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Reg. No. : .....

Name : .....

First Semester B.Sc. Degree Examination, March 2023

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

PART – A

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

1. How do Balmer series of lines in the hydrogen spectrum arise?
2. Define Hund's rule.
3. Give the electronic configuration of copper (Z = 29).
4. Define hydrogen bonding.
5. Draw the shape of SF_6 and give its hybridization.
6. Calculate the bond order of Li_2.
7. Give two examples for a primary standard.
8. Give Beer-Lambert's law.

9. Define BOD.

10. What is ozone hole?

(10 × 1 = 10 Marks)

PART – B

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

11. Draw the shape of the orbitals d_{x2-y2} and d_{xy}.

12. Which of the following sets of quantum numbers are not allowed?

    (a) n = 2, l = 1, m = 0, s = +1/2

    (b) n = 3, l = 2, m = 0, s = +1/2

    (c) n = 2, l = 2, m = -1, s = -1/2

13. Write Schrodinger wave equation and explain the terms.

14. Comment on the magnetic behavior of NO and O_2^{2+}.

15. Write on the applications of Fajan's rule.

16. Discuss the deviation of bond angle in H_2O from 109° 28' to 104°50.

17. Differentiate between equivalence point and end point.

18. Calculate the mass of anhydrous sodium carbonate required to prepare 250 ml of 0.25 M solution.

19. Define redox titrations. What is meant by self-indicator?

20. What is meant by ozone depletion? Give an example of man-made chemical responsible for ozone depletion.

21. What is reverse osmosis? Give its principle.

22. Define greenhouse effect. How are humans impacting the greenhouse effect?

(8 × 2 = 16 Marks)

PART – C

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

23. Describe the special features of the spectrum of hydrogen atom.

24. Discuss the limitations of Bohr's theory.

25. An electron is in 4f orbital. Find out all the possible quantum numbers it can have.

26. Discuss the Born-Haber cycle for the formation of NaCl.

27. Draw the MO diagram of NO.

28. Why o-nitrophenol is more volatile than p-nitrophenol?

29. Explain acid-base titrations with examples.

30. Explain the principle and procedure for the estimation of zinc using EDTA.

31. Write on water pollution due to sewage water and industrial waste.

(6 × 4 = 24 Marks)

PART – D

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

32. (a) Write the postulates of Bohr atom model.

    (b) Derive an expression for the frequency of the spectral lines of hydrogen based on Bohr's theory.

33. (a) Explain the hybridization and geometry of compounds CCl_4, C_2H_4 and IF_5.

    (b) Silver halides have low solubility in water. Explain.

34. What are indicators? Explain acid-alkali and redox indicators with examples. Outline the conditions under which they act.

35. Write on different methods used for the treatment of industrial waste water.

(2 × 15 = 30 Marks)
