

C 82417

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Name.....

Reg. No.....

SECOND SEMESTER B.A./B.Sc. DEGREE EXAMINATION, APRIL 2020

(CBCSS—UG)

Chemistry

CHE 2B 02—THEORETICAL AND INORGANIC CHEMISTRY—II

(2019 Admissions)

Time : Two Hours

Maximum : 60 Marks

Section A (Short Answers)

Answer questions up to 20 marks.

Each question carries 2 marks.

1. Explain Einstein's interpretation of Photoelectric effect.
2. Calculate the wavelength of spectral line in Balmer series if $n_2 = 3$.
3. Sketch spectral series of hydrogen atom and label them. Which of these series is observed in visible region ?
4. What is an operator ? Give an example.
5. Write down expression for Hamiltonian operator.
6. Draw radial distribution curve of 1 s orbitals of H_2 .
7. What is antibonding molecular orbital ?
8. Explain LCAO principle.
9. What is the shape and angle of molecule in which the central atom undergoes :
 - (i) sp^2 hybridisation.
 - (ii) dsp^2 hybridisation.
10. Which p orbital is involved in (a) sp ; (b) sp^2 hybridisation.
11. What are the conditions to be satisfied for hybridization of atomic orbitals ?
12. What is orthogonality of hybrid orbitals ?

Turn over

Section B (Paragraph)

Answer questions up to 30 marks.

Each question carries 5 marks.

13. Calculate the radius of first orbit of hydrogen atom and calculate velocity and energy of an electron revolving in it. $\epsilon_0 = 8.854 \times 10^{-12} \text{ C}^2 \text{ m}^{-1} \text{ J}^{-1}$.
14. Explain the defects of Bohr atom model.
15. When are molecular orbital said to be (a) normalized ; (b) Hermitian.
16. What are the conditions for effective linear combination of atomic orbitals ? Explain.
17. Give angular distribution plots of d orbitals.
18. Explain Born-Oppenheimer approximation.
19. What is the type of hybridization in the formation of CH_4 ? Discuss.

Section C (Essay)

Answer any one question.

The question carries 10 marks.

20. (a) Explain terms radial distribution function and radial distribution curves.
(b) Draw the radial distribution curves for 1s, 2s and 2p orbitals of hydrogen atom.
21. (a) Calculate bond order of O_2 , O_2^- , O_2^+ .
(b) Compare their stability and arrange them in increasing order of bond strength and bond length.
(c) Draw molecular orbital diagram of O_2^{2+} .