

Model Question Paper
ENGINEERING CHEMISTRY
(14CHE12/14CHE22)

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing one full question from each module.

MODULE 1

1)	a.	Derive Nernst equation for electrode potential.	(5 Marks)
	b.	Discuss the construction and working of Ag/AgCl electrode.	(5 Marks)
	c.	Explain the following characteristics of battery: i) cell potential ii) energy efficiency & iii) capacity.	(6 Marks)
	d.	Discuss the construction and working of nickel-metal hydride battery.	(4 Marks)

OR

2)	a.	Discuss the construction and working of glass electrode and explain the determination of pH of a solution using glass electrode.	(6 Marks)
	b.	What is electrolyte concentration cell? The cell potential of concentration cell of copper was measured 0.0592V. One of the concentrations of the CuSO ₄ solutions was 0.001M. Calculate the concentration of other CuSO ₄ solution.	(4 Marks)
	c.	What is fuel cell? Write the difference between conventional cell and fuel cell and mention the advantages of fuel cell.	(5Marks)
	d.	Discuss the construction and working of methanol-oxygen fuel cell.	(5 Marks)

MODULE 2

3)	a.	Explain the electrochemical theory of corrosion taking iron as corroding metal.	(4 Marks)
	b.	Explain the following factors affecting the rate of corrosion:	(6 Marks)

		i) ratio of anodic to cathodic areas ii) nature of corrosion product and iii) pH of medium.	
	c.	Discuss polarization and over voltage which govern the electroplating.	(6 Marks)
	d.	Explain current density and pH of the electrolytic bath which influence the nature of electro deposit.	(4 Marks)
OR			
4)	a.	Explain the differential metal and stress corrosions.	(4 Marks)
	b.	Discuss anodizing of aluminium and sacrificial anodic methods of corrosion control.	(6 Marks)
	c.	Discuss the electroplating of gold using acidic cyanide bath.	(5Marks)
	d.	Explain the process of manufacture of double sided PCB with copper.	(5 Marks)
MODULE 3			
5)	a.	Explain the determination of calorific value of a liquid fuel using bomb calorimeter.	(6 Marks)
	b.	Explain the fluidized catalytic cracking of heavy oil.	(4 Marks)
	c.	Discuss the construction and working of PV cells.	(5Marks)
	d.	Discuss the physical and chemical properties of silicon, relevant to photovoltaics.	(5 Marks)
OR			
6)	a.	What is reformation of petrol? Write the reactions involved in it.	(5Marks)
	b.	0.85g of coal sample (carbon 90%, H ₂ 5% and ash 5%) was subjected to combustion in a bomb calorimeter. Mass of water taken in the calorimeter was 2500cm ³ and the water equivalent of the calorimeter was 650cm ³ . The rise in temperature was found to be 3.2°C. Calculate the gross and net calorific values of the sample. Latent heat of steam = 2.457 KJg ⁻¹ and specific heat of water = 4.187 KJ Kg ⁻¹ K ⁻¹ .	(5Marks)

	c.	Discuss the production of solar grade silicon by union carbide process.	(5Marks)
	d.	Explain n-doping of silicon by diffusion technique.	(5Marks)
MODULE 4			
7)	a.	Explain the free radical mechanism of polymerization taking vinyl chloride as a monomer.	(5Marks)
	b.	What is glass transition temperature of a polymer? Explain the following factors influencing the Tg: i) inter molecular forces ii) molecular mass and iii) stereo regularity.	(5Marks)
	c.	Write the synthesis of polyurethane and polycarbonate.	(4 Marks)
	d.	Write the synthesis and properties of silicone rubber.	(6 Marks)
OR			
8)	a.	A polymer sample contains 100, 200, 300 and 400 molecules having molecular mass 1000, 2000, 3000 and 4000 respectively. Calculate the number average and weight average molecular masses of the polymer.	(4 Marks)
	b.	Explain the following structure property relationships of polymer: i) crystallinity ii) plastic deformation and iii) chemical resistivity.	(6 Marks)
	c.	What are polymer composites? Explain the preparation of carbon fibre.	(5 Marks)
	d.	What is conducting polymer? Explain the mechanism of conduction in polyaniline.	(5 Marks)
MODULE 5			
9)	a.	What is boiler feed water? Explain the scale and sludge formation in boiler.	(5 Marks)
	b.	Explain the determination of dissolved oxygen content in water by Winkler's method.	(5 Marks)
	c.	What is nano material? Explain the synthesis of nano material by solgel and precipitation methods.	(5 Marks)

	d.	Write a note on fullerenes.	(5 Marks)
OR			
10)	a.	Explain the primary and activated sludge methods of sewage treatment.	(5 Marks)
	b.	Discuss the softening of water by ion exchange process.	(5 Marks)
	c.	Explain the synthesis of nano material by chemical vapour condensation and hydrothermal methods.	(5 Marks)
	d.	Write a note on carbon nanotubes.	(5 Marks)