

SEE MODEL QUESTION PAPER-2

UG

First Semester B.E. Degree Examination, April - 2021

Engineering Chemistry 20CHE12

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any Five full questions, choosing ONE full question from each module.
Draw neat labeled diagram wherever necessary.*

Q. No.	MODULE - 1	Marks
1	(a) What voltage will be generated by a cell that consists of an iron electrode immersed in 0.5M FeSO ₄ solution and a copper electrode immersed in 1M CuSO ₄ solution at 298 K. Given $E^0_{Fe} = -0.44$ V and $E^0_{Cu} = 0.34$ V. Write the cell representation and cell reactions.	06
	(b) Illustrate the classifications of batteries with relevant examples.	07
	(c) With the help of a neat sketch explain the construction and working of calomel electrode and list out its applications.	07
2	(a) Explain the construction and working of glass electrode. Mention its applications.	07
	(b) The cell potential of copper concentration cell Cu/CuSO ₄ (0.005M) // CuSO ₄ (X)/ Cu is 0.0295 V at 25°C. Solve for the value of X.	06
	(c) Describe the construction and working of Methanol-Oxygen fuel cell with its applications.	07
MODULE - 2		
3	(a) Outline the process of electroplating of chromium. chromium cannot be used as anode, Justify the statement.	07
	(b) Discuss the following types of corrosion with relevant examples. i) Differential metallic corrosion ii) Water line corrosion	07
	(c) Interpret the the following factors affecting the rate of corrosion. i) Ratio of anodic to cathodic areas ii) Nature of corrosion product.	06
4	(a) With suitable reactions explain caustic embrittlement in mild steel boilers.	07
	(b) What is meant by metal finishing ? Mention the technological importance of metal finishing.	07
	(c) Distinguish between electroplating and electroless plating.	06
MODULE - 3		
5	(a) How gasoline is produced from the crude oil by fluidized bed catalytic cracking process?	07
	(b) 50 cm ³ of sewage water was refluxed with 20 cm ³ of 0.1N K ₂ Cr ₂ O ₇ . The unreacted acidified K ₂ Cr ₂ O ₇ consumed 10.2 cm ³ of 0.1 N FAS. 20 cm ³ of 0.1N K ₂ Cr ₂ O ₇ when titrated under identical conditions consumed 31.1 cm ³ of 0.1 N FAS. Calculate the COD of sewage water.	06

	(c) What is meant by Boiler corrosion? Summarize the boiler corrosion occurring due to dissolved CO ₂ , O ₂ and MgCl ₂ illustrate the phenomenon with relevant reactions.	07
6	(a) On burning 1.15g of a coal sample in a bomb calorimeter, the temperature of 3.5Kg of water in the calorimeter increased from 26.5 ⁰ C to 28.5 ⁰ C. Water equivalent of calorimeter is 325g. Specific heat of water is 4.187 KJ/Kg/ ⁰ C. Latent heat of steam = 587 Cal/g. If the fuel contains 4% hydrogen, calculate gross and net calorific values.	06
	(b) Define COD. Discuss the experimental determination of COD of the waste water sample.	07
	(c) With the help of a neat sketch, summarize the process of activated sludge treatment of sewage water.	07
MODULE - 4		
7	(a) Show the steps involved in the manufacturing of refractories. Highlight the applications of refractories in engineering field.	07
	(b) Illustrate the synthesis of Polyaniline. Interpret the mechanism of conduction in polyaniline Conducting Polymer.	07
	(c) Discuss the synthesis and applications of carbon Fiber.	06
8	(a) How Polyurethanes is synthesized, mention its applications.	07
	(b) Define Drop point of a lubricant? Explain its determination experimentally?	07
	(c) Discuss the synthesis and applications of Kevlar fiber	06
MODULE - 5		
9	(a) Interpret the theory and application of colorimeter.	07
	(b) Summarize the characterization techniques of PXRD and SEM. Quote its applications in the Nanotechnology field.	07
	(c) Explain the organization and processing of Biomedical waste.	06
10	(a) Outline the theory and Instrumentation of Potentiometer. Illustrate its application.	07
	(b) Write short notes on: i) CNT ii) Fullerenes	06
	(c) Explain how three way catalytic converter is utilized for controlling the oxides of nitrogen, oxides of carbon and hydrocarbons.	07

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