Reg. No. : ....

Name : ....

First Semester B.Sc. Degree Examination, June 2022

First Degree Programme under CBCSS

Chemistry

Complementary Course for Physics

CH 1131.1 : THEORETICAL AND ANALYTICAL CHEMISTRY

(2020 Admission Onwards)

Time : 3 Hours   Max. Marks : 80

SECTION – A

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

1. State Aufbau rule.

2. Give any two factors which determine the lattice energy of an ionic compound.

3. Give an example for a redox indicator.

4. Give the full name of ppm.

5. Give an example for secondary standard in volumetric analysis.

6. Give the ideal gas equation.

7. What is meant by a cyclic process?

8. Give an example for intensive property.

9. What is meant by internal energy?

10. Precipitation of cations in qualitative analysis is based on which factor?

(10 × 1 = 10 Marks)

SECTION – B

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

11. Explain oxidation-reduction titrations with a suitable example.

12. Give the mathematical form of first law of thermodynamics.

13. Calculate the solubility of AgCl at 373 K. The solubility product of AgCl is 3.4×10^{-2} mol/L.

14. What are the characteristics of a primary standard?

15. How does ionic product of water vary with temperature?

16. What is difference between molarity and molality?

17. A solution is prepared by dissolving 2g NaOH in distilled water to give 250 mL solution. Calculate the molarity of the solution.

18. Give two advantages of complexometric titrations.

19. Distinguish between sigma and pi bonds.

20. What is energy sequence rule?

21. What is meant by bond order?

22. What are the factors affecting the lattice energy?

23. What is binding energy and how is it calculated?

24. Give the mathematical relationship of Gibbs free energy.

25. Define Gibbs energy.

26. State second law of thermodynamics.

(8 × 2 = 16 Marks)

SECTION – C

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

27. What are spontaneous and nonspontaneous processes? Explain.

28. Explain the sp³d² hybridization.

29. Show that Cp-Cv=R.

30. Derive Gibbs- Helmholtz equation.

31. What is meant by VSEPR theory? What are the limitations?

32. How will you analyse a compound qualitatively?

33. Write a note on transition metal complexes.

34. What are the significances of Pauli's exclusion principle?

35. Discuss the Mullikan's approach of electronegativity scale.

36. Describe the titration curve of a strong acid with weak base.

37. Distinguish between orbit and orbital.

38. Discuss the theory of acid-base indicators.

(6 × 4 = 24 Marks)

N – 3982

SECTION – D

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

39. Explain the principle and applications of thin layer chromatography.

40. (a) What is common ion effect? What are its applications?

    (b) What is the significance of ΔG and ΔH?

41. Briefly discuss the energetics of ionic bond formation.

42. (a) One mole of an ideal gas expands against a constant external pressure of 1 atm from a volume of 10 dm^3 to a volume of 30 dm^3. Calculate the work done by the gas in joules.

    (b) Discuss the Born-Haber cycle considering the formation of NaCl.

43. (a) Calculate q.w, ΔU and ΔH for the reversible isothermal expansion of one mole of an ideal gas at 27°C from a volume of 10dm³ to a volume of 20 dm³.

    (b) Show that maximum work is produced in a reversible isothermal expansion of a gas.

44. Explain the various types of chemical bonds.

(2 $\times$ 15 = 30 Marks)

_____