical flask. The filtrate when titrated, required 10.1 cm^3 of 0.025 M EDTA solution. Calculate total, permanent and temporary hardness of water.	*CO2*	*PO2*	**6**
			OR			
	10	a)	Explain the construction, working principle and applications of conductometric sensor.	*CO5*	*PO1,2*	**7**
		b)	What is desalination? Describe the desalination of water by electrodialysis method.	*CO1*	*PO1*	**7**
		c)	Differentiate between BOD and COD. In a COD experiment, 25 cm^3 of waste water sample consumes 15 cm^3 of 0.01 N FAS for the titration. The blank titre value was found to be 20 cm^3. Calculate COD of water sample.	*CO2*	*PO2*	**6**

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