

18U207

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Name.....

Reg. No.....

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2019

(Regular/ Supplementary/Improvement)

(CUCBCSS – UG)

Core Course: Chemistry

CC15U CHE2 B02 - THEORETICAL AND INORGANIC CHEMISTRY

(2015 Admission onwards)

Time: Three Hours

Maximum: 80 Marks

Section A (One word)

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

1. Photoelectric effect provides experimental evidence fornature of light.
2. O – nitrophenol has lower boiling point compared to P - nitrophenol due to
3. The number of unpaired electrons in Fe^{3+} is
4. The probability amplitude is denoted asin wave mechanics.
5. The element with atomic number 72 belongs to block in periodic table.
6. Degenerate orbitals are having equal
7. The hybridization state of iodine in IF_7 is
8. N_2 and NO^+ are both magnetic.
9. Electro negativity of SP^3 hybridized orbital isthan that of SP hybridized orbital.
10. The structure of PCl_5 is

(10 x 1 = 10 Marks)

Section B (Short answer)

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

11. Write down the expressions for the radius of Bohr orbit and energy of electron in H like atom. Explain the terms.
12. State variation theorem.
13. Number of electrons that can be accommodated in an orbital is restricted to two. Why?
14. Sketch the radial probability of an orbital of $n = 3$ and $l = 1$.
15. Among Ne and Ar, which one will have higher ionization enthalpy? Why?
16. How is bond order related to bond enthalpy and bond length? Define bond order.
17. Under what conditions the molecular orbital is termed to be normalized ?
18. Using VSEPR theory, explain the shape of BF_3 molecule.
19. Hybrid orbital is better oriented than a pure orbital. Why?

20. How is the electrical properties of metals explained with free electron model?
21. How is dipole- dipole interaction related to Kelvin temperature?
22. State Born- Lande equation and explain the terms.

(10 x 2 = 20 Marks)

Section C (Paragraph)

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

23. State and explain postulates of Bohr atom model.
24. Calculate the kinetic energy of an electron emitted from the surface of a metal by light of wave length 350nm. The threshold frequency of metal is $5 \times 10^{14} \text{ s}^{-1}$. ($h = 6.6 \times 10^{-34} \text{ J}$.)
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 postulates of quantum mechanics.
28. Distinguish between bonding and anti bonding molecular orbitals.
29. Account for the magnetic behavior of oxygen molecule with the help of MO diagram.
30. Write briefly on the intermolecular forces.

(5 x 6 = 30 Marks)

Section D (Essay)

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

31. a) Explain the drawbacks of Bohr atom model.
b) Calculate the wave length of the matter wave associated with a cricket ball of 240 grams moving with a velocity of 38 m s^{-1} .
32. Derive the wave equation for a particle in a three dimensional box applying the separation of variables method.
33. Discuss
 - a) Modern periodic table reflects the electronic configuration of elements?
 - b) Band theory of metals.
34. a) Draw the MO diagram of CO molecule and explain
b) Make a comparison of VB and MO theories.

(2 x 10 = 20 Marks)
