19U207S (Pages: 2) Name……

Reg. No……

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2020

(CUCBCSS – UG)

(Supplementary/Improvement)

CC15U CHE2 B02 – THEORETICAL AND INORGANIC CHEMISTRY - II

(Chemistry - Core Course)

(2015 to 2018 Admissions)

Time: Three Hours Maximum: 80 Marks

Section A (One Word)

Answer ***all*** questions. Each question carries 1mark

1. Element with highest electron affinity is ……
2. Arrange the following species in the increasing order of bond energies: O_2, O_2^{2+}, O_2^{2-}
3. Shape of SF_6 molecule is ……
4. The lowest irremovable energy associated with a system is called ……
5. Give an example for a linear operator.
6. Hybridization of B in BH_3 is ……
7. Among N_2, B_2, C_2, O_2 the paramagnetic species are ……
8. CCl_4 has no net dipole moment due to ……
9. The time independent schrodinger equation is ……
10. Carbonate ion has …… resonance structures.

(10 x 1 = 10 Marks)

Section B (Short Answer)

Answer any ***ten*** questions. Each question carries 2 marks.

11. Write and explain Born-Lande equation.
12. Predict hybridization and shapes in BeF_2, BCl_3, CCl_4, NH_3.
13. Explain the modes of origin of Vander Waal's forces.
14. Write a note on applications of Born-Haber cycle.
15. Comment on the boiling points of ortho and para nitro phenol.
16. Draw the radial probability distribution curve of 3s and 3p orbitals.
17. Explain Fajan's rule with appropriate examples.
18. Explain the trend in electron affinity of halogen family.
19. Write a note on effective nuclear charge.

20. Explain Mulliken scale of electronegativity.
21. Write a note on degeneracy of states with respect to particle in a box model.
22. Briefly discuss the free electron theory in metallic bonds.

(10 x 2 = 20 Marks)

Section C (Paragraph)

Answer any ***five*** questions. Each question carries 6 marks.

23. Explain sp^3d and sp^3d^2 hybridisations with example.
24. Write a note on aufbau principle and explain the order of electron filling in orbitals.
25. Write a note on diagonal relationship of elements in periodic table.
26. Sketch the shape of different d-orbitals.
27. Give the M.O diagram of CO and comment on the bond order and magnetism of the molecule.
28. Write the important postulates of quantum mechanics.
29. Write a note on a) dipole-induced dipole b) induced dipole-induced dipole interactions.
30. Explain various factors influencing ionization energy and electron affinity of elements in the periodic table.

(5 x 6 = 30 Marks)

Section D (Essay)

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

31. Compare VB and MO theories of chemical bonding?
32. Derive the time independent Schrodinger wave equation for particle in a one dimensional box.
33. a) What are quantum numbers? Discuss the significance of each quantum number?

(7 Marks)

b) Explain Hund's rule of maximum multiplicity.

(3 Marks)

34. Write a note on different electronegativity scales.

(2 x 10 = 20 Marks)

****