Code No.: 11326 N/O

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

Accredited by NAAC with A++ Grade

B.E. I-Semester Main & Backlog Examinations, Jan./Feb.-2024

Engineering Chemistry

(Common for EEE & ECE)

Time: 3 hours

Max. Marks: 60

Note: Answer all questions from Part-A and any FIVE from Part-B

Part-A $(10 \times 2 = 20 \text{ Marks})$

Q. No.	Stem of the question	M	L	CO	PO
1.	0.05N solution of sodium chloride shows a resistance of 150ohms in a conductivity cell at 25°C temperature. Calculate its equivalent and molar conductance of the solution. If cell constant of the cell is 0.99cm ⁻¹	2	3	1	1,2
2.	Can we store Nickle sulphate solution in zinc container? Reason (E^0 of Zn and Ni are $-0.76V$ and $-0.22V$ respectively)	2	3	1	1,2
3.	100grms of a battery produces 22amp of current under the potential of 1.5V for about 45 minutes. Calculate its Power density and Energy density.	2	3	2	1,2
4.	Write the discharging reactions of Li-V ₂ O ₅ .	2	2	2	1,7,12
5.	Define co-polymer and mention any one example.	2	2	3	1,7,12
6.	What are conducting polymers and mention the requirement to exhibit the conductance and classify them.	2	2	3	1,7
7.	Gold is inert in bulk form whereas it shows good catalytic activity in Nano state-Reason.	2	3	4	1,12
8.	List out the applications of liquid crystals.	2	1	4	1
9.	Optical microscope is not useful to characterize the nanomaterials- Substantiate.	2	3	5	1,2
10.	State Beer Lamberts law.	2	1	5	1
	Part-B $(5 \times 8 = 40 \text{ Marks})$				
11. a)	Explain the principle involved in a titration between CH ₃ COOH vs NaOH and Mix of HCl and CH ₃ COOH vs NaOH with a neat labeled graph.	5	2	1	1,2
b)	Construct a Galvanic cell using Ag and Copper electrodes by placing in their own solutions of 0.1N and 0.02N respectively. Calculate its emf at 25°C, given that the E° of Ag+ /Ag and Cu/Cu²+ are +0.80V and -0.33V respectively.	3	3	1	1,2

12. a)	Illustrate the construction and electrochemistry of Lead acid battery. Write the effects of overcharging of the battery.	4	2	2	1,2,7
b)	List the characteristics required for the selection of a good battery. Discuss any three characteristics for a good battery.	4	3	2	1,2,7
13. a)	Explain the method to manufacture the composite materials by Resin transfer method (RTM) with a labeled diagram.	4	1	3	1,7
b)	Polymer is not having fixed molecular mass whereas simple molecules have fixed mass-Reason. A polymer sample contains the following composition:	4	3	3	1,2
	15 molecules have the molecular mass each is 7500				
	25 molecules have molecular mass each is 12500				
	30 molecules have molecular mass each is 17500				
	30 molecules have molecular mass each is 22000				
	Calculate the number average and weight average molecular mass.	nd 1M gr			
14. a)	Define CNTs and discuss the synthesis of carbon nano tubes by Laser ablation method.	4	1	4	1
b)	What are liquid crystals and list the conditions required to exhibit liquid crystalline behavior by molecules and classify them.	4	2	4	1
15. a)	Suggest and discuss a method to determine the concentration of metal ion present in a given solution by absorption spectroscopy with a neat labeled block diagram.	4	3	5	1
b)	Write the decomposition reactions of Calcium oxalate as a function of temperature and discuss the working principle of thermogravimetry.	4	2	5	1,2
16. a)	Discuss the construction and chemistry of calomel electrode and prove that its potential depends upon the concentration of KCl solution.	4	3	1	1
b)	Describe the chemistry of Zn-Carbon battery with a net labeled figure. Why this battery can't be rechargeable? Reason.	4	3	2	1,7
17.	Answer any <i>two</i> of the following:				
a)	Differentiate thermosofts and themosets and give one example for each.	4	1	3	1,7
b)	Illustrate the synthesis of nanomaterials by ball milling method.	4	2	4	1
		4	2	5	1
c)	Explain the working principle of Atomic force microscope (AFM) with a labeled block diagram and list any two differences between SEM and AFM.	4		5	1

M: Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	40%
iii)	Blooms Taxonomy Level – 3 & 4	40%
