Roll No. ..... Total Pages : 4

337101

December, 2019

B.Sc. (H) CHEMISTRY-1st SEMESTER

Inorganic Chemistry-I (BCH -101)

Time : 3 Hours] [Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART - A

1. (a) Why 1s orbital is spherically symmetrical? (1.5)

(b) Calculate the wavelength associated with an electron having mass 9.01×10^{-31} kg and travelling with a speed, 40% of the speed of light. (1.5)

(c) Comment up on the existence of 4g orbital. (1.5)

(d) How vander wall's radius differ from covalent radius of an atom? (1.5)

(e) Why are electron affinities of halogen so high? (1.5)

(f) What is radius ratio rule? (1.5)

(g) Give the geometry of ClF_3, XeF_4 and Nitrate ion. (1.5)

(h) Draw two resonating structures of HNO_2. (1.5)

(i) What do you mean by equivalent and non-equivalent hybrid orbitals? (1.5)

(j) Draw Molecular orbital energy level diagram for O_2 molecule. (1.5)

PART - B

2. (a) Give Schrödinger wave equation. How it leads to the concept of orbital? (5)

(b) State and Explain Heisenberg's Uncertainty Principle and its relevance in our daily life. (5)

(c) State and explain Hund's rule of maximum multiplicity. (5)

3. (a) Explain the term effective nuclear charge. Calculate the effective nuclear charge for 3p electron in phosphorous atom. (5)

(b) Discuss the quantum numbers, their origin and significance in detail. (10)

2 (a) Define electronegativity. Discuss Allred and Rochow scale of electronegativity and using this calculate the electronegativity of nitrogen for which r = 74 pm. (5)

(b) What is ionization energy? Give and explain the factors affecting ionization energy? How does the ionization energy of the elements vary on moving down a group and along a period? (10)

5. (a) What is solvation energy? (2)

(b) Calculate Madelung constant for MgO from the data given below :

Distance of separation = 2.10 Å,

Born exponent = 7,

Lattice energy = –3940 kJ/mole

Electronic charge, e = 4.8×10^{-10} e.s.u. (3)

(b) What is Born-Haber cycle? Discuss its applications. (10)

6. (a) Discuss the main postulates of VSEPER theory. (5)

(b) Draw molecular orbital energy level diagram for NO molecules and using this compare the bond order of NO, NO^+ and NO^-. (5)

(c) Using BAND theory explain the behavior of conductors, insulators and semiconductors. (5)

7 (a) What is hydrogen bonding? Discuss the consequences of hydrogen bonding. (5)

(b) Describes Fajan's rule and consequences of polarisation. (10)
