VCD 050315 CHEMISTRY P-I S.Y.B.Sc SEM-IV MARKS 75 TIME 2.5HRS

**NOTE: i) All the questions are compulsory.**

**ii) Figures to right indicate full marks.**

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

**Q.1. Attempt any four:** **[20]**

A) State the Gibb's phase rule and explain meaning of terms involved.

B) What are ideal and non-ideal solutions? What are the conditions for the solution to be ideal?

C) Discuss the variation of mutual solubility for Water + Phenol system.

D) The vapour pressure of pure benzene and toluene at 320 K is $3.2 \times 10^4$ $Nm^{-2}$ and $1.02 \times 10^4 Nm^{-2}$ respectively. Calculate the vapour pressure of solution containing one mole of benzene and 2.5 mole of toluene if solution obeys Raoult's law.

E) Explain principle and instrumentation of steam distillation.

F) State and explain Nernst distribution law and give its limitations.

G) State and explain Raoult's law.

H) What is number of components? Explain it with suitable examples.

**Q.2. Attempt any four:** **[20]**

A) Describe the construction & working of Daniel cell with a suitable example.

B) Calculate $E^\circ_{cell}$ and $E_{cell}$ of the following cell

$Fe_{(s)} \mid Fe^{2+} \parallel Cd^{2+} \mid Cd_{(s)}$

(0.1) (0.05)

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

C) Explain the classification of electrodes with example.

D) Explain Henderson's equation for acidic buffer solution.

E) a) Derive the relationship between pH & pOH.

b) What is buffer solution? Give its types.

F) Distinguish between

a) Reversible and irreversible cell b) Primary cell and secondary cell

G) Define the following terms

a) Buffer action b) Electrolysis c) Electrolytic cell

d) pH e) pOH

H) Write down the total cell reaction for the following cells.

a) $Ag_{(s)} \mid Ag^+ \parallel Fe^{2+} \mid Fe_{(s)}$

b) $Pt, H_{2(g)} \mid HCl \mid Cl_{2(g)}, Pt$

c) $Zn_{(s)} \mid Zn^{2+} \parallel Cu^{2+} \mid Cu_{(s)}$

d) $Pb_{(s)} \mid Pb^{2+} \parallel Ag^+ \mid Ag_{(s)}$

e) $Al_{(s)} \mid Al^{3+} \parallel Fe^{2+} \mid Fe$

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**Q.3. Attempt any four:** **[20]**

A) Explain the terms
   a) Titration b) Equivalence point c) End point
   d) Titration error e) Indicator

B) Explain the Ostwald's theory of Acid-base indicator.

C) Explain the principle of photometric titration. Give its advantages & limitations.

D) Explain the conductometric titration of strong acid against strong base.

E) Explain the principle of potentiometric titration and give its advantages & limitations.

F) a) Define titrant and titrand.
   b) What are the requirements fulfill the criteria of titrimetic analysis?

G) Explain the curves in photometric titration.

H) Explain the classification of titrimetric analysis.

**Q.4. Attempt any three:** **[15]**

A) Explain positive and negative deviation from Raoult's law.

B) Discuss advantages & limitations of conductometric titration.

C) Explain the conductometric titration of mixture of strong and weak acids against weak base.

D) Solve the problems.
   a) Liquid A (Mol. Wt. - 46) and liquid B (Mol. Wt. 18) form an ideal solution. at $20^{\circ}$ C, the vapour pressure of pure liquid A and pure liquid B are $5.865 \times 10^{4}$ $Nm^{-2}$ and $2.333 \times 10^{3}$ $Nm^{-2}$ 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.

E) Write a note on Standard Hydrogen electrode

F) a) State Nernst equation & explain the terms involved in it.
   b) What is salt-bridge? Give its two functions.