



Seat No. _____

HAL-003-2015007

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

June - 2023

C-503 : Chemistry

(Physical and Analytical Chemistry) (2019)

Faculty Code : 003

Subject Code : 2015007

Time : $2\frac{1}{2}$ / Total Marks : 70

Instructions :

- (1) All questions are compulsory.
- (2) In all questions, B, C, D have internal options.
- (3) All questions carry equal marks (14 marks for each question)

- 1 (a) Answer the following questions : 4
- (1) All natural processes are irreversible. True or False.
 - (2) Isochoric process takes place at constant _____.
 - (3) Define : Spontaneous process.
 - (4) $\Delta S_{\text{sys}} + \Delta S_{\text{surr}} = 0$ for _____ process.
- (b) Answer any one of the following : 2
- (1) Define entropy in short.
 - (2) Differentiate between reversible process and spontaneous process.
- (c) Answer any one of the following : 3
- (1) Write any two statements of 2nd law of thermodynamics.
 - (2) Calculate the amount of heat absorbed by the reversible cycle working between 358 K and 280 K. The maximum work obtained is 892 Joule.
- (d) Answer any one of the following : 5
- (1) Derive the equation of entropy change for a mixture of Ideal gas.
 - (2) Discuss Carnot's cycle with its operations.

- 2 (a) Answer the following questions : 4
- (1) An electrochemical cell converts _____ energy to _____ energy.
 - (2) Define Electrolyte.
 - (3) Maximum degree of freedom possible for three component system is _____.
 - (4) Define Quintuple point.
- (b) Answer any one of the following : 2
- (1) Write a note on Half cell.
 - (2) Differentiate reversible and irreversible cell with example.
- (c) Answer any one of the following : 3
- (1) Write the construction of saturated calomel electrode.
 - (2) Explain phase rule and terms involved in it.
- (d) Answer any one of the following : 5
- (1) Derive Nernst equation and give its applications.
 - (2) Explain phase diagram of three component system, which form one pair of partially miscible liquids.
- 3 (a) Answer the following questions : 4
- (1) Give the Helmholtz equation for variation in work function at constant volume.
 - (2) _____ law gives relation between absorbed light and thickness of medium.
 - (3) As the colour intensity of the solution increases, absorbance value will _____.
 - (4) Define Work function (A).
- (b) Answer any one of the following : 2
- (1) Define Absorbance and Transmittance.
 - (2) Discuss the effect of pressure on the melting point of ice.
- (c) Answer any one of the following : 3
- (1) Derive mathematical expression for Lambert-Beer's law.
 - (2) Explain law of mass action in short.
- (d) Answer any one of the following : 5
- (1) Explain derive Van't Hoff Isotherm equation.
 - (2) Discuss the spectrophotometric titration for :
 - (a) Deficiency of absorbance by titrant and reactant.
 - (b) Deficiency of absorbance by product.

- 4 (a) Answer the following questions : 4
- (1) In Murexide, how many H^+ ions can be ionized ?
 - (2) Which salt is used to prepare the standard solution of EDTA ?
 - (3) Upon dilution, the value of specific conductance _____.
 - (4) Write the unit of conductivity of a solution.
- (b) Answer any one of the following : 2
- (1) State the Velcher's rules for EDTA titration.
 - (2) Write the factors affecting conductance of solution.
- (c) Answer any one of the following : 3
- (1) Explain Equivalent Conductance and Molar Conductance.
 - (2) Write a short note on EBT indicator.
- (d) Answer any one of the following : 5
- (1) Discuss the use of Masking and Demasking agents used in complexometric titrations.
 - (2) Discuss the neutralization conductometric titration curve for :
 - (a) Strong acid against strong base.
 - (b) Mixture of strong acid and weak acid against strong base.
- 5 (a) Answer the following questions : 4
- (1) Define Iodimetry titration.
 - (2) Give two examples of redox indicators.
 - (3) Phenolphthalein gives _____ colour in basic solution.
 - (4) Calculate Molarity of 2 litre solution containing 100 grams NaOH.
- (b) Answer any one of the following ; 2
- (1) Explain the difference between end point and equivalent point.
 - (2) How much litres of 0.2 M aqueous solution of Na_2CO_3 can be prepared from 212 grams of Na_2CO_3 ?
(Na = 23, C = 12, O=16 gm/mole)
- (c) Answer any one of the following : 3
- (1) Explain the neutralization titration curve of weak acid against strong base.
 - (2) Explain primary and secondary standard.
- (d) Answer any one of the following : 5
- (1) Explain Mohr's method for precipitation titration.
 - (2) Discuss Ostwald's Indicator principle for neutralization titration.