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Name.......................................

Reg. No...................................

FIFTH SEMESTER B.A./B.Sc. DEGREE EXAMINATION, NOVEMBER 2020

(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. Give one example of heterogeneous catalysis.

2. Define order of a reaction.

3. Instantaneous emission of radiant energy after its absorption by a substance is called ————.

4. When the temperature increases, adsorption ————————.

5. At triple point of water, the number of degree of freedom is ————————.

6. Define Phase.

7. Expand HPLC.

8. The number of NMR signals that the protons of TMS give is ————————.

9. Give the mathematical representation for the rotational constant B.

10. Define identity operation.

(10 × 1 = 10 marks)

Section B

Answer at least five questions.

Each question carries 4 marks.

All questions can be attended.

Overall ceiling 20.

11. What is hyperfine splitting in ESR spectroscopy ?

12. Sketch the vibrational modes of H_2O.

Turn over

13. What is a mathematical group ?

14. Write a short note on gas chromatography.

15. Explain the term congruent melting point. Give an example of such a binary condensed system.

16. State and explain Nernst distribution law.

17. Explain zeta potential.

18. Sketch the Langmuir adsorption isotherm.

19. Differentiate between adsorption and absorption.

20. State Grothus-Draper law of photochemical equivalence.

21. What is fluorescence ?

22. Explain steady state approximation.

(5 × 4 = 20 marks)

Section C

Answer at least **four** *questions.*
Each question carries 7.5 marks.
All questions can be attended.
Overall ceiling 30.

23. Draw the Jablonski diagram and explain the various transitions involved.

24. Define quantum yield of a photochemical reaction. Explain the high quantum yield for the light induced hydrogen-chloride reaction.

25. Discuss on the ESR spectrum of phenyl radical.

26. What is meant by chemical shift ? Discuss the factors affecting it.

27. Discuss the phase diagram of lead-silver system.

28. Explain the group multiplication table for C_{2h} point group.

29. How does temperature affect rate of a reaction. Arrive at the Arrhenius equation and explain the influence on reaction rate.

30. Write a note on optical and electrical properties of colloids.

(4 × 7.5 = 30 marks)

Section D

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

31. (a) Discuss on Lindemann theory of unimolecular reactions.

    (b) Write a note on thin layer chromatography.

32. (a) Discuss the phase diagram of sodium sulphate-water system.

    (b) What are partially miscible and immiscible liquid systems ? Give examples for each.

33. (a) Discuss on the complementary character of IR and Raman spectroscopies.

    (b) Write a note on emulsions and gels.

34. (a) What are singlet and triplet states ?

    (b) What are the applications of rotational spectroscopy ?

(2 × 10 = 20 marks)