

SEE MODEL QUESTION PAPER-1

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) Define the terms (i) EMF of a cell (ii) Free energy (iii) Single electrode potential.	06
	(b) For the cell, Fe/Fe ²⁺ (0.05M)//Ag ⁺ (0.1M)/Ag, write the cell reaction and calculate the EMF of cell at 298K, If E ⁰ values of Fe and Ag electrodes are -0.44 V and +0.8V respectively.	07
	(c) List the applications, explain the construction and working of Li- ion battery.	07
2	(a) Derive Nernst's equation for the determination of single electrode potential.	07
	(b) With the help of a neat sketch discuss the construction, working and applications of Methanol- Oxygen fuel cell.	07
	(c) A cell is obtained by combining two Cadmium electrodes immersed in cadmium sulphate solutions of 0.1M and 0.5M at 25 °C. Represent the cell, cell reaction and hence calculate the EMF of the cell.	06
MODULE - 2		
3	(a) State electrochemical theory of corrosion taking iron as an example.	07
	(b) Explain the Effluent treatment for Chromium from electroplating industry by Photocatalytic method.	07
	(c) Outline the process of galvanization for prevention of corrosion.	06
4	(a) Summarise the principle of cathodic protection and enumerate the processes of cathodic protection.	07
	(b) List the Technological importance of metal finishing.	06
	(c) What is meant by electroless plating? Interpret the process of electroless plating of copper on PCB.	07
MODULE - 3		
5	(a) With the help of a neat sketch explain the determination of the calorific value of solid/ liquid fuel using a Bomb calorimeter.	07
	(b) State the applications of a Photovoltaic cell. Describe the construction and working of Photovoltaic cell.	06
	(c) Write a note on desalination process of water by reverse osmosis method.	07

6	(a) 0.87 g of coal sample (Carbon 90%, H ₂ 5% and ash 5%) was subjected to combustion in Bomb calorimeter. Mass of water taken in calorimeter was 2.6 kg and water equivalent of calorimeter is 0.65 kg. The raise in temperature was found to be 3.8 °C. Calculate HCV and LCV values of the coal sample. Latent heat of steam = 2454KJ/kg and specific heat of water =4.187kJ/kg/°C.	07
	(b) Explain the synthesis of Biodiesel by transesterification method. Mention the advantages of Biodiesel.	06
	(c) Define COD of water. 25 cm ³ of wastewater sample was mixed with 25 cm ³ of K ₂ Cr ₂ O ₇ , acidified & refluxed. The unreacted K ₂ Cr ₂ O ₇ acidified required 8.2 cm ³ of FAS. In a blank titration 25 cm ³ of K ₂ Cr ₂ O ₇ acidified required 16.4 cm ³ of same 0.2 N FAS. Calculate the COD of the wastewater sample.	07
MODULE - 4		
7	(a) Citing the applications of Kevlar fiber in the industry, explain the synthesis.	07
	(b) With the help of a neat sketch illustrate the experimental determination of drop point of a lubricant.	07
	(c) Enumerate in brief the steps involved in the manufacturing of the refractories.	06
8	(a) How poly aniline is converted into conducting poly aniline? Justify with the suitable mechanism.	07
	(b) Classify lubricants and state the applications of lubricants.	06
	(c) Describe any four properties of refractories and state the applications of them in the industry scenario.	07
MODULE - 5		
9	(a) Stating the principle and the appropriate instrumentation discuss the working and application of Potentiometer.	07
	(b) Define nanomaterials. Outline the synthesis of nanomaterials via solution combustion method.	07
	(c) Discuss the control measurements of oxides of nitrogen, oxides of carbon and hydrocarbons by three ways catalytic convertor method.	06
10	(a) Stating the principle and the appropriate instrumentation discuss any one application of conductometer.	07
	(b) Enumerate the synthesis of nanomaterials by sol-gel method.	
	(c) Explain on e-waste management and their methods of processing.	07 06

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