



Seat No. _____

HB-003-2016008

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

April - 2023

Chemistry : C-603

(Physical Chemistry & Analytical Chemistry)

(New Course)

Faculty Code : 003

Subject Code : 2016008

Time : $2\frac{1}{2}$ / Total Marks : 70

Instructions :

- (1) All questions are compulsory.
- (2) Figures at right side indicate marks.

- 1 (a) Answer the following : 4
- (1) $a = fc$, a is the _____.
 - (2) Define : Activity Co-efficient.
 - (3) Define : Entropy.
 - (4) $\lim_{T \rightarrow 0} \Delta S =$ _____ at absolute zero temperature.
- (b) Answer any one : 2
- (1) Explain Ionic strength.
 - (2) Give the statement of Levis and Rendal.
- (c) Answer any one : 3
- (1) Calculate Ionic strength for 0.1 M KCl solution with complete ionization.
 - (2) Write a note on Nernst heat theorem.
- (d) Answer any one : 5
- (1) Derive method to determine activity co-efficient by solubility method.
 - (2) Discuss the determination of absolute entropies of solid, liquid and gas with related equations.

- 2 (a) Answer the following : 4
- (1) Define : Concentration cell.
 - (2) Give the full name of LJP.
 - (3) The electrolyte concentration cell in which salt bridge has been removed, for that LJP _____.
(Produce/Ignore)
 - (4) Give the equation to determine solubility.
- (b) Answer any one : 2
- (1) Explain advantages of Glass electrode.
 - (2) Give only classification of concentration cell.
- (c) Answer any one : 3
- (1) Derive equation of emf for Gas electrode concentration cell.
 - (2) Calculate cell potential of given cell at 25°C (R = 8.314 JK⁻¹ mol⁻¹)

$$\text{Cu} / \text{Cu}^{+2} / \text{Cu}^{+2} / \text{Cu}$$

$$0.1\text{M} \quad 0.5\text{M}$$
- (d) Answer any one : 5
- (1) Derive the equations for the concentration cell including LJP and with transference.
 - (2) Explain determination of dissociation constant of weak acid by emf measurement.
- 3 (a) Answer the following : 4
- (1) Partial molar properties depend on _____ function.
 - (2) Give the statement of Raoult's law.
 - (3) For 7.146351, a significant figure is _____.
 - (4) Define : Accuracy.
- (b) Answer any one : 2
- (1) Explain partial molar properties in short.
 - (2) Define :
 - (i) Absolute error
 - (ii) Relative error
- (c) Answer any one : 3
- (1) Explain Henry's law.
 - (2) Write a note on Q-Test.
- (d) Answer any one : 5
- (1) Write down method of intercept for partial molar properties.
 - (2) Explain any three method for minimization of errors.

- 4 (a) Answer the following : 4
- (1) Define : Chromatography.
 - (2) Give the full form of TLC.
 - (3) In paper chromatography mobile phase is _____.
 - (4) What is R_f value ?
- (b) Answer any one : 2
- (1) Give the factors affecting on GLC.
 - (2) Give the principle of Gas chromatography.
- (c) Answer any one : 3
- (1) Explain Ascending paper chromatography.
 - (2) Explain separation of carotenes from carrot by using column chromatography.
- (d) Answer any one : 5
- (1) Explain TLC method.
 - (2) Explain Ion exchange chromatography.
- 5 (a) Answer the following : 4
- (1) Define : Solubility.
 - (2) Addition of which chemical gives red precipitates for aqueous solution of a mixture of CO_3^{2-} , SO_3^{2-} , S^{2-} ?
 - (3) Which electrode is used as primary reference electrode ?
 - (4) Why saturated calomel electrode is useful ?
- (b) Answer any one : 2
- (1) Explain common ion effect.
 - (2) Give the principle of potentiometry method.
- (c) Answer any one : 3
- (1) Explain separation of Cl^- , Br^- , I^- with equation.
 - (2) Explain pH and pH scale.
- (d) Answer any one : 5
- (1) Determine the dissociation constant of weak acid by pH metry.
 - (2) Explain titration of Cl^- , Br^- , I^- mixture with $AgNO_3$ by potentiometry.