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Name.....

Reg. No.....

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, JUNE 2016

(CUCBCSS – UG)

(Core Course: Chemistry)

CC15UCHE2B02-Theoretical and Inorganic Chemistry

(2015 Admission)

Time: Three Hours

Maximum: 80 Marks

Section A (One word)

Answer all ten questions. Each question carries 1 mark

1. If an operator satisfies the condition $\hat{A} [c_1f(x)+c_2g(x)] = c_1[\hat{A} f(x)]+c_2[\hat{A} g(x)]$ is known asoperator.
2. In the expression $\hat{A} f(x) = g f(x)$, g is called
3. The ground state electron configuration of copper atom is
4. In a semiconductor, there is a gap between the two energy levels.
5. The element with atomic number 57 belongs toblock in periodic table.
6. The increasing order of radii of O^{2-} , Na^+ , Mg^{2+} and F^- is.....
7. The hybridization state of iodine in IF_7 is.....
8. The increasing order of bond length in C_2^+ , C_2 and C_2^- is
9. In N_2 molecule $\sigma 2p_z$ molecular orbital is filled filling $\pi 2p_x$ and $\pi 2p_y$ molecular orbitals.
10. The structure of CO_3^{2-} is

Section B (Short answer)

Answer any ten questions. Each carries 2 marks.

11. What is meant by well behaved wave function?
12. What is the aufbau order of energy levels?
13. Number of electrons that can be accommodated in an orbital is restricted to two. Why?
14. Sketch the shapes of 2p orbitals .
15. Among F and Cl , which will have higher electron gain enthalpy. Why?

16. What is bond order? How is it related to bond enthalpy and bond length?
17. What is meant by pseudo-transition elements?
18. Using VSEPR theory, explain the shape of BF_3 molecule.
19. Give the various resonating structures of O_3 .
20. Name the different types of van der Waals forces.
21. Ca^{+2} ion is smaller than Ca atom. Why?
22. Half-filled and fully filled electronic configurations have greater stability. Why?

Section C (Paragraph)

Answer any five questions. Each question carries 6 marks

23. State and explain all the rules relevant in the filling up of atomic orbitals
24. State and explain the postulates of quantum theory.
25. Second ionization enthalpy of sodium is greater than its first ionization enthalpy. Explain why?
26. How is it possible to predict the ionic character of a bond?
27. Discuss the differences between the sigma and pi bonds.
28. Distinguish between bonding and anti-bonding molecular orbitals.
29. Explain the electrical and thermal conductivities of metals by using band theory.
30. Draw the MO energy diagram of NO. Find out the bond order. Discuss the stability and magnetic behaviours.

Section D (Essay)

Answer any two questions. Each question carries 10 marks

31. Explain the concept of hybridization taking PCl_5 , SF_6 and IF_7 . draw their structures.
32. Derive the expression for energy of a particle in a one dimensional box. What is zero point energy? Briefly discuss one application of the particle in a box model.
33. Discuss a) Slater theory and its applications.
b) Born-Landé equation and mention its significances.
34. Discuss the salient features of VB theory and MO theory. Make a comparison of these two theories.
