



AAI-003-001608

Seat No. _____

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

March / April – 2016

Chemistry : Paper - C-603

(Physical Chemistry & Analytical Chemistry - VI)
(New Course)

Faculty Code : 003

Subject Code : 001608

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

[Total Marks : 70

- Instructions :**
- (1) Q. 1 is MCQ which carries 20 marks.
 - (2) MCQs answers are to be written on the same answer sheet.
 - (3) Q. 2 and 3 carry 25 marks each with internal option.

SECTION - I

1 Multiple Choice Questions : 20

(Write the correct option number and answer)

- (1) With the use of 3rd law of thermodynamics which value can be calculated ?
(A) ΔS° (B) ΔG°
(C) K (D) All of these
- (2) Identify example of intensive property.
(A) Internal Energy (B) Refractive Index
(C) Entropy (D) Mass

- (3) At the absolute zero temperature, which property of every perfectly crystalline solid become zero ?
- (A) Enthalpy (B) Internal energy
(C) Entropy (D) Free energy
- (4) Equation $\frac{P_o - P}{P_o} = X_2$ indicates which law ?
- (A) Nernst (B) Henry
(C) Raoult (D) Gibbs
- (5) For AlCl_3 value of ionic strength is.....
- (A) $3C$ (B) $6C$
(C) $9C$ (D) 0
- (6) State method to determine activity coefficient.
- (A) Solubility method (B) EMF method
(C) Both (A) and (B) (D) None of these
- (7) $\text{Zn} \left| \text{Zn}_{(a_1)}^{+2} \right\| \left| \text{Zn}_{(a_2)}^{+2} \right| \text{Zn}$ is called which type of the cell ?
- (A) Electrolyte-concentration cell
(B) Electrode-concentration cell
(C) Concentration cell without transference
(D) None of these
- (8) If junction solution of cell contains Ag^+ ions, which solution is used in salt-bridge ?
- (A) KCl (B) NH_4Cl
(C) NaBr (D) NH_4NO_3
- (9) By measurement of EMF, value of which property can be achieved ?
- (A) pH (B) K_w
(C) K_a (D) All of these

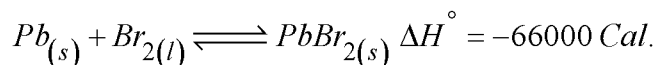
- (10) Unit of conductivity is.....
- (A) volt (B) mho
(C) ohm (D) mho·cm
- (11) Upon dilution of solution, which value decreases ?
- (A) Conductance
(B) Specific conductance
(C) Equivalent conductance
(D) Molar conductance
- (12) Degree of dissociation of weak acid can be achieved by.....
- (A) $\lambda_{\infty}/\lambda_c$ (B) $\lambda_{\infty} \cdot \lambda_c$
(C) $\lambda_c/\lambda_{\infty}$ (D) $1/\lambda_{\infty}$
- (13) To find value of $\lambda_{\infty}(CH_3COOH)$, which value is required ?
- (A) $\lambda_{\infty}(CH_3COONa)$ (B) $\lambda_{\infty}(HCl)$
(C) $\lambda_{\infty}(NaCl)$ (D) All of these
- (14) To separate gama-carotene from carrot by column chromatography, which adsorbent is used ?
- (A) Alumina (B) CaO
(C) SiO₂ (D) MgO
- (15) In which chromatography, stationary phase is taken solid ?
- (A) Gel (B) PC
(C) GLC (D) Column

- (16) When the concentration of ions are same, which is the correct rate of resin exchange ?
- (A) $K^+ > Rb^+ > Cs^+ > Li^+$
 - (B) $Rb^+ > K^+ > Li^+ > Cs^+$
 - (C) $Cs^+ > Rb^+ > K^+ > Li^+$
 - (D) $Li^+ > Cs^+ > Rb^+ > K^+$
- (17) Complexometric titration can also referred as.....
- (A) Chealetometry titration
 - (B) EDTA titration
 - (C) Both (A) and (B)
 - (D) None of these
- (18) Which EDTA salt is used in complexometric titration ?
- (A) Na_4Y
 - (B) Na_3HY
 - (C) Na_2H_2Y
 - (D) NaH_3Y
- (19) Which is consider as primary reference electrode ?
- (A) Calomel
 - (B) Hydrogen
 - (C) Quinhydrone
 - (D) Silver-silver chloride
- (20) Glass used in glass electrode should have.....
- (A) low M.P., high conductivity
 - (B) high M.P., low conductivity
 - (C) low M.P., low conductivity
 - (D) high M.P., high conductivity

SECTION-II

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

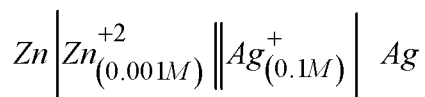
- (1) Give exception to the third law of thermodynamics.
- (2) Derive effect of pressure on chemical potential.
- (3) How pH of solution can determine by using glass electrode ?
- (4) What is electrode - concentration cell ? Draw only figure of electrode-concentration cell.
- (5) What is average activity and average activity coefficient ?
- (6) For reaction :



Values of absolute entropies of Pb, Br₂ and PbBr₂ are 15.5, 36.8 and 38.6 cal/mole at 298K. Find ΔG° .

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

- (1) Determine absolute entropy of liquids and gases.
- (2) Explain Nernst distribution law.
- (3) Derive equation of mean activity (a_2) for univalent electrolyte.
- (4) How ionic product of water (K_w) can obtain by help of EMF measurement ?
- (5) Explain electrolyte concentration cell.
- (6) Calculate E_{cell} and give cell reaction.



$$E^\circ_{Ag^+ / Ag} = +0.80 \text{ V}, \quad E^\circ_{Zn^{+2} / Zn} = -0.76 \text{ V}$$

- (c) Answer any two of the following : 10
- (1) State third law of thermodynamics. Explain Nernst heat theorem.
 - (2) Explain the concept of chemical potential. Derive Gibbs-Duhem equation.
 - (3) Derive Debye-Huckel limiting law equation.
 - (4) What is LJP ? How it can be eliminate ?
 - (5) Explain determination of solubility of sparingly soluble salt and transport number of ion by measurement of EMF.
- 3 (a) Answer any three of the following : 6
- (1) Explain : Equivalent conductance.
 - (2) Define : Stationary phase, Mobile phase.
 - (3) Discuss method of Preparation of standard edta solution.
 - (4) Draw figure and write reaction of calomel electrode.
 - (5) Explain two dimensional paper chromatography.
 - (6) Write factors affecting conductance of solution.
- (b) Answer any three of the following : 9
- (1) Explain platinum electrode and platinization of platinum electrode.
 - (2) Discuss : Visualization methods in chromatography.
 - (3) Write applications of conductometry method.
 - (4) Discuss : Eriochrome black-T.
 - (5) Write note on Quinhydrone electrode.
 - (6) Explain circular paper chromatography.

(c) Answer any two of the following :

10

- (1) What is conductometric titration ? Discuss titration of weak acid by strong base by conductometric method.
- (2) Discuss principle and method of column chromatography.
- (3) Explain principle of redox titration. Discuss titration of FeSO_4 by $\text{Ce}(\text{SO}_4)_2$ potentiometrically.
- (4) Discuss any three type of edta titrations.
- (5) Explain ion exchange resins. Give principle and working of resins.
