BBH-003-1016008 Seat No. _____

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

July – 2021

Chemistry : C-603

(Physical & Analytical Chemistry)

(New Course)

Faculty Code : 003

Subject Code : 1016008

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions :

(1) There are ten questions.
(2) Answer any five questions.
(3) All questions carry equal marks. (14 marks for each question)
(4) Figure on the right side indicates marks.

1 (a) Answer the following questions : **4**

(1) Who proposed the term "Ionic Strength" ?
(2) If the value of activity (a_2) of NaCl solution is 0.04, then mean activity of the solution is _____.
(3) At absolute zero temp, which property of every perfect crystalline solid becomes zero ?
(4) For a phase conversion "Solid to liquid" give a expression / equation to calculate entropy change.

(b) Give equation of mean activity and mean activity co-efficient. **2**

(c) Calculate ionic strength for 0.1 M Kcl and 0.01 M Bacla solution. (Ionization completed) **3**

(d) Discuss the determination of absolute entropy of solid, liquid and gas with related equation. **5**

2 (a) Answer the following questions : **4**

(1) Give equation for ionic strength.

(2) $\log f_{\pm} = -0.509 z_{+} z - \sqrt{\mu}$ is the equation for _____.

(3) The relationship between activity a_2 of $FeCl_3$ solution and its mean activity is _____.

(4) Define : Perfect crystal.

(b) Write any two statement of third law of thermo dynamics. **2**

(c) Explain Nernst Heat theorem. **3**

(d) Explain method to determine activity co-efficients by EMF method. **5**

3 (a) Answer the following questions : **4**

(1) E^{o} cell for any concentration cell is _____.

(2) $zn \,/\, \underset{(a_1)}{zn^{+2}} \,//\, \underset{(a_2)}{zn^{+2}} \,/\, zn$ is called which type of the cell ?

(3) Quinhydrone is a mixture of _____ and _____.

(4) The cell $pt \,/\, \underset{(1\ atm)}{H_2(g)} \,.\, \underset{(0.01N)}{KOH} \,//\, \underset{(0.01N)}{HCl} \,.\, \underset{(1\ atm)}{H2(g)} \,/\, pt$

is used to determine _____.

(b) What is LJP ? How it can be eliminate ? **2**

(c) Derive the equation of EMF for gas electrode concentration cell. **3**

(d) Explain determination of degree of hydrolysis and hydrolysis constant of salt by emf measurement. **5**

4 (a) Answer the following questions : **4**

(1) In concentration cell _____ energy is converted into _____ energy.

(2) Give full form of LJP and EMF.

(3) Give only name of main two type of concentration cell.

(4) What is the value of ionic product of water at 25°C ?

(b) Calculate Ecell for the following cell at 25°C. **2**

$cu \,/\, \underset{(0.1M)}{cu^{+2}} \,/\, \underset{(0.5M)}{cu^{+2}} \,/\, cu$ R=8.314 Jule/mole k

(c) Derive an equation to determine emf for amalgam concentration cell. **3**

(d) Explain determination of dissociation constant of weak acid by emf measurement. **5**

5 (a) Answer the following questions. **4**

(1) Which type of error arises due to colour blindness of a person ?

(2) _____ error is the most serious error.

(3) Who introduce the concept of partial molar property ?

(4) Equation $\frac{Po - P}{Po} = x_2$ indicates which law ?

(b) Simplify 3.145 + 10.08 + 15.4, according to significant rule. **2**

(c) Derive Henry's law using partial molar property. **3**

(d) Describe the types of determinate error. **5**

6 (a) Answer the following questions : **4**

(1) Occurrence of side reaction is _____ type of error.

(2) How many significant figures are in the number 409.10 and 4091.00 respectively ?

(3) Rounding of 4.125000 to a value having three significant figures.

(4) Give the mathematical form of Nernst's distribution law.

(b) Explain partial molar property in short. **2**

(c) Derive Gibbs–Duhem equation. **3**

(d) What is error ? Explain any three method for minimization of error. **5**

7 (a) Answer the following questions. **4**

(1) Who separated the extraction of green leaves by chromatography ?

(2) In which chromatography, stationary phase is taken solid ?

(3) Which chromatography is useful for the purpose of "water-softening" ?

(4) Which chromatography is used for components having low Rf value ?

(b) What is meant by Rf and Rx value ? **2**

(c) Give advantages of TLC over other chromatography. **3**

(d) Explain different type of paper chromatography. **5**

8 (a) Answer the following questions. **4**

(1) By which chromatography α, β and γ carotene can be separated ?

(2) Best TLC plate is prepared by which method ?

(3) Which chromatography is known as open column chromatography ?

(4) Alumina is strong absorbent : (True/False)

(b) Which factor affect the Rf value ? **2**

(c) Describe the methods for preparation of plate of TLC. **3**

(d) Explain in detail GLC technique and give uses of GLC. **5**

9 (a) Answer the following questions. **4**

(1) Which electrode is used as indicator electrode in redox potentiometry titration ?

(2) In following redox reaction how many electrons are involved ? $Fe^{+2} + Ce^{+4} \rightleftharpoons Fe^{+3} + Ce^{+3}$

(3) In a mixture of ions S^{-2}, SO_3^{-2} and Co_3^{-2} which ion will give yellow ppt with $CdCo_3$?

(4) Define soluble salt.

10 (a) Answer the following questions : **4**

(1) Which electrode is used as primary reference electrode ?

(2) Which ion is precipitated first in potentiometry titration of $\overline{Cl}, \overline{Br}$ and $\bar{I}$ mixture by $AgNO_3$?

(3) Concept of pH was first introduced by _____.

(4) Define sparingly soluble salt.

(b) How Nitrite ion $\left(No_2^-\right)$ is removed from the mixture of No_2^-, No_3^-, and $\overline{Br}$ ions ? **2**

(c) Explain titration of $\overline{Cl}, \overline{Br}$ and $\bar{I}$ mixture against $AgNO_3$ by potentiometry. **3**

(d) Give principle of redox titration and explain $FeSO_4 \rightarrow Ce(SO_4)_2$ titration by potentiometrically. **5**