SEE MODEL QUESTION PAPER

UG

USN

21CHE12

First Semester B.E. Degree Examination, March- 2022

Engineering Chemistry

Time: 3 hrs. Max. Marks: 100 Note: answer any Five full questions, choosing ONE full question from each module.

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Q. No.		MODULE - 1	Marks
	а	With the help of a neat sketch explain the construction and working of calomel electrode and list out its applications.	07
1	b	For the cell, $\text{Cu/Cu}^{+2}(0.04\text{M})//\text{Ag}+(0.1\text{M})/\text{Ag}$, write the cell reaction and calculate the EMF of cell at 25 °C, If E^0 values of Cu and Ag electrodes are +0.34 V and +0.8V respectively.	07
	С	Explain the construction, working of Li- ion battery. Mention its applications.	06
	а	Describe the construction, working and applications of methanol-oxygen fuel cell.	07
2	b	A cell is obtained by combining two Magnesium electrodes immersed in Magnesium sulphate solutions of 0.1M and 0.5M at 298 K. Represent the cell, cell reaction and hence calculate the EMF of the cell.	07
	С	Enumerate the determination of pH of the given solution by using glass electrode.	
	а	MODULE - 2 Outline the process of electroplating of chromium. Chromium cannot be used as anode, Justify the statement.	07
3	b	Discuss electrochemical theory of corrosion taking iron as an example.	07
	С	List the Technological importance of metal finishing.	06
	а	Explain the following types of corrosion with relevant examples. i) Differential metallic corrosion ii) Water line corrosion	07
4	b	Summarize the principle of cathodic protection and enumerate the processes with relevant sketch.	07
	С	What is meant by electroless plating? Interpret the process of electroless plating of copper on PCB with relevant reactions.	06
5	а	MODULE - 3 Demonstrate the determination of the calorific value of solid/ liquid fuel using a Bomb calorimeter.	07
	b		07

	С	State the applications of a Photovoltaic cell. Describe the construction and working of Photovoltaic cell.	06
		Show the steps involved in the manufacturing of refractories. Highlight the applications in engineering field.	
	а	On burning 0.97 g of a coal sample in a bomb calorimeter, the temperature of 2.5 Kg of water in the calorimeter increased from 28.5°C to 30 °C. Water equivalent of calorimeter is 325g. Specific heat of water is 4.187 KJ/Kg/°C. Latent heat of steam = 587 Cal/g. If the fuel contains 6% hydrogen, calculate gross and net calorific values.	07
6	b	What is meant by Flash point of a lubricant. Explain its determination experimentally.	07
	С	Outline the synthesis of Biodiesel by transesterification method. Mention the advantages of Biodiesel.	06
		MODULE - 4	
	а	Illustrate the synthesis of Polyaniline. Interpret the mechanism of conduction in polyaniline Conducting Polymer.	07
7	b	Define COD. Discuss the experimental determination of COD of the waste water sample.	07
	С	Write a note on desalination process of water by reverse osmosis method.	06
	a	$25~\text{cm}^3$ of wastewater sample was mixed with $20~\text{cm}^3$ of $K_2Cr_2O_7$, acidified & refluxed. The unreacted $K_2Cr_2O_7$ acidified required $9~\text{cm}^3$ of $0.1~\text{N}$ FAS. In a blank titration $20~\text{cm}^3$ of $K_2Cr_2O_7$ acidified required $18~\text{cm}^3$ of same $0.1~\text{N}$ FAS. Calculate the COD of the wastewater sample.	07
8	b	Interpret the softening of water by ion exchange process with relevant diagram and reactions.	07
	С	Citing the applications of Kevlar fiber in the industry, explain its synthesis.	06
		MODULE - 5	
	а	Stating the theory and Instrumentation of Potentiometer. Illustrate its applications.	07
	-	What are Nanomaterials. Explain the synthesis of ZnO nano material by solution combustion method.	
9	b		07
	С	Discuss the control measurements of oxides of nitrogen, oxides of carbon and hydrocarbons by using three ways catalytic convertor.	06
10	а	Interpret the principle and the appropriate instrumentation discuss any one application of conductometer.	07
	b		07
	•	Write short notes on: i) CNT ii) Fullerenes Enumerate the conservation of water by recycling and rain water harvesting process.	
	С		06