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Reg. No. :

Code No. : 30324 E Sub. Code : AMCH 62

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2024.

Sixth Semester

Chemistry — Core

PHYSICAL CHEMISTRY — III

(For those who joined in July 2020 only)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

- Selection rule for vibrational spectra is
(a) $\Delta J = \pm 1$ (b) $\Delta V = \pm 1$
(c) $\Delta J = 0$ (d) $\Delta V = 0$
- U.V. spectroscopy is also known as _____ spectroscopy.
(a) Vibrational (b) Electronic
(c) Dipole (d) Optical

- The solvent used in NMR is
(a) CCl_4 (b) C_6H_6
(c) H_2O (d) None of the above
- How many kinds of protons are there in $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$
(a) 3 (b) 2
(c) 7 (d) 4
- Symbol for center of inversion
(a) E (b) S_n
(c) σ (d) I
- The symbol for proper axis of rotation is
(a) S_n (b) E
(c) σ (d) C_n
- The unit of zero order rate constant is
(a) S^{-1} (b) $\text{dm}^3\text{mol}^{-1}\text{s}^{-1}$
(c) $\text{mol dm}^3\text{s}^{-1}$ (d) $\text{mol l}^{-1}\text{s}^{-1}$

8. What is the order of the following reaction?



- (a) 3 (b) 2
(c) 1 (d) 0

9. The multilayer adsorption of gases on solids is explained by

- (a) Freundlich isotherm
(b) Langmuir isotherm
(c) BET isotherm
(d) None

10. An ideal solution obeys

- (a) Boyles law (b) Raoult's law
(c) Distribution law (d) None of the above

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Write short notes on effect of isotopic substitution in rotational spectroscopy.

Or

(b) Write short notes on finger print region in IR spectroscopy.

12. (a) Write any two applications of Raman spectroscopy.

Or

(b) Explain ESR spectrum of hydrogen atom.

13. (a) Illustrate the point group of H₂O molecule.

Or

(b) Write short notes on groups, subgroups and classes.

14. (a) Derive Arrhenius equation.

Or

(b) Explain Ostwald's isolation method for calculating order of a reaction.

15. (a) Explain Freundlich adsorption isotherm.

Or

(b) Write the properties of an ideal solution.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)

Each answer should not exceed 600 words.

16. (a) Explain the principles of infrared spectroscopy.

Or

(b) Explain the principles of rotational spectroscopy.

17. (a) Write the applications of NMR spectroscopy.

Or

(b) Write the application of ESR spectroscopy.

18. (a) Explain the point group of NH_3 .

Or

(b) Write the group multiplication table of NH_3 and explain.

19. (a) Explain ARR theory.

Or

(b) Discuss Lindemann theory of unimolecular reactions.

20. (a) Explain B.E.T. isotherm.

Or

(b) Write the applications of liquid crystals.
