DCK-003-1016008   Seat No. _____

B. Sc. (Sem. VI) (CBCS) Examination

July - 2022

Chemistry : C - 603

(Physical & Analytical Chemistry) (Old Course)

Faculty Code : 003

Subject Code : 1016008

Time : $2\frac{1}{2}$ Hours]   [Total Marks : **70**

Instructions : (1) All questions are compulsory.

(2) Figures on right hand side indicate marks.

1 (a) Answer the following questions :   4

    (1) The term "Ionic strength" is introduced by

        _____.

    (2) Define perfect crystal.

    (3) The third law of thermodynamics can not apply

        to _____ substances.

        (Perfect crystalline, Amorphous)

    (4) What is relation between activity and concentration

        for very dilute solution ?

  (b) Answer any one from the following questions :   2

    (1) Define : Activity and Activity coefficient.

    (2) Give statement and mathematical form of Nernst

        heat theorem.

  (c) Answer any one from the following questions :   3

    (1) Write any two statements of third law of thermodynamics.

    (2) Explain ionic strength.

(d) Answer any one from the following questions : **5**

(1) Discuss EMF method for determination of activity coefficient.

(2) Discuss the determination of absolute entropy of solid, liquid and gas with related equation.

2 (a) Answer the following questions : **4**

(1) In concentration cell _____ energy is converted into _____ energy.

(2) $Pt \left| \begin{matrix} H_2(g) \\ P_1 \end{matrix} \right| \begin{matrix} H^+(aq) \\ a \end{matrix} \left| \right| \begin{matrix} H_2(g) \\ P_2 \end{matrix} \right| Pt$ is _____ type of cell.

(3) What is the value of ionic product of water at 25°C temperature ?

(4) If transference number of positive ion (t_+) is 0.74, what is that of the negative ion ?

(b) Answer any one from the following questions : **2**

(1) What is the value of ΔE°_{cell} for concentration cell ? Why ?

(2) What is LJP ? How it can be eliminated ?

(c) Answer any one from the following questions : **3**

(1) Derive the equation of E.M.F. for amalgam electrode concentration cell.

(2) Explain determination of valency for metal ion by emf measurement.

(d) Answer any **one** from the following questions : **5**

(1) Derive equation of E.M.F. for concentration cell without transference.

(2) Explain determination of solubility product and solubility by emf measurement.

3 (a) Answer the following questions :   4

(1) Who introduced the concept of partial molar property ?

(2) In physical chemistry the partial molar free energy is termed as chemical potential. (True or False)

(3) Occurrence of side reaction is _____ type of error.

(4) How many significant figures in number 5.003 and 8.80×10^5 ?

(b) Answer any one from the following questions :   2

(1) Explain effect of temperature on chemical potential.

(2) Round off the following to two and three significant figures :

(a) 15.99   (b) 1.00727

(c) Answer any one from the following questions :   3

(1) Derive Henry's law using partial molar property.

(2) Write short note on Q-test.

(d) Answer any one from the following questions :   5

(1) Define chemical potential. Derive Gibbs Duhem equation in reference of chemical potential.

(2) What is error ? Describe any three methods for minimization of error.

4 (a) Answer the following questions :   4

(1) By which chromatography lanthanide ions can be separated ?

(2) Alumina is strong adsorbent. (True or False)

(3) Which paper chromatography is fast ?

(4) Best TLC plate is prepared by _____ method.

(b) Answer any one from the following questions : 2
(1) Give factors affects the R_f-values.
(2) Write uses of column chromatography.

(c) Answer any one from the following questions : 3
(1) Explain advantages of TLC over other chromatography.
(2) Explain characteristic selection of adsorbent in column chromatography.

(d) Answer any one from the following questions : 5
(1) Explain GLC technique in detail and give uses of GLC.
(2) Explain different types of paper chromatography.

5 (a) Answer the following questions : 4
(1) pH scale is arranged between _____ to _____.
(2) Concept of pH was first introduced by _____ .
(3) Define sparingly soluble salt.
(4) Which substance is used to remove S^{-2} ion from the mixtures $S^{-2}, SO_3^{-2}, SO_4^{-2}$?

(b) Answer any one from the following questions : 2
(1) Explain principle of potentiometry method.
(2) Explain common ion effect.

(c) Answer any one from the following questions : 3
(1) Explain separation of Cl^-, Br^- and I^- by qualitative analysis.
(2) Derive Handerson equation to determine dissociation constant of weak acid by pH metry.

(d) Answer any **one** from the following questions : 5
(1) Discuss Argentometeric titration by potentiometry.
(2) Explain $Fe \rightarrow Ce(SO_4)_2$ Redox titration by potentiometry.

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