



NAO-003-001608

Seat No. \_\_\_\_\_

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

**March / April - 2017**

**C-603 : Physical & Analytical Chemistry**

**Faculty Code : 003**

**Subject Code : 001608**

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

- Instructions :** (1) All questions are compulsory.  
(2) Write university seat no. on question paper, do not write any rough work and tick mark in question paper.

**1 Answer the following question : 20**

- (1) Who stated an alternative version of third law of thermodynamics?
- (2) According to Which theory, heat capacity of crystalline substance at low temperature is  $C_p \cong C_v \cong \alpha T^3$  ?
- (3) Give two example of intensive properties.
- (4) Who introduced the concept of partial molar property?
- (5) What is electrolyte?
- (6) Define : activity coefficient.
- (7) What is the ionic strength of 0.01 M NaCl solution?
- (8) Give other name of diffusion potential.
- (9) What is cell potential?
- (10) Define : electrochemical cell.
- (11) What is conductometric analysis?
- (12) Give unit of specific conductance.
- (13) What is the effect of dilution on specific conductance ?
- (14) Who separated the extraction of green leaves by chromatography ?

- (15) Define : Rx value.
- (16) Which paper chromatography is fast?
- (17) What is chelate?
- (18) Give two example of metal ion indicator.
- (19) Who introduce quinhydrone electrode ?
- (20) Which tube is used in colorimetry method to determine pH ?

2 (a) Answer the following question : (any **three**) **6**

- (1) Write the statements of third law of thermodynamics. (any two)
- (2) Explain- partial molar property.
- (3) Calculate  $\mu$  (ionic strength) of solution. When 5.6 gram. KOH is dissolved in 2 kg of water ?
- (4) Derive mean activity for AB type of salt.
- (5) Find the potential of the cell Pt / H<sub>2</sub> (10 atm) / HCl<sub>(0.1m)</sub> / H<sub>2</sub> (1 atm) / Pt at 25°C.
- (6) How to determine transport number of ion with the help of EMF?

(b) Answer the following question : (any **three**) **9**

- (1) Application of Third law of thermodynamics: Explain.
- (2) Derive Nernst distribution law by chemical potential.
- (3) Calculate  $f_{\pm}$  of  $2 \times 10^{-3} \text{m BaCl}_2$  solution. ( $A=0.509$ ).
- (4) Define ionic strength and write the factors which affect ionic strength.
- (5) The valency of mercurous ion is 2. Explain with the help of EMF.
- (6) The emf of cell Pt / H<sub>2</sub>(1 atm) / KOH(0.01N) / HCl(0.01N) / H<sub>2</sub> (1 atm) / Pt is 0.59 V at 25°C. Calculate the ionic product ( $K_w$ ) of water. The activity coefficient of both H<sup>+</sup> and OH<sup>-</sup> ion is 0.98.

(c) Answer the following,, question: (any two) **10**

- (1) How can we measure the absolute value of entropy of any substance at its boiling point? Explain with help of third law of thermodynamics.
- (2) Derive Gibbs-Duhem equation.
- (3) Derive equation of E.M.F. of concentration cell with transference.
- (4) Describe the determination of dissociation constant of weak acid by E.M.F. method.
- (5) Discuss solubility method for determination of activity coefficient.

**3** (a) Answer the following question: (any three) **6**

- (1) If  $\lambda_{\text{CH}_3\text{COONa}}^\circ = 71.7$ ,  $\lambda_{\text{HCl}}^\circ = 369.3$  and  $\lambda_{\text{NaCl}}^\circ = 101.7$ , then find  $\lambda_{\text{CH}_3\text{COOH}}^\circ$ .
- (2) Explain cell constant of conductivity cell.
- (3) Name any two methods to prepare a plate of TLC.
- (4) Which factors effect the  $R_f$  value?(any two)
- (5) Explain Welcher Rule for EDTA titration.
- (6) Give advantages of  $\text{H}_2$  electrode. (any two)

(b) Answer the following question : (any **three**) **9**

- (1) Specific conductivity of 60 gm acetic acid solution in 1000 liters is  $4.1 \times 10^{-5}$  mho at  $18^\circ\text{C}$  temperature. The conductivity of  $\text{H}^+$  ion and  $\text{CH}_3\text{COO}$  ion is 315 and 35 respectively. Calculate degree of dissociation.
- (2) Explain the conductometric titration of strong acid against weak base.
- (3) Explain the separation of  $\alpha, \beta, \gamma$  carotene from carrot by chromatography.

- (4) Give advantages of TLC over other chromatography.  
(any six)
- (5) Give essential conditions for complexometric titrations:
- (6) Find  $P^H$  of Mixture of  $P^H=2$  and  $P^H=4$  are equal volume solution.

(c) Answer the following question : (any two) **10**

- (1) Describe precipitation titration by conductometry.
- (2) Discuss different type of paper chromatography.
- (3) Describe the various types of EDTA titration.
- (4) Explain redox titration of  $FeSO_4 \rightarrow K_2Cr_2O_7$  by potentiometry.
- (5) Explain pH metry method determine dissociation constant of weak electrolyte.

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