

C 22062

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Name.....

Reg. No.....

**SECOND SEMESTER (CBCSS—UG) DEGREE EXAMINATION
APRIL 2022**

Chemistry

CHE 2B 02—THEORETICAL AND INORGANIC CHEMISTRY—II

(2021 Admissions)

Time : Two Hours

Maximum : 60 Marks

Section A (Short Answers)*Answer at least **eight** questions.**Each question carries 3 marks.**All questions can be attended.**Overall Ceiling 24.*

1. Explain how the shape of p orbitals are deduced on the basis of angular wave functions.
2. Calculate the short and long wavelength limits of the Balmer series in the spectrum of hydrogen atom.
3. Explain the characteristics of curves for the emission of radiations from a black body at different temperatures.
4. Demonstrate photoelectric effect on the basis of quantum theory.
5. What is Hamiltonian operator ?
6. What is the significance of ψ and ψ^2 ?
7. On the basis of MOT, show that the existence of stable Be_2 molecule is not possible.
8. Describe sp^3 hybridization with a suitable example.
9. What is variation principle ?
10. Write down the common features among VBT and MOT.
11. Comment on the magnetic property of C_2 molecule.
12. Illustrate the combination of two p_x atomic orbitals to form molecular orbitals.

(8 × 3 = 24 marks)

Section B (Paragraph)

*Answer at least **five** questions.
Each question carries 5 marks.
All questions can be attended.
Overall Ceiling 25.*

13. Derive the time independent Schrodinger wave equation.
14. Deduce the expression for energy of an electron in n^{th} orbit. Calculate the energy of electron in hydrogen atom in ground state.
15. Write the postulates of quantum mechanics.
16. What is valence bond theory ? Explain with an example.
17. Explain why hydrogen forms diatomic molecule while helium remains monoatomic.
18. Illustrate the hybridization and geometry of PCl_5 and IF_7 .
19. Explain the experiment which led to the discovery of spin of electrons.

(5 × 5 = 25 marks)

Section C (Essay)

*Answer any **one** question.
The question carries 11 marks.*

20. Explain Bohr theory of atom model. Derive the expression for Bohr radius. What are the shortcomings of Bohr theory ?
21. What is meant by bonding and antibonding molecular orbitals ? How are they formed ? Illustrate the concept on the basis of hydrogen molecule ion H_2^+ .

(1 × 11 = 11 marks)