21U207 (Pages: 2) Name: .....

Reg.No: .....

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2022

(CBCSS - UG)

(Regular/Supplementary/Improvement)

CC19U CHE2 B02 - THEORETICAL AND INORGANIC CHEMISTRY II

(Chemistry - Core Course)

(2019 Admission onwards)

Time : 2.00 Hours Maximum : 60 Marks

Credit : 2

Part A (Short answer questions)

Answer ***all*** questions. Each question carries 2 marks.

1. Depict the apparatus used for demonstrating photoelectric effect.
2. What are the values of m and n in Rydberg formula for Paschen series of hydrogen spectra?
3. What evidence supports the wave particle dual nature of electrons?
4. Write the time dependent Schrodinger wave equation and explain the terms.
5. What is the physical interpretation of linear hermitian operator?
6. Write the equation for energy of a particle in cubic three dimensional box and explain the terms.
7. Give the angular distribution plaots for the p orbitals.
8. What is Born-Oppenheimer approximation?
9. State variation theorem.
10. Write down Hamiltonian for H_2 molecule.
11. How does the MO theory explain the paramagnetism of O_2?
12. Write MO configuration of CO molecule and predict its magnetic behavior.

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

Answer ***all*** questions. Each question carries 5 marks.

13. Calculate the wave number and frequency of a radiation which has a wavelength of 6×10^5 pm
14. Explain the term Hermitian operator.

15. A car weighing 3.0 x 10^3 kg is moving on a highway. Its speed can be measured with an accuracy of ±0.0025 m hr^{-1} and its position with an accuracy of ± 0.01m. Is the Heisenberg uncertainty principle valid?

16. Explain with example the stability of electronic configurations with completely filled and half filled orbitals.

17. What is LCAO principle?

18. Give three differences between bonding and antibonding molecular orbitals.

19. Discuss shape of XeF_2 molecule on the basis of hybridization.

(Ceiling: 30 Marks)

Part C (Essay questions)

Answer any ***one*** question. Each question carries 10 marks.

20. Give postulates of Bohr theory. Discuss how Bohr explained the hydrogen spectrum an also list out the limitations of Bohr model.

21. (a) What are quantum numbers?
    (b) Discuss the significance of each quantum number.

(1 × 10 = 10 Marks)

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