17U231 (Pages: 2) Name:……

Reg.No……..

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2018

(Regular/ supplementary/ Improvement)

(CUCBCSS-UG)

(Core course: Chemistry)

CC15U CHE2 B02 -THEORETICAL AND INORGANIC CHEMISTRY-II

(2015 Admission onwards)

Time: Three hours Maximum: 80 marks

Section A

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

1. The Hamiltonian operator($\hat{H}$) is define as: ……..
2. The electronic configuration of titanium atom is ……..
3. The lowest energy state of an atom is called its ……..
4. A 1s orbital has …….. radial nodes.
5. The radius of $\mathbf{Cl^-}$ ion is …….. than that of **Cl** atom.
6. In Pauling's scale, fluorine has the electronegativity value of ……..
7. The susceptibility of an anion to undergo distortion by a nearby cation is called its ……..
8. The actual geometry of $\mathbf{XeF_4}$ molecule is ……..
9. The resultant dipole moment of $\mathbf{CO_2}$ molecule is ……..
10. The state of hybridisation of **P** in $\mathbf{PCl_5}$ is ……..

(10 x 1 = 10 Marks)

Section B

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

11. When is a wave function said to be normalised?
12. Write the time independent Schrödinger wave equation and explain the terms.
13. State and explain Pauli's exclusion principle.
14. Explain the term diagonal relationship.
15. What are inner transition elements? Why are they called so?
16. Electron affinities of noble gases are zero. Why?
17. The ionisation enthalpy of nitrogen is higher than that of oxygen. Why?
18. Define electronegativity. How does it vary down a group?
19. Define lattice energy.
20. Predict the hybridisation and shape of $\mathbf{SF_6}$, $\mathbf{SO_4^{2-}}$.

21. What is meant by a polar covalent bond?

22. What is a bonding molecular orbital?

(10 x 2 = 20 Marks)

Section C

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

23. What are the postulates of quantum mechanics?

24. Distinguish between orbital and orbit.

25. Explain the terms eigen value and eigen function.

26. Explain why the ionisation energy of transition element is reasonably constant.

27. Discuss the hybridisation and structure of ethylene and $\mathbf{SF_6}$

28. Define the term electron gain enthalpy. What are the factors that influences it?

29. Write a note on intermolecular forces.

30. Explain Fajan's rule and its applications.

(5 x 6 = 30 Marks)

Section D

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

31. What are quantum numbers? Discuss the significance of each quantum number.

32. A) Explain the terms screening effect and effective nuclear charge. B) Explain Pauling's scale of electronegativity.

33. What is Born- Haber cycle? Explain its applications.

34. Compare the bond length, bond energy and magnetic behaviour of $\mathbf{O_2}$, $\mathbf{O_2^+}$, $\mathbf{O_2^{2+}}$ and $\mathbf{O_2^{2-}}$ on the basis of MO Theory.

(2 x 10 = 20 Marks)

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