VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
Accredited by NAAC with A++ Grade
B.E. II-Semester Main & Backlog Examinations, September-2022
Applied Chemistry
(Civil Engg.)

Time: **3 hours**　　　　　　　　　　　　　　　　　　　　　　　　Max. Marks: **60**

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

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Resistance of a 0.1N solution of $MgCl_2$ was found to be 46ohms. Compute the molar conductance of the solution at room temperature.	2	3	1	1,2,12
2.	What makes to develop the electrode potential of an ion selective electrode and mention any one example for ion selective electrode?	2	2	1	1,12
3.	Define energy density of a battery and calculate energy density when 65grams of battery produces a current of 2amp for about 3hours under the potential difference of 3.1V in Whatt/Kg.	2	3	2	1,2
4.	Pure lithium is used as anode in lithium primary battery whereas lithiated compounds used as anode in lithium secondary batteries-Reason	2	3	2	1,2,7,12
5.	Define glass transition temperature of a polymer and mention the factors affecting on it.	2	2	2	1,12
6.	Write the requirements for bio degradation of a polymer.	2	1	2	1,7,12
7.	How the catalytic converters reduce the toxicity of automobile exhausts.	2	2	3	1,2,7,12
8.	Calculate the amount of Oxygen required for the complete combustion of 1kg coal having the composition, 80% of C, 16 % of H, 2% of Nitrogen and rest is Ash.	2	3	4	1,2,7,12
9.	Write any four differences between scales and sludges.	2	1	5	1,12
10.	State the Gibbs phase rule and calculate the number of degrees of freedom for the following reaction $$H_2O\ (s) <=> H_2O\ (l)$$	2	3	5	1,2,12

Part-B (5 × 8 = 40 Marks)

11. a)	Describe the construction of metal and metal insoluble salt electrode and show that its potential depends on concentration of anion of insoluble salt.	4	2	1	1,12
b)	A galvanic cell is constructed with Cd and Mg electrodes by placing in their solutions of 0.01N and 0.05N respectively. Write the cell notation of constructed cell and calculate the cell emf at 25°C, given that E° of Cd^{2+} / Cd and Mg/ Mg^{2+} is -0.40V and 2.14V respectively.	4	3	1	1,2,12

		M	L	CO	PO
12. a)	Illustrate the construction, discharging and charging reactions of Lead acid battery with neat diagram.	4	2	2	1,7,12
b)	Write the discharging reactions involved in i) $Zn-Ag_2O$ ii) Li-ion battery	4	1	2	1,12
13. a)	Differentiate between thermosets and thermosofts and mention two examples for each. Why Bakelite can't be recycled.	4	3	3	1,7, 12
b)	Why the natural rubber is subjected to vulcanization and discuss the chemistry of it.	4	2	3	1,12
14. a)	List the methods to raise the quality and quantity of gasoline and discuss Fixed bed method with neat, labelled diagram.	4	3	4	1,2,7,12
b)	Differentiate between Gross and Net calorific value and Calculate Net calorific value of a sample of coal having the composition by weight are C= 86%, H= 7%, S=4%, N= 1% and rest is Oxygen.	4	3	4	1,2
15. a)	Name the compounds causes alkalinity of water and which combination can't exist together and why? A sample of water consumes 15ml of N/50 acid for colour change with phenolphthalein indicator and 3more ml of same acid is consumed for colour change with methyl orange indicator. Calculate the alkalinity contributed by the compounds in ppm.	4	3	5	1,2
b)	Explain the phase diagram of water system with neat, labelled diagram.	4	1	5	1,12
16. a)	Discuss the working principle and how the conductance changes as titration proceeds between following acid and base with neat, labelled graph i) HCl vs NaOH and CH_3COOH vs NaOH.	4	1	1	1
b)	Write the working principle of fuel cells and discuss the construction and chemistry involved in CH_3OH-O_2 fuel cell.	4	2	2	1,7,12
17.	Answer any *two* of the following:				
a)	Explain the mechanism of conduction of doped poly acetylene.	4	2	3	1,12
b)	Write the need and discuss the trans esterification of bio diesel.	4	3	4	1,7,12
c)	Discuss the break point chlorination of water with neat labelled graph and write its significance.	4	2	5	1,2

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

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	37.5%
iii)	Blooms Taxonomy Level – 3 & 4	42.5%

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