# UG (CBCS) Even Semester Examination, May 2025

## EDUCATION
## (B.Sc. B.Ed.)

6th Semester

**Course No. : BSCH - 601**

( Physical Chemistry )

Full Marks : 50
Pass Marks : 20

Time : 2 hours

*The figures in the margin indicate full marks for the questions*

(*Answer five questions*)

1. (a) Comment on the factors affecting adsorption. 4

   (b) Describe Langmuir adsorption isotherm. 6

Or

2. The data below are for the adsorption of CO on charcoal at 273K. Confirm that they fit the Langmuir isotherm, and find (i) the constant $K_1$ and volume corresponding to complete surface coverage, (ii) the fraction of surface covered at each pressure, and (iii) change of standard free energy on adsorption at STP. 4+3+3=10

| p/mm Hg | 100 | 200 | 300 | 400 | 500 | 600 | 700 |
|---|---|---|---|---|---|---|---|
| v/cm$^3$ | 10.2 | 18.6 | 25.5 | 31.4 | 36.9 | 41.6 | 46.1 |

   Mass of sample of charcoal = 3.022 g

3. (a) Explain Roult's law. 3

   (b) What do you mean by azeotrope? 2

(c) The vapor pressure of pure $CCl_4$ (M= 154 g/mol) and $SnCl_4$ (M=170 g/mol) at $25^0$C are 114.9 and 283.3 torr, respectively. Assuming ideal behavior, calculate the total vapour pressure of a solution containing 10g of $CCl_4$ and 15g of $SnCl_4$. 5

Or

4. (a) What do you mean by critical solution temperature? Give one example of a liquid mixture that shows both upper and lower consolute temperature. 2+1=3

(b) Briefly explain the application of Nernst distribution law. 7

5. (a) Prove that $\frac{dlnK_p}{dT} = \frac{\Delta H}{RT^2}$ 5

(b) How do the equilibrium constant varies with pressure? 5

Or

6. (a) Plot K vs $^1/_T$ of the Vant Hoff's equation where the term signify their usual meaning. 4

(b) Compare the equilibrium constants for 6

$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

and $^1/_2\, N_2(g) + {}^3/_2\, H_2(g) \rightleftharpoons NH_3(g)$

7. (a) What do you mean by association and dissociation? 2x2=4

(b) In case of KCl in water, how do the osmotic effect vary with the molar mass of KCl? 4

(c) What is molarity? 2

Or

8. Elaboratively explain abnormal colligative properties. 10



9. (a) Prove that $\log (I_o/I) = \epsilon cl$, where the terms signify their usual meaning. 4

(b) Sketch different modes of vibration for non-linear molecule. 6

Or

10. (a) With an example, explain the isotope effect on rotational spectra of a molecule. 4

(b) Draw the $^1$HNMR spectrum of toluence and give suitable justification to your answer. 6

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