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First Semester B.Sc. Degree Examination, June 2022

First Degree Programme under CBCSS

Chemistry

Complementary Course I for Botany/Zoology/Microbiology

CH 1131.3/CH 1131.4/CH 1131.7 : THEORETICAL CHEMISTRY

(2017-2019 Admission)

Time : 3 Hours Max. Marks : 80

SECTION – A

Answer **all** questions in **one** word to maximum **two** sentences. **Each** question carries **1** mark.

1. Which is the lowest principal quantum number with g orbitals?
2. Name quantum number which proposes the five different orientations for d-subshell.
3. What is the bond angel in BeF_2?
4. Predict the structure of ammonia molecule.
5. What is the bond order of NO^+?
6. Which layer of atmosphere has the maximum concentration of ozone?
7. Write the electronic configuration of Nitrogen.

P.T.O.

8. Calculate amount of oxalic acid required to prepare one liter of 0.5 solution.

9. Predict the change in oxidation number of Cr in dichromatic titrations.

10. Name the cation which produce dirty white precipitate in the inter group separation in 4^{th}.

(10 × 1 = 10 Marks)

SECTION – B

Short answer type. Answer any **eight** questions. **Each** question carries **2** marks.

11. Give the Schrodinger wave equation for an electron wave propagating in three dimensions in space and explain the terms.

12. Describe the importance of azimuthal quantum number.

13. Describe Pauli's exclusion principle.

14. Water is a liquid and H_2S is a gas at normal conditions. Justify.

15. Briefly explain the different type of chemical bonds in molecules.

16. Identify the structure of ClF_3.

17. Explain the term lattice energy.

18. Explain greenhouse effect.

19. Describe the required qualities for drinking water.

20. What are the impacts of acid rain on environment?

21. Draw the titration curve for a weak acid against strong base.

22. Describe the use of H_2SO_4 in permanganometry.

(8 × 2 = 16 Marks)

SECTION – C

Short essay type. Answer any **six** questions. **Each** question carries **4** marks.

23. Write the electric configuration of Cr (24) and Cu (29) with proper justification.

24. Compare the stability of O_2, O_2^{2+} and O_2^{2-} with the help of MO Theory.

25. Describe the structure of IF_7.

26. Differentiate between BOD and COD.

27. Write a note on agricultural pollution of water.

28. Describe the role of ozone in prevailing harmful radiations.

29. What are the conditions for using a compound as primary standard?

30. Explain two methods for determining the concentration of an oxalic acid solution.

31. Describe the theory of redox indicators.

(6 × 4 = 24 Marks)

SECTION – D

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

32. (a) Write note on Hund's rule in orbital filling;
    (b) With the help of Bohr theory explain the origin of spectral lines of Hydrogen.
    (5 + 10)

33. (a) Draw the MO energy level diagram of CO;
    (b) Describe the formation of polar covalent bond with the help of Fajan's rule.
    (5 + 10)

34. Briefly discuss the methods for treating industrial waste water.

35. Explain the application of common ion effect and solubility product in intergroup separation.

(2 × 15 = 30 Marks)
