

U.S.N.

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

Autonomous Institute Affiliated to VTU

**February / March 2024 Semester End Main Examinations****Programme: B.E.****Branch: Computer Science Stream****Course Code: 22CY1BSCCS / 22CY2BSCCS****Course: Applied Chemistry for Computer Science Engg Stream****Semester: I / II****Duration: 3 hrs.****Max Marks: 100**

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

<b>Important Note:</b> Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.			<b>UNIT - I</b>	<i>COs</i>	<i>POs</i>	<b>Marks</b>
	1	a)	Explain the construction and working of a glass electrode. Elaborate on its application in the determination of pH of a solution.	<i>CO2</i>	<i>PO2</i>	<b>7</b>
		b)	What are surface conversion coatings? Describe the anodization of aluminum and its applications.	<i>CO2</i>	<i>PO2</i>	<b>7</b>
		c)	A brass sheet of area 400 in <sup>2</sup> is exposed to air near the ocean. After two years it was found to experience a weight loss of 375 g due to corrosion. Density of the brass sheet is 8.73 g/cm <sup>3</sup> . Calculate CPR in mpy and mmpy. (K = 534)	<i>CO2</i>	<i>PO2</i>	<b>6</b>
			<b>OR</b>			
	2	a)	Define metallic corrosion. Describe the electrochemical theory of corrosion by taking iron as an example.	<i>CO2</i>	<i>PO2</i>	<b>7</b>
		b)	Explain the electroless plating of copper with relevant reactions and mention its advantages.	<i>CO3</i>	<i>PO7</i>	<b>7</b>
		c)	The EMF of a concentration cell Ag AgNO <sub>3</sub> (0.018M)   AgNO <sub>3</sub> (X) Ag is found to be 0.083V at 298K. Write the cell reactions and calculate the value of X.	<i>CO2</i>	<i>PO2</i>	<b>6</b>
			<b>UNIT - II</b>			
	3	a)	"Reformation improves the quality of petrol". Justify the statement with relevant reformation reactions.	<i>CO3</i>	<i>PO7</i>	<b>7</b>
		b)	Explain the construction and working of QDSSCs. Highlight its advantages over silicon based solar cells.	<i>CO3</i>	<i>PO7</i>	<b>7</b>
		c)	On burning of a chemical fuel in a Bomb calorimeter, the GCV was found to be 45.745kJ/kg. The temperature of the surrounding water increased by 2.7 °C. The weight of water taken and water equivalent of bomb calorimeter were 3.5 kg and 0.385 kg respectively. Calculate the mass of chemical fuel and NCV. (Given: Specific heat of water = 4.186 kJ/kg/°C, Latent heat of steam is 2454 kJ/kg. % of H is 4.98%).	<i>CO2</i>	<i>PO2</i>	<b>6</b>

		<b>UNIT - III</b>			
4	a)	Define Tg of a polymer. Discuss the influence of flexibility and crystallinity of polymers on Tg.	CO2	PO2	7
	b)	Appraise the statements: i) Kevlar is less flexible than nylons ii) tensile strength of polymers is related to their chemical structure.	CO2	PO2	7
	c)	A polymer sample has the following composition, 20% molecules have molecular mass 15,000 g/mol, 35% molecules have molecular mass 25000 g/mol and remaining molecules have molecular mass 20000 g/mol. Calculate the number average and weight average molecular mass of the polymer. Calculate PDI and comment on it.	CO2	PO2	6
		<b>OR</b>			
5	a)	Write the synthesis and applications of the following polymers: i) Butyl rubber ii) U-F resin.	CO2	PO2	7
	b)	List the criteria for a polymer to exhibit electrical conductivity. Illustrate the oxidative doping of polyacetylene to make it a conducting polymer.	CO2	PO2	7
	c)	What are biodegradable polymers? Describe the synthesis and applications of polyglycolic acid.	CO3	PO7	6
		<b>UNIT - IV</b>			
6	a)	What are memory devices? Explain the working of capacitor and resistor type memory devices.	CO3	PO7	7
	b)	What are liquid crystals? Discuss their classification.	CO3	PO7	7
	c)	Sketch and explain Jablonski's diagram.	CO2	PO2	6
		<b>UNIT-V</b>			
7	a)	What are electrochemical sensors? Explain the construction and working of NOx sensor.	CO2	PO2	7
	b)	Define hardness of water. In an experiment, 25 cm <sup>3</sup> of hard water required 15.8 cm <sup>3</sup> of 0.02 M EDTA solution for titration using EBT as an indicator. Under similar conditions, same sample water after boiling and cooling required 9.5 cm <sup>3</sup> of EDTA solution. Calculate the temporary, permanent and total hardness of water sample.	CO2	PO2	7
	c)	Explain the hydrometallurgical extraction of copper. Analyze the ill effects of e-waste.	CO3	PO7	6

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