

## B.Sc. Semester - 6 (CBCS) Examination

March/April -2020

## PHYSICAL AND ANALYTICAL CHEMISTRY (CORE)

Time: 2:30 Hours

Marks: 70

## Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

**Q. 1 (a) Answer the following question.**

(4)

- (1) Explain the Third law of thermodynamics and Calculate Ionic strength of 0.01 M KI + 0.20 M KBr solution.

**Q. 1 (b) Answer any two questions out of three.**

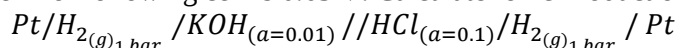
(10)

- (1) Describe the method of determination of activity co-efficient by solubility method.
- (2) Derive the equation to determine the absolute entropy of solids, liquids and gases by Third law of Thermodynamic.
- (3) Derive the equation :  $\log f_{\pm} = -0.509 |Z_+ Z_-| \sqrt{\mu}$ .

**Q. 2 (a) Answer the following question.**

(4)

- (1) At 298 K, emf of following cell is 0.65 V. Calculate Ionic Product of water ( $K_w$ ).

**Q. 2 (b) Answer any two questions out of three.**

(10)

- (1) Derive the equation:  $E_{w.t.} = t_- \times \frac{RT}{F} \ln \frac{a_2}{a_1}$ .
- (2) Discuss the method of determination the Dissociation Constant ( $K_a$ ) of weak acid ( $CH_3COOH$ ) by using emf.
- (3) Write reactions of  $Zn - Hg_{(C_1)} / ZnSO_4(sol.) / Zn - Hg_{(C_2)}$  and How valency of Mercurous ion is determined by using emf measurement.

**Q. 3 (a) Answer the following question.**

(4)

- (1) Derive the equation of Raoult's law with reference to chemical potential.

**Q. 3 (b) Answer any two questions out of three.**

(10)

- (1) Derive Gibbs-Duhem equation.
- (2) (a) Explain Student T-test with example.  
(b) Identify the significant figure in (i) 500.0 (ii) 0.008940
- (3) The amount of element X in XY compound in different experiments obtained as 40.22%, 40.26%, 40.13%, 40.01% and 40.28%. Then, calculate Median value, Mean Value, Average deviation, Relative average deviation and Standard deviation.

**Q. 4 (a) Answer the following question.**

(4)

- (1) Give detailed information of  $R_f$  and  $R_x$  value and Write factors affecting on  $R_f$  value.

**Q. 4 (b) Answer any two questions out of three.**

(10)

- (1) Discuss the classification of Chromatography in detail.
- (2) Explain Principle and working method of Ion-exchange Chromatography.
- (3) Describe general techniques of Circular Paper Chromatography in detail.

**Q. 5 (a) Answer the following question.**

(4)

- (1) Discuss in detail: Borax bead test with principle.

**Q. 5 (b) Answer any two questions out of three.**

(10)

- (1) Discuss the Separation of  $NO_2^-$ ,  $NO_3^-$  and  $Br^-$  ions in presence of each other.
- (2) Explain: Redox titration of  $FeSO_4 \rightarrow KMnO_4$  potentiometrically.
- (3) Define:  $P^H$  metry. Derive the equation for  $P^H$  of unknown solution by using  $H_2 - electrode$  as an indicator electrode and Calomel electrode as a reference electrode.

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