

NOTE: i) All the questions are compulsory.

ii) Figures to right indicate full marks.

iii) Use of non-programmable calculator / log table is allowed.

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Q.1. Attempt any four:

- What is number of components? Explain it with suitable examples.
- What are ideal and non-ideal solutions? What are the conditions for the solution to be ideal?
- Discuss the variation of mutual solubility for Water + Phenol system.
- The vapour pressure of pure benzene and toluene at 320 K is $3.2 \times 10^4 \text{ Nm}^{-2}$ and $1.02 \times 10^4 \text{ Nm}^{-2}$ respectively. Calculate the vapour pressure of solution containing one mole of benzene and 2.5 mole of toluene if solution obeys Raoult's law.
- State the Gibb's phase rule and explain meaning of terms involved.
- Explain principle and instrumentation of steam distillation.
- State and explain Nernst distribution law and give its limitations.
- Explain positive and negative deviation from Raoult's law.

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Q.2. Attempt any four:

- State Nernst equation & explain the terms involved in it.
 - What is salt-bridge? Give its two functions.
- Write down the total cell reaction for the following cells.
 - $\text{Ag}_{(s)} | \text{Ag}^+ || \text{Fe}^{2+} | \text{Fe}_{(s)}$
 - $\text{Pt}, \text{H}_{2(g)} | \text{HCl} | \text{Cl}_{2(g)}, \text{Pt}$
 - $\text{Zn}_{(s)} | \text{Zn}^{2+} || \text{Cu}^{2+} | \text{Cu}_{(s)}$
 - $\text{Pb}_{(s)} | \text{Pb}^{2+} || \text{Ag}^+ | \text{Ag}_{(s)}$
 - $\text{Al}_{(s)} | \text{Al}^{3+} || \text{Fe}^{2+} | \text{Fe}$
- Explain the classification of electrodes with example.
- Describe the construction & working of Daniel cell with a suitable example.
- Explain Henderson's equation for acidic buffer solution.
- Derive the relationship between pH & pOH.
 - What is buffer solution? Give its types.
- Define the following terms
 - Buffer action
 - Electrolysis
 - Electrolytic cell
 - pH
 - pOH
- Calculate E°_{cell} and E_{cell} of the following cell

$$\text{Fe}_{(s)} | \text{Fe}^{2+} (0.1) || \text{Cd}^{2+} (0.05) | \text{Cd}_{(s)}$$

Given that $E^\circ_{\text{Fe}/\text{Fe}^{2+}} = -0.441 \text{ V}$ & $E^\circ_{\text{Cd}/\text{Cd}^{2+}} = -0.403 \text{ V}$.

VCD

CHEMISTRY P-I S.Y.B.Sc SEM-IV MARKS 75 TIME 2.5HRS

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Q.3. Attempt any four:

- A) Explain the Ostwald's theory of Acid-base indicator.
- B) Explain the principle of photometric titration. Give its advantages & limitations.
- C) Explain the conductometric titration of strong acid against strong base.
- D) Explain the principle of potentiometric titration and give its advantages & limitations.
- E) a) Define titrant and titrand.
b) What are the requirements fulfill the criteria of titrimetric analysis?
- F) Explain the classification of titrimetric analysis.
- G) Discuss advantages & limitations of conductometric titration.
- H) Explain the terms
a) Titration b) Equivalence point c) End point
d) Titration error e) Indicator

Q.4. Attempt any three:

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- A) State and explain Raoult's law.
- B) Solve the problems.
 - a) Liquid A (Mol. Wt. - 46) and liquid B (Mol. Wt. 18) form an ideal solution. At 20°C, the vapour pressure of pure liquid A and pure liquid B are $5.865 \times 10^4 \text{ Nm}^{-2}$ and $2.333 \times 10^3 \text{ Nm}^{-2}$ respectively. Calculate the vapour pressure of the solution of A in B containing 0.2 mole fraction of A.
 - b) A solution of two liquids A and B exhibits ideal behavior. The mole fraction of A is 0.4. The vapour pressure of pure component A is 0.5 bar and that of B is 0.3 bar. Calculate the partial vapour pressure of A and B in solution.
- C) Explain the curves in photometric titration.
- D) Explain the conductometric titration of mixture of strong and weak acids against weak base.
- E) Write a note on Standard Hydrogen electrode
- F) Distinguish between
 - a) Reversible and irreversible cell
 - b) Primary cell and secondary cell
