



RP-003-1015007

Seat No. _____

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

February - 2019

Chemistry : C - 503

(Physical & Analytical Chemistry) (New Course)

Faculty Code : 003

Subject Code : 1015007

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

[Total Marks : 70

- Instructions :**
- (1) There are five questions.
 - (2) In each question sub question (a) of 4 marks, all are compulsory.
 - (3) Sub questions (b), (c), (d) each with internal option.
 - (4) Figures to the right indicate full marks.

- 1 (a) Answer the following questions : 4
- (1) Entropy is a measure of _____ and _____.
 - (2) In an adiabatic process for carnot cycle _____ must change.
 - (3) Mixing of two or more gases in a _____ process.
 - (4) What is cyclic process ?
- (b) Answer in brief : (any **one** out of two questions) 2
- (1) Explain spontaneous process.
 - (2) Write two statements of second law of thermodynamics.

- (c) Answer in detail : (any **one** out of two questions) **3**
- (1) What is entropy ? Prove that it is a state function.
 - (2) Calculate the amount of heat supplied to Carnot's cycle working between 368 K and 288 K. The maximum work obtained is 895 Joule.
- (d) Answer any **one** out of two questions : **5**
- (1) Prove that : $\eta = \frac{W_{\max}}{Q_2} = \frac{Q_2 - Q_1}{Q_1} = \frac{T_2 - T_1}{T_2}$
 - (2) 12.8 litre O₂ and 9.6 litre H₂ mixed at STP, calculate the entropy change (R=2 cal/degree mole)
- 2** (a) Answer the following questions : **4**
- (1) Give the cell formation for Galvanic cell.
 - (2) $\text{Hg} \left| \text{Hg}_2\text{Cl}_2(\text{s}), \text{KCl} \right.$ is representation of _____ electrode.
 - (3) Give one example of one pair of partially miscible liquids.
 - (4) Define : Quintuple Point.
- (b) Answer in brief : (any **one** out of two questions) **2**
- (1) Explain standard Half Cell.
 - (2) Define :
 - (i) Tie Lines
 - (ii) Binodal curve
- (c) Answer in detail : (any **one** out of two questions) **3**
- (1) Write short note : Calomel electrode.
 - (2) Explain reversible and irreversible cell with example.
- (d) Answer any **one** out of two questions : **5**
- (1) Explain the Nernst equation for the calculation of single electrode potential.
 - (2) Describe the phase diagram of three pairs of partially miscible liquid system.

- 3 (a) Answer the following questions : 4
- (1) The variation of vapour-pressure with temperature is given by _____,
 - (2) Which region is used for colourimetry ?
 - (3) With increase in pressure, melting point of Ice _____.
 - (4) Decomposition of NH_3 is _____ reaction.
- (b) Answer in brief : (any **one** out of two questions) 2
- (1) Give the physical significance of free energy.
 - (2) Define : Optical density and transmittance.
- (c) Answer in detail : (any **one** out of two questions) 3
- (1) Derive Gibbs-Helmholtz equation.
 - (2) Derive equation of Lambert's-Bear's law.
- (d) Answer any **one** out of two questions. 5
- (1) Derive Vant-Hoff isotherm equation by equilibrium box method.
 - (2) The specific volume of ice and water at 0°C temperature are 1.1 ml and 1.0 ml respectively. Calculate the decrease in melting point at 1 atm pressure ($L_f = 80 \text{ Cal/g}$ and $1 \text{ cal} = 41.3 \text{ ml}$)
- 4 (a) Answer the following questions : 4
- (1) To determine cell constant of the conductivity cell, the conductance of _____ solution is measured.
 - (2) Unit of Conductivity is _____.
 - (3) In metal complex, metal show _____ and _____ valency.
 - (4) What is the effect of dilution on specific conductance ?
- (b) Answer in brief : (any **one** out of two questions) 2
- (1) Give the factors affecting conductance.
 - (2) Explain the method for the preparation of standard EDTA solution.

- (c) Answer in detail : (any **one** out of two questions) **3**
- (1) Give structure of murexide indicator and explain its working method.
 - (2) Explain the conductometric titration of weak acid against strong base.
- (d) Answer any **one** out of two questions : **5**
- (1) Describe precipitation titration by conductometry.
 - (2) Explain conductometric titration between a strong base against a mixture of a weak and strong acid.
- 5** (a) Answer the following questions : **4**
- (1) Find out the normality of 0.1 M KMnO_4 .
 - (2) Name any two primary standard solution.
 - (3) Which indicator is used in the titration of $\text{FAS} \rightarrow \text{K}_2\text{Cr}_2\text{O}_7$?
 - (4) Define : Equivalent point.
- (b) Answer in brief : (any **one** out of two questions) **2**
- (1) Give difference between end point and equivalent point.
 - (2) For the preparation of 250 ml 0.5 M KMnO_4 solution how much grams of KMnO_4 is required ?
- (c) Answer in detail : (any **one** out of two questions) **3**
- (1) Write the principle of Redox indicator.
 - (2) Explain the principle of Ostwald's law based on indicator.
- (b) Answer any **one** out of two questions : **5**
- (1) Explain Volhard method of precipitation titration.
 - (2) Explain titration curve for polyprotic acid and strong base in detail.