BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: B.SC. **SEMESTER : V**
BRANCH: CHEMISTRY **SESSION : MO/2025**

SUBJECT: CH331 PHYSICAL CHEMISTRY-I

TIME: 02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)	What is Ostwald's dilution law? What are its limitation?	[2]	1	2
Q.1(b)	What is common ion effect? Discuss with example	[3]	1	2
Q.2(a)	In case of polybasic acids, why the second dissociation constant has lower value that the first dissociation constant?	[2]	1	3
Q.2(b)	Calculate the pH of a 0.20 M solution of NH_4Cl. Given, $K_w = 1.008 \times 10^{-14}$; $K_b = 1.80 \times 10^{-5}$.	[3]	1	3
Q.3(a)	Define partial molar properties? Are they extensive or intensive variables?	[2]	2	2
Q.3(b)	What is chemical potential? Show that chemical potential of a component decreases in a mixture.	[3]	2	2
Q.4(a)	Derive Gibbs-Duhem equation? Explain its significance.	[2]	2	3
Q.4(b)	Calculate the change in entropy of mixing of two components. Show that maximum entropy changes take place when two components are mixed in equal mole ratio.	[3]	2	3
Q.5(a)	What are colligative properties? Explain how chemical potential governs the colligative properties of a solution.	[2]	3	2
Q.5(b)	What is Raoult's law? Derive Raoult's law for the relative lowering of vapour pressure of solvent in a solution.	[3]	3	2

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