U.S.N.										

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

Autonomous Institute Affiliated to VTU

April 2025 Semester End Make-Up Examinations

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

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

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

Course: Applied Chemistry for CSE 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)	Explain the concept of secondary reference electrodes and describe the construction and working of a calomel electrode with a labeled diagram.	*CO1*	*PO1*	**7**
	b)	Define CPR. Calculate the corrosion penetration rate (CPR) in mils per year (mpy) and millimeters per year (mmpy) for a brass sheet exposed to air near the ocean. Given, area of the brass sheet: 400 in^2, weight loss due to corrosion: 375 g, density of the brass sheet: 8.73 g/cm^3, exposure time: 2 years, K: 534.	*CO2*	*PO2*	**7**
	c)	Predict the effect of the following factors on the rate of corrosion, providing suitable examples: (i) Electrode potential difference (ii) Relative anodic and cathodic areas	*CO2*	*PO2*	**6**
		OR			
2	a)	What are concentration cells? A spontaneous galvanic cell, M/M^{n+} (0.03 M)//M^{n+} (0.064 N)/M develops an EMF of 0.013 V at 25 ºC. Calculate the valency of metal.	*CO2*	*PO2*	**7**
	b)	Outline the principle of corrosion control by cathodic protection and discuss the methods.	*CO3*	*PO7*	**7**
	c)	Explain the electrochemical theory of corrosion by taking iron as example.	*CO1*	*PO1*	**6**
		UNIT - II			
3	a)	Explain why the gross calorific value (GCV) of a fuel is higher than its net calorific value (NCV). Calculate GCV and NCV of a fuel, on burning 0.85 g of a fuel in a bomb calorimeter, the temperature of 2.35 kg of water raised from 23.5 ºC to 28.5 ºC. The water equivalent of calorimeter and	*CO2*	*PO2*	**7**

			latent heat of steam 0.45 kg and 2454 kJ/kg respectively. Specific heat of water is 4.187 kJ/kg/^{o}C and the fuel contains 2.5% hydrogen.			
		b)	Describe the construction and electrochemical reactions of $LiCoO_2$ battery during discharging. Energy density of Li ion battery is high, justify.	*CO3*	*PO7*	**7**
		c)	Describe the construction and working of silicon based photovoltaic cells. Highlight its advantages.	*CO3*	*PO7*	**6**
			OR			
	4	a)	Explain the process of petrol reformation, including the necessary reactions and conditions. Justify the importance of petrol reformation.	*CO1*	*PO1*	**7**
		b)	Provide an overview of (i) biodiesel production and (ii) hydrogen production.	*CO3*	*PO7*	**7**
		c)	Elaborate on the following battery characteristics: (i) capacity (ii) voltage and (iii) cycle life.	*CO1*	*PO1*	**6**
			UNIT - III			
	5	a)	Define glass transition temperature (Tg) and explain its significance in polymer science. Choose two factors and provide a clear and concise explanation of how each factor affects the Tg of a polymer.	*CO1*	*PO1*	**7**
		b)	In a polymer sample 30 molecules have molecular mass of 14,000, 45 molecules have molecular mass of 16,000 and remaining 25 molecules have molecular mass of 20,000. Calculate number average and weight average molecular masses. Also calculate PDI and comment on it.	*CO2*	*PO2*	**7**
		c)	What are biodegradable polymers? Explain their significance in medical and environmental applications. Describe the preparation of polyglycolic acid.	*CO3*	*PO7*	**6**
			OR			
	6	a)	Explain the synthesis and uses of nitrile rubber and Kevlar fiber.	*CO1*	*PO1*	**7**
		b)	What are conducting polymers? Outline the synthesis and conducting mechanism of polyacetylene.	*CO1*	*PO1*	**7**
		c)	Analyze structure-property relationship in polymers with reference to (i) tensile strength and (ii) crystallinity.	*CO2*	*PO2*	**6**
			UNIT - IV			
	7	a)	Elaborate on different materials used in memory devices.	*CO3*	*PO7*	**7**
		b)	What are liquid crystals? Explain the classification of liquid crystals.	*CO1*	*PO1*	**7**

		c)	Explain the construction and working of OLEDs with a neat diagram.	*CO3*	*PO7*	**6**
			OR			
	8	a)	What are memory devices? Explain the working of capacitor and resistor-type memory devices.	*CO1*	*PO1*	**7**
		b)	Outline the possible transitions occurring during photoexcitation using Jablonski diagram.	*CO1*	*PO1*	**7**
		c)	Explain the construction and working of QLEDs with a neat sketch.	*CO3*	*PO7*	**6**
			UNIT - V			
	9	a)	What are sensors? Discuss the application of conductometric sensors in estimation of acid mixture.	*CO5*	*PO1,2*	**7**
		b)	Discuss the ion exchange process for softening of hard water.	*CO1*	*PO1*	**7**
		c)	Calculate the temporary, permanent and total hardness of water sample containing $Mg(HCO_3)_2$ = 7.3 mg/L, $Ca(HCO_3)_2$= 16.2 mg/L, $MgCl_2$= 9.5 mg/L, $CaSO_4$=13.6 mg/L. (Given molecular weight of $Mg(HCO_3)_2$= 146, $Ca(HCO_3)_2$= 162, $MgCl_2$= 92, $CaSO_4$ =136). Mention the disadvantages of hard water.	*CO2*	*PO2*	**6**
			OR			
	10	a)	Explain the experimental determination of COD of an industrial wastewater sample. Mention the usefulness of determining the COD.	*CO5*	*PO1,2*	**7**
		b)	What are optical sensors? Explain the estimation of copper using colorimetry.	*CO5*	*PO1,2*	**7**
		c)	Discuss the importance of recycling electronic waste.	*CO3*	*PO7*	**6**

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