

20U207

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Name:

Reg.No:

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2021

(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. List the main observations from black body spectra.
2. Write Rydberg formula and explain the terms.
3. Why doesn't the wave nature of a moving cricket ball become evident to an observer?
4. Find $(\hat{A} - \hat{B})f(x)$ if $\hat{A} = d/dx$; $\hat{B} = x^2$ and $f(x) = x$
5. State Heisenberg's Uncertainty principle.
6. What is meant by a well behaved wave function?
7. State and explain the Pauli exclusion principle.
8. What is Born-Oppenheimer approximation?
9. State variation theorem.
10. Write down Hamiltonian for H₂ molecule.
11. What is LCAO principle?
12. How does the MO theory explain the paramagnetism of O₂?

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

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

13. Starting from the expression of energy for an electron in Bohr orbit; deduce an expression for the wave number of radiations emitted for two orbits of Hydrogen atom.
14. Write the time dependent and time independent Schrodinger equation and explain the instances they are used.
15. Calculate the ground state energy of an electron confined in a one dimensional box of length 0.3 nm. Also calculate its energy when it is in $n=3$ level.
16. What are radial distribution curves? Explain the physical significance.
17. Calculate the bond orders of (i) B_2 (ii) B_2^+ (iii) B_2^-
18. Make comparison of VB and MO theories.
19. What is geometry of BeH_2 molecule? How will you explain geometry on the basis of hybridization?

(Ceiling: 30 Marks)

Part C (Essay questions)

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

20.
 - a) What is photoelectric effect?
 - b) Discuss how photoelectric effect established the particle nature of radiation.
 - c) The threshold wavelength of Cu is 300 nm. Calculate its threshold frequency and work function.
21.
 - a) What are quantum numbers?
 - b) Discuss the significance of each quantum number.

(1 × 10 = 10 Marks)
