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N – 3981

Reg. No. :

Name :

First Semester B.Sc. Degree Examination, June 2022

First Degree Programme under CBCSS

Chemistry

Complementary Course I for Physics/Geology

CH 1131.1/CH 1131.2 – THEORETICAL CHEMISTRY

(2017 – 2019 Admission)

Time : 3 Hours

Max. Marks : 80

PART – A

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

1. Which of the following molecules have dipole moment?

HF, Cl₂ and CO

2. State Hund's rule of maximum multiplicity.

3. What is radioactivity?

4. Write any two examples of acid-base indicators.

5. What is meant by mass number of an atom of an element?

6. Draw the geometry of H₂O molecule based on VSEPR theory.

P.T.O.

7. Write the electronic configuration of Zn.
8. What is normality?
9. What is the SI unit of radioactivity?
10. What is the hybridization of 'S' in SF₆?

(10 × 1 = 10 Marks)

PART – B

Short answer type.

Answer **any eight** questions from the following. Each questions carries **2** marks.

11. What are polar covalent bonds?
12. What is mass defect?
13. Discuss the Pauling's scale of electronegativity.
14. What is an indicator? What is its utility in titrimetric analysis?
15. Write the Schrodinger wave equation and indicate terms in it.
16. What is common ion effect?
17. Calculate the ground state energy of the electron (in eV) in He⁺.
18. State group displacement law.
19. What are primary standards?
20. Completely filled orbitals have extra stability. Justify.
21. Define half-life period of a radioactive substance.
22. Why is H₂O a liquid and H₂S a gas?

(8 × 2 = 16 Marks)

PART – C

Short essay type.

Answer **any six** questions from the following. Each questions carries **4** marks.

23. Differentiate intermolecular and intramolecular hydrogen bonding.
24. The activity of a mummy is 75% of the activity of living tissue. How old is the mummy? Half-life of C^{14} is 5730 years.
25. Write the molecular orbital electronic configuration of O_2 and O_2^{2-} . Calculate its bond order.
26. How does Lyman, Balmer, Paschen and Brackett lines are produced in H spectrum?
27. Briefly discuss the ceric sulphate dosimeter.
28. State postulates of Bohr's theory.
29. Write a note on redox titrations?
30. Explain Fajan's rules?
31. Discuss the importance of solubility product in qualitative inorganic analysis.

(6 × 4 = 24 Marks)

PART – D

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

32. What are quantum numbers? Explain different types of quantum numbers.
33. What is lattice energy? How do you determine experimentally the lattice energy with the help of Born–Haber cycle?

34. (a) Derive the expression for disintegration constant of a radioactive nuclide.
(b) Discuss the principle and applications of neutron activation analysis.
35. Write a note on thin layer chromatography (TLC).

(2 × 15 = 30 Marks)

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