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

Autonomous Institute Affiliated to VTU

April 2023 Semester End Main Examinations

Programme: B.E. **Semester: I**
Branch: ME/CH/AS/IEM **Duration: 3 hrs.**
Course Code: 22CHIBSCME **Max Marks: 100**
Course: Applied chemistry for Mechanical Engineering stream **Date: 08.04.2023**

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

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

UNIT - I

1	a)	With a neat diagram, explain the construction and working of Calomel electrode.	**05**
	b)	Two copper rods are placed in 0.1M and 1.0 M $CuSO_4$ solutions separately to form a cell. Write the representation of the cell. Evaluate the EMF of the cell at 25^{o}C.	**04**
	c)	Explain the corrosion of iron based on electrochemical theory.	**06**
	d)	Describe the electroless plating of copper with relevant reactions.	**05**

OR

2	a)	Describe the experimental details and give the mathematical derivation for determination of the pH of a solution using glass electrode.	**06**
	b)	Define CPR. Calculate CPR in mpy for a thick steel sheet of area 50 inch^2 which experiences a weight loss of 380 g after 365 day. (Density of steel = 7.9 g/cm^3).	**04**
	c)	What is cathodic protection? With neat diagram, describe the corrosion control by sacrificial anode method.	**06**
	d)	List the differences between electro plating and electroless plating.	**04**

UNIT - II

3	a)	Explain the following battery characteristics: (i) Capacity (ii) Energy Efficiency	**04**
	b)	With a suitable reaction, explain the synthesis of bio-diesel.	**04**
	c)	Define calorific value. Explain the determination of calorific value of solid fuel by Bomb Calorimeter.	**06**
	d)	Discuss the Fluidized bed catalytic cracking of petroleum.	**06**

UNIT - III

4	a)	How is PMMA synthesized? Mention its applications.	**04**
	b)	Define the following terms: i)Elastomers ii) Polymer composites iii)Biodegradable polymers and iv) PDI	**06**
	c)	Elaborate on the structural property relationship of polymers with reference to i) Strength and ii) Chemical resistance.	**06**
	d)	*Give* the synthesis and applications of butyl rubber.	**04**

OR

5	a)	Illustrate any three factors which affect the glass transition temperature.	**06**
	b)	Evaluate the number average molecular weight and weight average molecular weight of a polymer consisting of 10% by weight of macromolecules of molecular mass 1000 and 90% by weight of macromolecules of molecular mass 10,000.	**04**
	c)	Explain the synthesis i) Kevlar ii) Nitrile rubber Mention their applications	**06**
	d)	Distinguish between thermoplastic and thermosetting plastic.	**04**

UNIT - IV

6	a)	Outline the classification of lubricants? Discuss the applications of the lubricants.	**06**
	b)	What are shape memory alloys? Mention their industrial importance.	**04**
	c)	Explain the synthesis of nanomaterials by sol-gel method and mention its advantages.	**06**
	d)	Explain the top down and bottom up process for the synthesis of nanomaterials.	**04**

UNIT - V

7	a)	Explain the determination of total hardness of water by complexometric method.	**06**
	b)	Analyze the variation in conductance for the titration of mixture of strong acid and weak acid against strong base.	**04**
	c)	Discuss the phase diagram of water system with the neat diagram.	**06**
	d)	Describe the various components of colorimeter.	**04**

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