



Shree H N Shukla Group of Colleges Rajkot
(Affiliated to Saurashtra University)
Behind marketing yard, near lalpari lake,
Between amargadh-bhichri Rajkot.



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)

- Define : Partition function, state the factors on which it depends.
- Discuss Zinc-silver accumulator.
- Discuss quantitative applications D-H theory.
- Fill in the blanks :
 - When temperature increases solubility of gas _____.
 - For solution exhibiting positive deviation from ideal behaviour sign of β will be _____.
 - Real gas behave ideally when pressure is _____.
 - Ideal solution follows _____ law.
- Explain approximate method.
- What are the assumption made in deviation of depression in freezing point of dilute solution.
- Explain D-H evaluation for concentrated solution.
- Show that $E = \frac{3}{2}RT$ for monoatomic gas and RT for diatomic gas.
 - Define : Ionic strength, chemical cell, Debye length, Fugacity.
 - Discuss paretically miscible liquid.



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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

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

- (b) Discuss Bose-Einstein statistics. Calculate the rotational partition function of hydrogen gas at 300°K
(For : H_2 I = 0.459×10^{-40} gcm² 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 O₂ at 0°C from 50 to 200 mole of O₂ at 0°C and non ideal condition.



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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.
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