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

Autonomous Institute Affiliated to VTU

September / October 2024 Supplementary Examinations

Programme: B.E   **Semester: I / II**
Branch: Common to all Branches   **Duration: 3 hrs.**
Course Code: 21CY1BSECT / 21CY2BSECT   **Max Marks: 100**
Course: Engineering Chemistry

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

1	a)	What are reference electrodes? Explain the construction and working of calomel electrode.	**6**
	b)	Give the technological importance of metal finishing. Explain galvanization of iron.	**8**
	c)	List and explain the steps involved in the electroless plating of copper.	**6**

OR

2	a)	A cell is constructed by dipping copper rod in copper sulphate solution (0.02 M) and nickel rod in nickel sulphate solution (0.2 M). Write the cell representation, cell reactions and calculate the cell potential at 25 ºC. Given Eº values of Cu^{2+}/Cu and Ni^{2+}/Ni are +0.34 V and -0.23 V respectively.	**6**
	b)	What are ion selective electrodes? Elaborate on the construction and working of glass electrode. Mention its advantages.	**8**
	c)	Explain differential aeration corrosion with an example.	**6**

UNIT - II

3	a)	0.85 g of coal sample is burnt in a Bomb calorimeter. 1200 g of water has a rise of 4.0 ºC temperature. Water equivalent of calorimeter was 135 g. Calculate GCV and NCV of coal. Specific heat of water = 4.18 kJ/kg/ ºC. Latent heat of steam = 2454 kJ/kg. Coal contains 5% Hydrogen.	**6**
	b)	What is petroleum cracking? Discuss fluidized bed catalytic cracking.	**8**
	c)	Elaborate on the construction, working and applications of Li-ion battery. Why aqueous electrolyte is not used in Li-ion battery?	**6**

UNIT - III

4	a)	Define glass transition temperature. Explain any two factors which affect glass transition temperature of a polymer.	**6**
	b)	Outline the synthesis and applications of Kevlar and Carbon fibre.	**8**
	c)	What are conducting polymers? Explain the mechanism of conduction in polyaniline.	**6**

UNIT - IV

5 a) 50 mL of water sample required 21.2 mL of 0.02M EDTA salt solution using EBT as indicator. 17 mL of same EDTA salt solution was used for 50 mL of same water sample after removing the temporary hardness. Calculate the total and permanent hardness in terms of $CaCO_3$ equivalents. **6**

   b) Elaborate on the basic principles of green chemistry (any eight). **8**

   c) Explain the desalination of water by reverse osmosis method. **6**

OR

6 a) Outline the synthesis of adipic acid by green route. **6**

   b) Define BOD. Explain treatment of waste water by trickling filter method. **8**

   c) Define COD. An effluent water sample of 100 mL is reacted with 10 mL of potassium dichromate solution. The unreacted potassium dichromate requires 15.4 mL of 0.01N FAS solution. Under similar conditions, blank titration requires 20.4 mL of same FAS solution. Calculate COD of water sample. **6**

UNIT - V

7 a) Explain any two size dependent properties of nanomaterials. **6**

   b) Elaborate on the application of phase rule to Pb-Ag system with neat phase diagram. **8**

   c) Outline the principle and instrumentation of copper colorimetry. **6**

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