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) $\Delta S°$ (B) $\Delta G°$

(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) $Zn \left| Zn^{+2}_{(a_1)} \right\| Zn^{+2}_{(a_2)} \left| Zn \right.$ 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) SiO_2 (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 :

$$Pb_{(s)} + Br_{2(l)} \rightleftharpoons PbBr_{2(s)} \quad \Delta H^{\circ} = -66000\ Cal.$$

Values of absolute entropies of Pb, Br_2 and $PbBr_2$ 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.

$$Zn \left| Zn^{+2}_{(0.001M)} \right\| Ag^{+}_{(0.1M)} \left| \right. Ag$$

$$E^{\circ}_{Ag^{+}/Ag} = +0.80\ V,\ E^{\circ}_{Zn^{+2}/Zn} = -0.76\ V$$

(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 platinizaiton of platinum electrode.

(2) Discus : Visualization methods in chromatography.

(3) Write applications of conductometry method.

(4) Discuss : Eriochrome black-T.

(5) Write note on Quin hydrone 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 $Ce(SO_4)_2$ potentiometrically.

(4) Discuss any three type of edta titrations.

(5) Explain ion exchange resins. Give principle and working of resins.
