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

Autonomous Institute Affiliated to VTU

December 2023 Supplementary Examinations

Programme: B.E. **Semester: I**
Branch: ME/CH/AS/IEM **Duration: 3 hrs.**
Course Code: 22CH1BSCME **Max Marks: 100**
Course: Applied Chemistry for Mechanical Engineering Stream

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 Ion selective electrodes? Describe the determination of the pH of a solution using glass electrode.	**08**
	b)	Define concentration cell and identify the driving force in a concentration cell. Calculate the EMF of the cell constructed by dipping two copper electrodes in 0.001 M and 0.1 M $CuSO_4$ at 25^oC.	**06**
	c)	Justify the following statements: i. Galvanization is preferred over Tinning for Iron structures ii. A small anode and a large cathode enhances corrosion rate.	**06**

OR

2	a)	Rusting of iron is an electrochemical phenomenon. Justify the statement with suitable reactions and a neat labeled diagram.	**06**
	b)	Compare differential metal and differential aeration corrosion process with suitable examples.	**08**
	c)	Define Corrosion penetration rate (CPR). A steel plate of area 100 in^2 exposed to corrosive environment was found to decline by 485g for a period of 365 days due to corrosion. Given density =7.9 g cm^{-3}, calculate CPR in mpy.	**06**

UNIT - II

3	a)	Define cracking. Describe fluidized-bed catalytic cracking process with a neat diagram and mention its advantages.	**08**
	b)	0.6g of a coal sample with 92 % Carbon, 5 % Hydrogen and 3 % ash caused a rise in temperature of 2000 g water by 3.2 ^oC in a bomb calorimeter. Calculate the gross and net calorific value of coal if water equivalent is 200g, specific heat of water and latent heat of condensation of steam are 4.18 kJ/Kg/^oC and 2455 kJ/Kg respectively. Calculate GCV and NCV.	**06**
	c)	Why Hydrogen is considered as a green fuel? Analyze the production of Hydrogen by electrolysis of water with neat diagram.	**06**

UNIT - III

4	a)	Outline the synthesis of (i) PMMA (ii) Kevlar (iii) Butyl rubber. Mention their applications.	**08**
	b)	Analyze the following factors influencing Tg with suitable examples i) Branching and Cross linking (ii) Intermolecular forces (iii) Molecular weight	**06**
	c)	In a polymer sample, 20 % of molecules have a molecular mass 25000 g/mole, 40 % molecules have a molecular mass 20000 g/mole and remaining molecules have molecular mass of 10000 g/mole. Calculate the number average, weight average molecular weight and PDI.	**06**

OR

5	a)	Explain the influence of polymers structures on tensile strength and chemical resistance.	**08**
	b)	Outline the synthesis of Polyglycolic acid and carbon fibres along with their applications.	**06**
	c)	Elaborate the synthesis of polycarbonates. Mention their applications.	**06**

UNIT - IV

6	a)	Describe the synthesis of nanomaterials by sol-gel method and mention its advantages.	**08**
	b)	Explain the electrical, optical and catalytic properties of nanomaterials.	**06**
	c)	Classify alloys based on (i) microstructure (ii) presence and absence of iron giving suitable examples.	**06**

UNIT - V

7	a)	Analyse the phase diagram of water system. Calculate P and F in areas, along lines and at triple point.	**08**
	b)	Define COD. Solve for the COD 28.1 ml and 14 ml of 0.05N FAS is required for blank and back titrations respectively. 50 mL of water is used for the titration.	**06**
	c)	Elaborate the experimental determination of colorimetric estimation of copper.	**06**

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