JBF-003-1101003 Seat No. _____

M. Sc. (Sem. I) (CBCS) Examination

December - 2019

Physical Chemistry : C-103

(New Course)

Faculty Code : 003

Subject Code : 1101003

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

Instructions : (1) All questions are compulsory.
(2) Each question carries 14 marks.

1 Answer the following : (any seven)

(a) Define : Partition function, state the factors on which it depends.

(b) Discuss Zinc-sliver accumulator.

(c) Discuss quantitative applications D–H theory.

(d) Fill in the blanks :
(i) When temperature increases solubility of gas _____.
(ii) For solution exhibiting positive deviation from ideal behaviour sign of β will be _____.
(iii) Real gas behave ideally when pressure is _____.
(iv) Ideal solution follows _____ law.

(e) Explain approximate method.

(f) What are the assumption made in deviation of depression in freezing point of dilute solution.

(g) Explain D-H evaluation for concentrated solution.

(h) Show that $E = \frac{3}{2}RT$ for monoatomic gas and RT for diatomic gas.

(i) Define : Ionic strength, chemical cell, Debye length, Fugacity.

(j) Discuss paretically miscible liquid.

2 Answer the following : (any **two**)

(a) Explain equation of state method for the determination of fugacity.

(b) Discuss the relationship between.

(i) Partition function and work function

(ii) Partition function and Heat content.

(c) Derive an expression for the determination of elevation of the boiling point of dilute solution.

3 Answer the following :

(a) Discuss electrode concentration cell in detail.

(b) Discuss the determination of equilibrium constant by D-H equation.

OR

(a) Derive the following equation

$$P = \frac{P_1^{\square} P_2^{\square}}{P_1^{\square} - Ni\,(P_1^{\square} - P_2^{\square})}$$

(b) Discuss Bose-Einstein statistics. Calculate the rotational partition function of hydrogen gas at 300°K

(For : H_2 I = 0.459×10^{-40} gcm^2 and $\sigma = 2$)

4 Answer the following :

(a) Discuss :

(i) Duhom margules equation

(ii) Solubility of gases.

(b) Explain Lewis-Randall rule following data are given below for oxygen gas at 0°C

P_{atm}	50	100	200	400
F_{atm}	48	92.5	175	338

Calculate the change in free energy in compressing 1 mole of O_2 at 0°C from 50 to 200 mole of O_2 at 0°C and non ideal condition.

5 Answer the following : (any **two**)

(a) What is LJP ? Derive and Expression for the determination of LJP.

(b) Discuss the Sakur - Tetrode equation.

(c) Discuss variation of fagacity with temperature for a mixture of gases.

(d) Discuss the determination of mean ionic activity coefficient by D-H theory.
