Code No. : 11116 S AO

## VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
*Accredited by NAAC with A++ Grade*
### B.E. I-Semester Supplementary Examinations, August-2023
### Applied Chemistry
(Common to Civil & Mech.)

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. | The resistance of a 0.1 molar KCl, solution is observed as 150 ohms. Calculate its specific conductance and equivalent conductance. Cell constant = 0.5 cm$^{-1}$ | 2 | 2 | 1 | 1,2,12 |
| 2. | Define Transport Number. | 2 | 3 | 1 | 1,2,12 |
| 3. | Write the electrode reactions of Li-V2O5 cell | 2 | 2 | 2 | 1,2,7,12 |
| 4. | Define battery and classify them. | 2 | 1 | 2 | 1,2,7,12 |
| 5. | Why PVC is not biodegradable-Reason and list any two biodegrade polymers. | 2 | 3 | 3 | 1,2,7,12 |
| 6. | Define co-polymer and mention one example | 2 | 2 | 3 | 1,2,7,12 |
| 7. | List the precautions during storage of high energy materials. | 2 | 3 | 4 | 1,2,7,12 |
| 8. | What is power alcohol list any two advantages of it. | 2 | 2 | 4 | 1,2,7,12 |
| 9. | Calculate the degree of freedom for the decomposition of CaCO3 in a closed vessel. | 2 | 2 | 5 | 1,2,7,12 |
| 10. | Differentiate between scale and sludge. | 2 | 2 | 5 | 1,2,7,12 |

### Part-B (5 × 8 = 40 Marks)

| | | | | | |
|---|---|---|---|---|---|
| 11. a) | Discuss the determination of P$^H$ of a given solution using Quinhydrone and saturated Calomel Electrodes. | 4 | 3 | 1 | 1,2,12 |
| b) | Sketch and label conductometry mixture of acids titration with strong base model graph and explain how do you determine the strength of acids in the given mixture. | 4 | 2 | 1 | 1,2,12 |
| 12. a) | Compute the power density and energy density of a battery weighing 20 g which produces 5 amperes current for 4 hours under a potential gradient of 2 V. | 4 | 3 | 2 | 1,2,7,12 |
| b) | List the materials used in the construction of a lead acid battery and write the chemistry involved in charging and discharging process. | 4 | 1 | 2 | 1,2,7,12 |

| | | | M | L | CO | PO |
|---|---|---|---|---|---|---|
| 13. | a) | Discuss the preparation, properties, and applications of Kevlar. | 4 | 1 | 3 | 1,2,7,12 |
| | b) | Suggest a method to improve the properties of natural rubber and write the chemistry involved in it. | 4 | 3 | 3 | 1,2,7,12 |
| 14. | a) | Calculate the HCV and LCV of the a coal sample, which has the following composition C=85.0 %,H=5.0%,N=2.0%,S=1%,ash=5.0% and rest is oxygen. | 4 | 3 | 4 | 1,2,7,12 |
| | b) | Define octane, cetane number and write the principle involved in the Rocket propulsion? | 4 | 1 | 4 | 1,2,7,12 |
| 15. | a) | Sketch and label one component systems phase diagram and calculate the degrees of freedom at triple point, areas, and curves of the system. | 4 | 2 | 5 | 1,2,7,12 |
| | b) | 100 ml of water sample required 15 ml of 0.01M EDTA before boiling and 100ml of same water after boiling required 10ml of same EDTA solution. Calculate the total, temporary and permanent hardness of water sample | 4 | 3 | 5 | 1,2,7,12 |
| 16. | a) | A Galvanic cell constructed using Zn and Mg electrodes at 298K, the concentrations of $Zn^{2+}$ and $Mg^{+2}$ electrolytic solution are 0.01M and 0.01 M respectively. Write the possible cell notation, reaction and calculate emf of the cell. (The electrode potential of $Mg^{+2}/Mg$ is -2.40 V and $Zn^{2+}/Zn$ is - 0.77V) | 4 | 3 | 1 | 1,2,12 |
| | b) | Discuss the construction and chemistry of phosphoric acid fuel cell. And list its merits and demerits. | 4 | 2 | 2 | 1,2,7,12 |
| 17. | | Answer any *two* of the following: | | | | |
| | a) | Classify conducting polymers and discuss the mechanism of conduction of undoped poly acetylene. | 4 | 1 | 3 | 1,2,7,12 |
| | b) | Discuss the advantages and the chemistry of transesterification of biodiesel. | 4 | 2 | 4 | 1,2,7,12 |
| | c) | Suggest one method for water softening and discuss the principle involved in it. | 4 | 2 | 5 | 1,2,7,12 |

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% |

*****