C 30321 (Pages : 3) Name.....

Reg. No.....

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2017

(CUCBCSS—UG)

Chemistry

CHE 5B 08—PHYSICAL CHEMISTRY—II

Time : Three Hours Maximum : 80 Marks

Section A

Answer **all** *questions.*
Each question carries 1 *mark.*

1. The radiation absorbed in vibrational spectroscopy is ————.
2. The number of fundamental modes of vibration in CH_3Cl is ————.
3. What is the point group of H_2O molecule ?
4. Solutions with same osmotic pressure is called ————.
5. Mention the number of phases present in mixture of H_2, O_2 and N_2.
6. The unit of first order reaction is :
7. Name a non-radiative transition.
8. Give an example for a symmetric top molecules.
9. Decrease in the intensity of an absorption band is called :
10. The minimum vibrational energy of a molecule is :

(10 × 1 = 10 marks)

Section B

Answer any **ten** *questions.*
Each question carries 2 *marks.*

11. Explain the term gold number.
12. Crystalline Na_2CO_3 10 H_2O on keeping in air become white powder. Why ?
13. What is congruent melting point ? Give one example.
14. Explain Hardy Schulze rule with suitable example.
15. Rotation-reflection axis is also called improper axis. Why ?
16. Explain the term R_f value.

Turn over

17. Explain an auxochrome with a suitable example.

18. Distinguish between order and molecularity

19. What is meant by zero order reaction ? Give one example.

20. What is meant by critical solution temperature ?

21. The half life time of a first order reaction is 450 *s*. Calculate the rate constant for the reaction.

22. Derive the rate expression for a first order reaction.

(10 × 2 = 20 marks)

Section C

Answer any **five** *questions.*
Each question carries 6 *marks.*

23. Construct the multiplication table for C_2V point group.

24. Derive Langmuir adsorption isotherm. Discus its features.

25. Explain ion exchange chromatography with a suitable example.

26. Explain briefly the origin of rotational spectrum.

27. What is zeta potential ? What is its significance ?

28. Explain with example the terms phase, number of components and degrees of freedom.

29. Write a note on photochemistry of Hydrogen-Chlorine reaction.

30. Derive an expression for a first order reaction.

(5 × 6 = 30 marks)

Section D

Answer any **two** *questions.*
Each question carries 10 *marks.*

31. (a) Explain the theory of NMR spectroscopy.

    (b) Write a note on the factors influencing rate of a reaction.

(5 + 5 = 10 marks)

32. (a) Discuss the principles of thin layer chromatography.

(b) Discus the phase diagram of water.

(c) State and explain Stark-Einstein's law of photochemical equivalence. What is its significance ?

(3 + 4 + 3 = 10 marks)

33. (a) Write a note on preparation and purification of colloids.

(b) The frequency separation of successive lines in the rotational spectrum of HCl is 21.18 cm^{-1}. Calculate the bond length.

(5 + 5 = 10 marks)

34. (a) Discuss the Lindemann theory of unimolecular reactions.

(b) Write a note on gel permeation chromatography.

(c) Write a note on chemiluminiscence.

(5 + 3 + 2 = 10 marks)

[2 × 10 = 20 marks]