Reg. No. : ....

Name : ....

First Semester B.Sc. Degree Examination, January 2024

First Degree Programme under CBCSS

Chemistry

Complementary Course for Zoology

CH 1131.4 : THEORETICAL CHEMISTRY

(2020 Admission Onwards)

Time : 3 Hours   Max. Marks : 80

SECTION – A

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

1. Explain the term biomagnification.

2. What are the shapes of s and p orbitals?

3. Write the electronic configuration of Cr (z=24).

4. What is meant by hybridization?

5. State Pauli's exclusion principle.

6. Give reason for the non-formation of He_2 molecule.

7. Define normality of a solution.

8. What are the essential qualities of a primary standard?

9. Give two examples for green house gases.

10. What is the indicator used in iodometry?

(10 × 1 = 10 Marks)

SECTION – B

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

11. State and explain Hund's rule of maximum multiplicity.

12. Write Rydberg equation and explain the terms.

13. The shape of water molecule is not linear. Explain.

14. Write Schrodinger wave equation and explain the terms.

15. What are the conditions required for hydrogen bonding?

16. Differentiate the terms orbit and orbital.

17. What is meant by greenhouse effect?

18. What is meant by DO of water? What is the optimum value of DO for good quality water?

19. What is meant by reverse osmosis?

20. Which indicator used in the titration of sodium carbonate against hydrochloric acid? What is the end point?

21. How to prepare 0.2 M, 100ml NaOH solution. (Mol wt. of NaOH = 40)?

22. What is a redox indicator? Give any two examples.

(8 × 2 = 16 Marks)

SECTION – C

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

23. Discuss the atomic spectrum of hydrogen.

24. Explain the stability of filled and half-filled orbitals with suitable example.

25. State and explain Fajan's rules.

26. How does the concept of hybridization to explain the geometry of PCl_5 molecule?

27. What is electrodialysis? Explain how it is useful in the purification of waste water.

28. What are detergents? Discuss the chemistry of detergent action.

29. What is meant by BOD of water? How is BOD of a water sample estimated?

30. Discuss briefly the principle of permanganometric titrations with suitable example.

31. Discuss the titration curves for the titration of strong acid with weak base and weak acid with strong base.

$(6 \times 4 = 24$ Marks$)$

SECTION – D

Answer any **two** questions. **Each** question carries **15** marks.

32. (a) Discuss the MO energy diagram of O_2 molecule highlighting its bond order, stability and magnetic behaviour.   8

    (b) What is Born-Haber cycle? Discuss it with respect to NaCl.   7

33. (a) Derive an expression for the spectral frequency during the electronic transition between two orbits of the H atom from Bohr equation.   9

    (b) Discuss the limitations of the Bohr atom model.   6

34. (a) Discuss the various factors responsible for agricultural pollution.   6

    (b) Discuss the causes and consequences of ozone layer depletion.   9

35. (a) Explain the principle of colorimetry. Discuss any two of its applications.   7

    (b) Discuss the principle of dichrometric titrations with suitable example.   8

$(2 \times 15 = 30$ Marks$)$

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