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

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E.   Semester: I/II
Branch: Common to all Branches   Duration: 3 hrs.
Course Code: 18CY1BSCHY/18CY2BSCHY   Max Marks: 100
Course: ENGINEERING CHEMISTRY   Date: 20.09.2023

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 boiler scales? Explain the formation of scales in industrial boilers.	**7**
	b)	Define BOD. Describe activated sludge method of sewage treatment.	**7**
	c)	Calculate total, permanent and temporary hardness of water sample. If 50 cm^3 of hard water sample was required 20 cm^3 of 0.02M EDTA salt solution. The same amount of hard water sample of after boiling and filtering required 13.7 cm^3 of the same EDTA solution with the experimental procedure.	6

UNIT - II

2	a)	Define corrosion. Describe Electrochemical theory of corrosion for rusting of iron.	**7**
	b)	What are secondary reference electrodes? Explain the construction and working of calomel electrode.	**7**
	c)	Predict the effect of following factors on the rate of corrosion. i) Humidity ii) Temperature iii) pH of medium.	6

OR

3	a)	What is anodizing? Explain how a thick passive layer of Al_2O_3 is developed on an aluminum article by electrochemical method.	**7**
	b)	Explain pitting corrosion with a suitable example.	**7**
	c)	What is meant by cathodic protection? Illustrate sacrificial anode method of cathodic protection.	6

UNIT - III

4	a)	What is reformation of petrol? Explain reformation process with any two chemical reactions.	**7**

	b)	What are fuel cells? Explain the construction and working of methanol oxygen fuel cell.	**7**
	c)	The following data were obtained in a Bomb calorimeter experiment. Solve for GCV and NCV of a sample of coal.	6

i) Weight of coal = 1.15g,

ii) Weight of water taken in calorimeter = 3.5kg, iii) Water equivalent of calorimeter = 325 g, iv) Rise in temperature = 2 °C v) Specific of water = 4.187kJ/kg/° C and vi) Latent heat of steam =2454 kJ/kg, vii) % H_2 is 3 %.

OR

5	a)	What are modern batteries? Illustrate the construction and working of Zinc-Air battery.	**7**
	b)	What are PV cells? Explain the construction and working of silicon based photovoltaic cell.	**7**
	c)	Appraise the following battery characteristics:	6

 i) Voltage   and ii) Capacity

UNIT - IV

6	a)	Explain solution polymerization techniques with its advantages and disadvantages.	**7**
	b)	What are conducting polymers? Explain the mechanism of conduction in polyaniline.	**7**
	c)	A polymer sample contains 10, 20, 30 and 40 molecules having molecular weights 1×10^5, 2×10^5, 3×10^5, and 4×10^5 respectively. Calculate the number average and weight average molecular weight of the polymer.	6

UNIT - V

7	a)	Elaborate on synthesis of nanomaterials by sol gel method	**7**
	b)	Explain the conductometric estimation of mixture of strong acid and weak acid against strong base.	**7**
	c)	Explain any two size dependent properties of nanomaterials.	6

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