U.S.N.										

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

Autonomous Institute Affiliated to VTU

September 2024 Supplementary Examinations

Programme: B.E. **Semester: I / II**
Branch: Mechanical Engineering Stream **Duration: 3 hrs.**
Course Code: 22CY1BSCME / 22CY2BSCME **Max Marks: 100**
Course title: 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.

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	CO	PO	Marks
1	a)	Describe the experimental method of determination of pH of a given solution using glass electrode.	CO1	PO1	**7**
	b)	Explain the corrosion of iron based on electrochemical theory.	CO1	PO1	**7**
	c)	What is a concentration cell? Two copper rods are placed in 0.1M and 1M $CuSO_4$ solutions separately to form a cell. Write the cell representation. Calculate the emf of the cell at 30^o C.	CO2	PO2	**6**
		OR			
2	a)	What are reference electrodes? With a neat diagram, explain the construction and working of calomel electrode.	CO1	PO1	**7**
	b)	What is cathodic protection? With a neat diagram, describe the corrosion control by sacrificial anode method and impressed current method.	CO1	PO1	**7**
	c)	An iron metal lost 2.4 mg of weight when it is immersed in acidic solution for 2 hrs. Calculate the corrosion penetration rate (CPR) for the exposed area of 4 cm^2. Given K = 534 and the density of metal = 5.37 g cm^{-3}. Express the CPR in terms of mpy and mmpy.	CO2	PO2	**6**
		UNIT - II			
3	a)	With suitable reaction, explain the synthesis of bio-diesel. Mention its advantages.	CO2	PO2	**7**
	b)	What is calorific value? Explain the determination of calorific value of solid fuel by bomb calorimeter method.	CO3	PO7	**7**
	c)	Explain the following battery characteristics: (i) Capacity (ii) Voltage	CO3	PO7	**6**
		UNIT - III			
4	a)	Compute the synthesis and applications of carbon fiber and Kevlar fibre**.**	CO3	PO7	**7**
	b)	How are the following polymers synthesized? i) PMMA ii) Butyl rubber Give any two applications of them.	CO3	PO7	**7**

		c)	Evaluate the number average molecular weight and weight average molecular weight of the following polymers with different compositions of polymer chains (neglect the mol. Mass of R) C_6H_5 ו R [–CH_2 –CH–] R $_{100}$ 30 % C_6H_5 ו R [–CH_2 –CH–] R $_{200}$ 30 % C_6H_5 ו R [–CH_2 –CH–] R $_{300}$ 40 %	CO2	PO2	**6**
			OR			
	5	a)	i) Distinguish between thermoplastic and thermosetting polymers. ii) Distinguish between resins and plastics.	CO3	PO2	**7**
		b)	Calculate the number average and weight average molecular mass of polystyrene sample containing 20%, 50% and 30% of polymer chains with the molecular weight of 10^3,10^4 and 10^5 respectively.	CO2	PO2	**7**
		c)	Discuss the synthesis, properties and applications of polycarbonates.	CO3	PO2	**6**
			UNIT - IV			
	6	a)	What is an alloy? Discuss the composition, properties and applications of stainless steel and shape memory alloys.	CO1	PO3	**7**
		b)	Explain the synthesis of nano-ZrO_2 by sol-gel method. Mention its advantages	CO1	PO3	**7**
		c)	What are ceramics? How are they classified based on chemical composition.	CO1	PO3	**6**
			UNIT - V			
	7	a)	Calculate the total, temporary and permanent hardness of a water sample if 13.5 cm^3 and 8.5 cm^3 of 0.025 M EDTA is required for the titration before and after boiling 25 cm^3 of water sample. Justify the role of NH_3 – NH_4Cl buffer in the experiment.	CO1	PO1	**7**
		b)	Discuss the principle and the instrumentation of colorimetry.	CO5	PO3	**7**
		c)	Write phase diagram of water system and evaluate the degrees of freedom along the curves, in the areas and at the triple point.	CO1	PO3	**6**

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