

D 130135

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Name.....

Reg. No.....

**FIFTH SEMESTER CBCSS-UG DEGREE EXAMINATION
NOVEMBER 2025**

(2019 Syllabus)

Chemistry

CHE 5B 08—PHYSICAL CHEMISTRY – II

Time : Two Hours

Maximum : 60 Marks

Section A (Short answers)*Answer questions up to 20 marks.**Each question carries 2 marks.*

1. State and explain Born - Oppenheimer approximation.
2. Explain photosensitized reactions with example.
3. Write any four applications of adsorption.
4. Write Michaelis - Menten equation and explain the terms.
5. Explain Deliquescence and efflorescence with example.
6. The $t_{1/2}$ of a reaction is doubled as the initial concentration of the reactant is doubled. What is the order of the reaction?
7. Draw the ESR spectra of phenyl radical.
8. Determine the number of components and number of degrees of freedom of the liquid water and water vapour in equilibrium at a pressure of 1 atm.
9. The vapour pressure of water at 95°C and 100°C are 634 and 760 mm, respectively. Calculate the molar heat of vapourisation of water between these temperatures.
10. What are the reasons for high quantum yield in hydrogen chlorine reaction ?
11. Discuss the selection rule for a substance to be IR active.
12. Sketch the NMR spectrum of ethyl acetate.

[Ceiling of marks 20]

Turn over

Section B (Paragraph)

*Answer questions up to 30 marks.
Each question carries 5 marks.*

13. Write and explain any two methods for the determination of order of a reaction.
14. Explain Pattinson's process for desilverization of lead.
15. What are the assumptions in the Langmuir theory of adsorption ? Derive the expression for Langmuir adsorption isotherm.
16. Discuss the rotational spectra of rigid diatomic molecules.
17. Explain chemical shift. What are the different scales used for measuring chemical shift?
18. Explain Fluorescence and phosphorescence with the help of Jablonski diagram.
19. Explain the origin of Stokes and anti stoke line in Raman spectra.

(Ceiling of marks 30)

Section C (Essay)

*Answer any one.
The question carries 10 marks.*

20.
 - a) Derive the rate equation for bimolecular reactions using collision theory.
 - b) Explain the effect of temperature on reaction rate.
21.
 - a) Draw and explain phase diagram for two component systems in which the two components form a stable compound with congruent melting point.
 - b) The fundamental vibrational frequency of HCl is 2890 cm^{-1} . Calculate the force constant of this molecule. The atomic masses are $^1\text{H} = 1.673 \times 10^{-27} \text{ kg}$, $^{35}\text{Cl} = 58.06 \times 10^{-27} \text{ kg}$.

(1 × 10 = 10 marks)