

Roll No.....

Unique Paper Code : 32175901_OC
Name of the Paper : GE-1: Atomic Structure, Bonding, General Organic Chemistry & Aliphatic Hydrocarbons
Name of the Course : **B.Sc.(H) Physics/ Botany/ Zoology/ Mathematics**
Semester : I
Duration : 3 hrs
Maximum Marks : 75

Instructions for Candidates

1. Write your roll number on the top immediately on receipt of this question paper.
 2. Attempt two questions from Section A and two questions from Section B.
 3. Sections A and B are to be attempted in separate answer sheets.
 4. Please indicate the section you are attempting at the appropriate place and do not intermix the sections.
- The questions should be numbered in accordance to the numbers in the question paper.
5. Calculators and Log tables may be used.

SECTION A**Attempt any two questions**

(Question No. 1 is compulsory)

1. (a) Plot the radial distribution curve for 3s, 4p, 3d and 5f orbitals
(b) Write short note on
 - (i) Fajan's Rule
 - (ii) Pauli Exclusion Principle
- (c) Write the hybridization and shape of the following molecules

PCl₅, NH₃, XeF₄, ClO₃⁻.

(d) Explain the stability of half-filled and fully filled orbitals.

(e) Explain why PCl_5 is more reactive than SF_6 molecule. (4,4,4,4,3.5)

2. (a) Write short note on the following:

- i. Resonance
- ii. Hund's Rule
- iii. Born Lande's equation

(b) Differentiate between Valence bond theory and Molecular Orbital theory

(c) Explain on the basis of Molecular Orbital theory N_2 is diamagnetic while O_2 is paramagnetic.

(d) CuCl and AgCl are insoluble in water while NaCl is soluble. Why? (6,4,4,4)

3. (a) Write short note on the following:

- (i) Heisenberg's Uncertainty Principle
- (ii) Radial Probability Distribution Curves
- (iii) Dipole Movement

(b) Arrange the electron represented by the following set of the quantum numbers in the increasing order of energy:

- (i) $n = 3, l = 2, m = 0$ and $s = +1/2$
- (ii) $n = 4, l = 0, m = 0$ and $s = +1/2$
- (iii) $n = 3, l = 0, m = 0$ and $s = +1/2$
- (iv) $n = 3, l = 1, m = +1$ and $s = -1/2$

(c) Explain the Monoatomic nature of Helium and Diatomic nature of Hydrogen

(d) Explain the following:

- (i) In SF_6 all the S-F bonds are equal while in PF_5 all the P-F bonds are not equal.
- (ii) Lattice Energy of alkali metal fluoride decreases from LiF to CsF . (6,4,4,4)

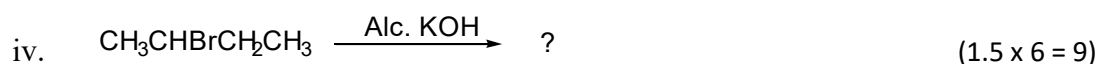
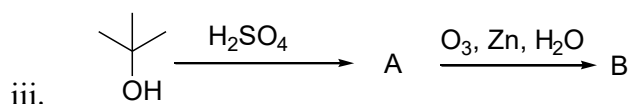
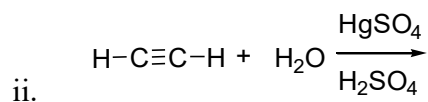
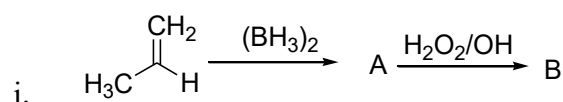
SECTION B

Attempt any two questions

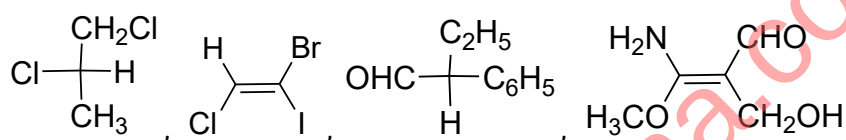
(Question No. 4 is compulsory)

4. a) Give the reason for the following (Any five)
- Chair confirmation of cyclohexane is more stable than the boat conformation
 - Meso compounds are optically inactive
 - Why propene is more acidic than propane.
 - Which is more basic methylamine or aniline and why?
 - Which is more acidic, ethanoic acid or 2-chloroethanoic acid and why?
 - Benzyl carbocation is more stable than allyl carbo cation. (4,4,4,4,3.5)
5. a) Explain the following (Any four)
- Mechanism of halogenation of alkane
 - Aromaticity
 - The structure and stability of free radical
 - Hyperconjugation
 - Electromeric and Inductive effect (3 x 4)
- b) With Mechanism discuss the following reaction (Any two)
- Kolbe's reaction
 - Ozonolysis of alkenes.
 - Oxymercuration-demercuration Reaction (3 x 2)

6. a) Complete the Following Reactions



b) Assign R/S or E/Z to the following isomers



4

c) Which of the following is Aromatic and Why?



3

d) Discuss the effect of Electron releasing group on the inductive effect.

2