BCH-003-1015007 Seat No. _____

B. Sc. (Sem. V) (W.E.F. 2016) Examination

August - 2021

C-503 - Chemistry

(Physical Chemistry & Analytical Chemistry)

(New Course)

Faculty Code : 003

Subject Code : 1015007

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)
(4) Figures to the right indicate full marks.

1 (a) Answer the following questions. **4**
(1) Define : Entropy.
(2) Define : Cyclic process.
(3) Give the equation for entropy change at solid substance converted into liquid.
(4) What is the value of entropy change in reversible process ?

(b) One heat engine is working at that time temperature of source is 120°C and sink is 15°C then calculate the work efficiency of heat engine. **2**

(c) Give the limitations of 1st law of thermodynamics. **3**

(d) Derive $\eta=\frac{W_{max}}{Q_2}=\frac{Q_2-Q_1}{Q_2}=\frac{T_2-T_1}{T_2}$ **5**

2 (a) Answer the following questions. **4**
(1) Define : Spontaneous process.
(2) In an adiabatic process _____ cannot flow into or out of the system.
(3) An isobaric process takes place at constant _____.
(4) Give the statement of Kelvin-Planck for second law of thermodynamics.

(b) Explain : Entropy is thermodynamic probability. **2**

(c) What is entropy ? Explain entropy change in an irreversible process. **3**

(d) Derive the equation for entropy change in mixture of ideal gas. **5**

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

(1) Give the cell formation of galvanic cell.

(2) Give one example of one pair partially miscible liquids.

(3) What is binodal curve ?

(4) Left side of electrochemical cell is known as _____.

(b) Explain component and degree of freedom. **2**

(c) Write short note : Calomel electrode. **3**

(d) Describe the phase diagram of two pair partially miscible liquid system. **5**

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

(1) Define standard half-cell.

(2) Write cell reaction of following cell
$Zn / Zn^{+2} // Ag+ / Ag$

(3) Define : Phase

(4) A mixture of two miscible liquids constitutes a system having the number of phase equal to _____.

(b) Discuss the types of cell. **2**

(c) Discuss phase rule with its related terms in detail. **3**

(d) Write note on Galvanic cell. **5**

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

(1) Define : Free energy.

(2) Give the Gibbs' Helmholtz equation for change at constant pressure in reference of free energy.

(3) What is optical density ?

(4) Give the mathematical expression of Beer-Lambert's law.

(b) When does a solution deviate from Lambert-Beer's law ? **2**

(c) Derive Gibb's Helmholtz equation. **3**

(d) Explain spectrophotometic estimation of : **5**

(i) Lacking of absorbance by reaction product and estimating reagent.

(ii) Lacking of absorbance by reactants and reagents.

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

(1) Define : Work function.

(2) What is transmittance.

(3) What is the effect of pressure on melting point of ice ?

(4) Write Grothus-Draper's law.

(b) Write down Clausius-Clapeyron equation for solid-liquid equilibria with indicating term with its name. **2**

(c) Derive Beer-Lambert's law. **3**

(d) Derive Vant-Hoff isotherm equation. **5**

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

(1) Define : Equivalent conductance.

(2) Unit of conductivity is _____.

(3) In metal complex metal show _____ and _____ valency.

(4) Define ligand.

(b) Write factors affecting conductance of solutions. **2**

(c) Write note on murexide indicator. **3**

(d) Describe precipitation titration by conductometry. **5**

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

(1) Give the structure of disodium salt of EDTA.

(2) Define: Metal ion potentiality.

(3) Draw the structure of Eriochrome black-T.

(4) What is the effect of dilution on specific conductance ?

(b) Explain the method for preparation of standard EDTA solution. **2**

(c) Explain the conductometric titration of weak acid and against strong base. **3**

(d) Give various method of EDTA titration and explain : (i) Direct titration and (ii) back-titration. **5**

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

(1) What is indicator ?

(2) Give one name of self indicator.

(3) Give the molecular formula of sodium thiosulfate.

(4) The indicator used for Volhard method in precipitation titration is _____.

(b) Write the characteristics of primary standard. **2**

(c) Usefulness of starch indicator in iodimetry and iodometry estimation and its merits and demerits. **3**

(d) Explain Mohr's method. **5**

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

(1) Which indicator used in Fajan's method for the tiltration of $AgNO_3 \rightarrow NaCl$.

(2) Normality of 1M Na_2CO_3 solution is ____ N.

(3) Define Molarity.

(4) Define : Equivalence point

(b) Give the difference between end point and equivalent point. **2**

(c) Explain the principle of Ostwald's law based on indicator. **3**

(d) Explain the titration curve of strong acid and strong base. **5**