U.S.N.										

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

Autonomous Institute Affiliated to VTU

December 2023 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 suitably assumed.

UNIT - I

1 a) Justify: **08**
(i) Glass electrode cannot be used in presence of fluoride ions
(ii) In a concentration cell, no electricity flows when the concentration of metal ions is same in both the half cells.
(iii) The corrosion product formed on aluminium is passive, whereas corrosion product formed on iron is not passive.

b) What is electroless plating? Mention the advantages of electroless plating over electroplating. **06**

c) What is standard reduction potential? A galvanic cell is constructed by dipping zinc rod in 5 x 10^{-2} M zinc nitrate solution and silver rod in 1.2 x 10^{-1} M silver sulphate solution. Write half-cell reactions and calculate the e.m.f of the cell. Given: Standard reduction potentials of zinc and silver metals are -0.76 V and +0.80 V respectively. **06**

OR

2 a) What is metallic corrosion? Explain the mechanism of rusting of iron by electrochemical theory by taking partially immersed iron rod in water. **08**

b) What are secondary reference electrodes? Explain the construction and working of Calomel electrode. **06**

c) Discuss electroplating of chromium. Mention its applications. **06**

UNIT - II

3 a) (i) Discuss construction and working of Si-based PV cell **08**
(ii) Discuss the following battery characteristics –
Capacity and Cycle life

b) What are fuel cells? Explain the construction and working of methanol-oxygen fuel cell. **06**

c) Define GCV. In bomb calorimetric method, 0.95 g of coal sample was burnt completely in copper calorimeter containing 2000 g water. The initial and final temperature of the water was 28.5 ^{o}C and 30.7 ^{o}C. Water equivalent of calorimeter is equal to 200 g. Specific heat of water is 4.2 kJ/kg/^{o}C. Latent heat of steam = 2454 kJ/kg. Calculate GCV and NCV of coal. Given % H = 2.0 % **06**

UNIT - III

4	a)	Define glass transition temperature. Explain any three factors affecting Tg of a polymer.	**08**
	b)	What are biodegradable polymers? Discuss synthesis and applications of polyglycolic acid.	**06**
	c)	What are conducting polymers? Illustrate the conduction mechanism in polyaniline.	**06**

UNIT - IV

5	a)	Explain synthesis of adipic acid and paracetamol by green synthesis method.	**08**
	b)	What is desalination? Explain the method of desalination of saline water by reverse osmosis method.	**06**
	c)	Define COD. In a COD experiment, 33.5 cm^3 and 28.2 cm^3 of 0.028 N FAS solution were required for blank and back titration respectively. The volume of test sample used is 50 cm^3. Calculate the COD of the sample solution.	**06**

OR

6	a)	Explain waste water treatment by secondary and tertiary treatment methods.	**08**
	b)	Mention any six basic principles of green chemistry.	**06**
	c)	Calculate the total and permanent hardness of the water sample, if 50 cm^3 of hard water sample required 20 cm^3 of M/50 EDTA salt solution. The same water sample after boiling and filtering required 13.7 cm^3 of the same EDTA salt solution.	**06**

UNIT - V

7	a)	State phase rule. Explain the phase diagram of water system.	**08**
	b)	Explain the different synthesis steps involved in sol-gel method.	**06**
	c)	Discuss determination of sodium present in a test solution using Flame photometer.	**06**

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