* D C K - 0 0 3 - 2 0 1 6 0 0 8 *

DCK-003-2016008 Seat No. _____

B. Sc. (Sem. VI) (CBCS) (W.E.F.-2019) Examination

July – 2022

C-603 : Physical Chemistry & Analytical Chemistry

Faculty Code : 003
Subject Code : 2016008

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

Instructions :

(1) There are five question.

(2) In each question sub-question (a) of 4 marks, all are compulsory.

(3) While sub-question (b) (c) (d) each with internal option.

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

(1) What is electrolyte ?

(2) Gibbs-Helmholtz equation is _____.

(3) For 0.01 m NaCl, ionic strength (μ) = _____.

(4) "Entropy become zero at absolute 0° temperature for perfect crystalline solid substance" is the statement of _____.

(b) Answer any **one** in brief : **2**

(1) Calculate ionic strength (μ) of 0.002 m $Cu(NO_3)_2$.

(2) Explain : Nernst heat theorem.

(c) Answer any **one** in detail : **3**

(1) Write note on residual entropy.

(2) Calculate γ_+ for solution of 0.005 m $BaCl_2$ (A = 0.509)

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

(1) Discuss the solubility method for the determination of activity coefficient.

(2) Explain the tests of third law of thermodynamics.

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

(1) Define concentration cell.

(2) Give full form of LJP.

(3) Standard cell potential measure at _____ °C temperature.

(4) In gas-concentration cell there is the difference in _____ of same electrode.

(b) Answer any **one** in brief : **2**

(1) Write note on salt-bridge.

(2) Calculate emf of given cell at 25°C temperature.

$$pt/H_2(g)/HCl/H_2(g)/pt$$
$$640\ mm \qquad 425\ mm$$

(c) Answer any **one** in detail : **3**

(1) Derive the equation of emf for amalgam electrode concentration cell.

(2) Derive the equation of emf for gas-electrode concentration cell.

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

(1) Explain determination of dissociation constant of weak acid by emf measurement.

(2) Describe the emf method to determine the solubility of sparingly soluble salt by using concentration cell.

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

(1) Define partial molar property.

(2) Define precision.

(3) Give statement of Raoult's law.

(4) Define deviation.

(b) Answer any **one** in brief : **2**

(1) Define mean deviation and mistake.

(2) Describe Nernst's law with its equation.

(c) Answer any **one** in detail : **3**

(1) Explain Henry's law of chemical potential.

(2) Explain Q-test with example.

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

(1) Derive the Gibbs-Duhem equation for chemical potential.

(2) Explain methods for minimization of errors.

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

(1) Who have separated the extraction of green leaves by chromatography ?

(2) What is R_f value ?

(3) Define mobile phase.

(4) Full form of GLC.

(b) Answer any **one** in brief : **2**

(1) TLC is superior than paper chromatography, why ?

(2) Give uses of GLC.

(c) Answer any **one** in detail : **3**

(1) Give classification of chromatography.

(2) Explain characteristics selection of adsorbent.

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

(1) Explain ion exchange chromatography.

(2) Write note on paper chromatography.

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

(1) Define pH.

(2) Give the principle of potentiometry method.

(3) Which gas gives blue colour with starch-iodide paper ?

(4) Which electrode used as indicator electrode in pH-metry titration ?

(b) Answer any **one** in brief : **2**

(1) Draw only potentiometric titration curve of oxalic acid $\rightarrow$ NaOH.

(2) KCN in the separation of Cu^{+2} and Cd^{+2}.

(c) Answer any **one** in detail : **3**

(1) Explain separation of the PO_4^{-3}, ASO_3^{-3}, ASO_4^{-3} in presence of each other.

(2) Discuss acid-base titration by pH-metry.

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

(1) Discuss acid-base titration in details by potentiometry.

(2) Discuss various methods of separation of Cl^-, Br^-, I^- ions in presence of each other.
