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Reg. No.....

Name.....

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, NOVEMBER 2022

Fourth Semester

Complementary Course—ADVANCED PHYSICAL CHEMISTRY – II

(For Student who have opted Physical Science and Geology as main)

(2013-2016 Admissions)

Time : Three Hours Maximum Marks : 60

Part A

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

1. How many normal modes of vibration may a diatomic molecule have ?
2. Define Chromophore.
3. What is the order of a reaction ?
4. What is zero point energy ?
5. State Beer–Lambert law.
6. Define standard electrode potential
7. What is electrochemical series ?
8. Define equivalent conductance.

(8 × 1 = 8)

Part B

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

9. Sketch the different vibrational modes of H_2O. Which of them are IR active ?
10. State and explain Frank–Condon principle.
11. The rate constant of a first order reaction is $7 \times 10^{-4} S^{-1}$. What is the time taken for the reactant to be reduced to one-fourth of the initial concentration ?
12. An aqueous solution if Sodium Cyanide is basic. Explain reason.
13. What are the possible electronic transition for organic compounds ?

Turn over

14. Define Faraday's law of electrolysis.

15. What are the limitations of liquid junction potential ?

16. Explain photosensitised reaction.

17. Construct Calomel electode and explain it uses.

18. Explain the hydrogen-Oxygen fuel cell.

(6 × 2 = 12)

Part C

Answer any **four** *questions.*
Each question carries 4 *marks.*

19. Derive an expression for the moment if inertia of a diatomic rigid rotator.

20. Explain two methods for the determination of the order of a reaction.

21. Differentiate between Phosphorescence and fluorescence.

22. Derive an expression for e.m.f. of a concentration cell with transference.

23. Explain the oxidation-reduction titration.

24. Explain the determination of transport number using moving boundary method.

(4 × 4 = 16)

Part D

Answer any **two** *questions.*
Each question carries 12 *marks.*

25. (a) Define molar extinction co-efficient. Explain its importance.

    (b) The pure rotational spectrum of HCl consist of equally spaced lines separated by 20.8 cm^{-1}. Calculate the moment of inertia and bond length.

    (c) Explain how internuclear separation can be studied from pure rotational spectra.

26. Explain the application of e.m.f. measurements.

27. (a) Explain the application of conductance measurements.

    (b) What are the advantages of conductometric titrations ?

28. (a) Give Arrhenius equation and explain the significance of the Arrhenius parameters.

    (b) Discuss the methods for the determination of Arrhenius parameters.

    (c) Explain the term photoluminescence and chemiluminescence.

(2 × 12 = 24)