* P B - 0 0 3 - 1 0 1 6 0 0 8 *

PB-003-1016008

Seat No. _____

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

March / April - 2020

Chemistry : C - 603

(Physical Chemistry & Analytical Chemistry)

Faculty Code : 003

Subject Code : 1016008

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

Instructions : (1) This question paper contains five questions.
(2) All questions are compulsory.
(3) Figures to the right indicate full marks.

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

(1) Define Activity Co-efficient.

(2) State Nernst Theorem.

(3) Define Perfect Crystal.

(4) Write the mathematical form of Debye Huckel Limiting Law.

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

(1) Calculate ionic strength of 0.001M $AlCl_3$ solution.

(2) Write the applications of 3rd law of thermodynamics.

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

(1) State any two statements of 3^{rd} law of thermodynamics.

(2) Short note on ionic strength.

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

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

(2) Derive $S_T = Cp/3$.

2 (a) Answer the following questions : 4

(1) Write the oxidation and reduction reaction of hydrogen electrode.

(2) The cell is Pt, H_2 (Pl)/ H^+ ion solution/ H_2 (P2), Pt. Name the type of concentration cell.

(3) Define Liquid Junction Potential.

(4) If concentration of cell is 3.3×10^{-6}, what is pH value ?

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

(1) The valency of mercuric ion is 2. Explain using EMF measurement.

(2) Explain electrolyte concentration cell using an example.

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

(1) Explain determination of dissociation constant of weak acid using EMF measurement.

(2) Determine pH of the cell: Pt, $H_{2(g)}$ / H^{+1} sol. // Sat. KCl, Hg_2Cl_2, Hg. EMF of calomel electrode is 0.242v and the EMF of the cell is 0.642v.

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

(1) Explain determination of degree of hydrolysis using emf measurement.

(2) Derive E = RT/F In a_2/a_1.

3 (a) Answer the following questions : 4

(1) Give examples of extensive properties.

(2) Write the equation of Raoult's law and Nernst distribution law.

(3) Define Accuracy.

(4) Give the only formula of standard deviation.

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

(1) Explain Partial Molar Property.

(2) Write note on student T-test.

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

(1) Derive Henry's law using chemical potential.

(2) Write short note on significant figure.

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

(1) Derive Gibbs Duhem equation.

(2) Explain methods of minimization of errors.

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

(1) Alumina is Strong adsorbent, True or False ?

(2) Define Rf value.

(3) Which method is best for the preparation of TLC plate ?

(4) Define Adsorption chromatography.

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

(1) Write uses of column chromatography.

(2) Give any four advantages of TLC.

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

(1) Explain separation of α, β, γ carotene from carrot by chromatography.

(2) What is ion exchange chromatography? Write note on Cation exchange chromatography.

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

(1) Write note on Gas chromatography.

(2) Write note on Thin layer chromatography.

5 (a) Answer the following : **4**

(1) Give chemical formula of Magnesia mixture.

(2) Define soluble salt.

(3) Draw only potentiometric titration curve of monobasic acid and strong base.

(4) What is pH metric titration.

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

(1) Discuss any one method for the separation of Cl^-, Br^- and I^-

(2) Explain the principle of potentiometric titration.

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

(1) Explain separation of Cu^{+2} and Cd^{+2}.

(2) Discuss Argentometric titration by potentiometric titration.

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

(1) Explain separation of CO_3^{-2}, SO_3^{-2} and S^{-2}.

(2) What is Redox titration? Discuss redox titration of $FeSO_4 \rightarrow CeSO_4$ by potentiometric titration.
