Reg.No.:												

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 40004

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – FEB. 2025
First Semester
Electrical and Electronics Engineering
U23CH101 – ENGINEERING CHEMISTRY
(Common to ECE, BME, AE & CE)
(Regulation 2023)

Time : Three Hours Maximum : 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Recall the reasons for boiler corrosion.	2	K1	CO1
2.	What is calgon conditioning?	2	K1	CO1
3.	Write the chemical reaction involving monomers for the following polymers: Nylon 6, Nylon 66, Poly Ethylene Terephthalate and Teflon, respectively.	2	K2	CO2
4.	Define the terms: functionality and degree of polymerization.	2	K3	CO2
5.	Between a nanocube of side 'r' and a nanosphere of radius 'r' determine mathematically which one is best suitable for heterogenous catalysis.	2	K3	CO3
6.	Raman prepared 50 mg gold nanoparticles and Krishnan was working with 50 mg bulk gold. On measuring their melting points Raman observed P °C and Krishnan got Q °C. Comment whether P and Q will be same or different and explain the reasoning behind your comment.	2	K3	CO3
7.	Write the overall chemical reactions after mentioning the half-cell reactions of a lead-acid battery and state why is sulphuric acid is preferred for this kind of battery?	2	K2	CO4

8.	Write the half-cell reactions of a H_2-O_2 fuel cell .	2	K2	CO4
9.	Between an iron cube and a solid sphere made of iron with its radius equal to the side of the cube, explain which one has a higher probability of getting corroded when exposed to similar hostile condition for similar time and why?	2	K3	CO5
10.	The famous Delhi iron pillar is right in the open exposed to sun and rain for almost 1500 years and yet it has not corroded. State any two reasons for this corrosion resistance.	2	K3	CO5

PART – B

(5 x 16 = 80 Marks)

Q.No.		Questions	Marks	KL	CO
11. a)	i.	Explain briefly the different types of problems that arise due to impurities in water that are fed to boilers.	10	K2	CO1
	ii.	Outline the chemical reactions that take place during softening process in a zeolite softener.	6	K2	
		(OR)			
b)	i.	What are the basic principles and advantages of water purification by reverse osmosis? a. What is meant by sterilization of water? Name any three substances used for sterilization of water.	10	K1	CO1
	ii.	Explain the softening of hard water by ion exchange process along with a neat diagram and appropriate chemical equations.	6	K2	
12. a)	i.	Considering hydrogen peroxide as an initiator and ethylene as a monomer, explain the mechanism of free radical addition polymerization.	10	K1	CO2
	ii.	Explain glass transition temperature (Tg) and detail the factors that affect the Tg value of a polymer.	6	K2	
		(OR)			
b)	i.	Compare addition and condensation polymerizations where over and above the points that you would mention, include a graph to depict the molecular weight distribution resulting from the above two processes (molecular weight in X-axis and number of polymer chains in Y-axis).	8	K2	CO2
	ii.	How are polymers classified and explain what is tacticity of a polymer?	8	K1	

13.	a)	Explain in detail the sol-gel, laser ablation and chemical vapor deposition methods of synthesizing nanoparticles with appropriate examples.	16	K2	CO3
		(OR)			
	b)	Explain in detail any four applications of nano materials in medical and electronic devices (two from each, respectively)	16	K2	CO3
14.	a)	Outline how nuclear fission and fusion are sources of energy and explain the working mechanism of a nuclear power plant based on breeder reactor.	16	K2	CO4
		(OR)			
	b)	Explain how energy is generated from solar cell and wind power plants thereby explaining the types, components and working mechanism of wind power plants. What are the differences between a ceiling fan and a fan used in a windmill?	16	K3	CO4
15.	a)	Explain the different types of corrosion in detail and the factors influencing the rate of corrosion.	16	K2	CO5
		(OR)			
	b)	Explain the different methods like impressed current cathodic protection, anodic protection and protective coating for preventing corrosion.	16	K2	CO5