SET I

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

PCl_5, NH_3, XeF_4, ClO_3^-.

(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)

   i. Chair confirmation of cyclohexane his more stable than and the boat conformation

   ii. Meso compounds are optically inactive

   iii. Why propene is more acidic then propane.

   iv. Which is more basic methylamine or aniline and why?

   v. Which is more acidic, ethanoic acid or 2-chloroethanoic acid and why?

   vi. Benzyl carbocation is more stable than allyl carbo cation. (4,4,4,4,3.5)

5. a) Explain the following (Any four)

   i. Mechanism of halogenation of alkane

   ii. Aromaticity

   iii. The structure and stability of free radical

   iv. Hyperconjugation

   v. Electromeric and Inductive effect (3 x 4)

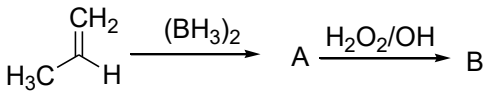
   b) With Mechanism discuss the following reaction (Any two)

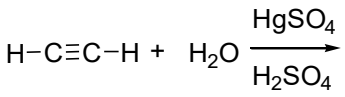
   i. Kolbe's reaction

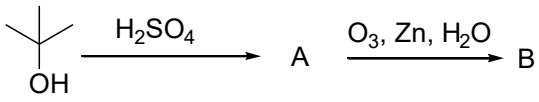
   ii. Ozonolysis of alkenes.

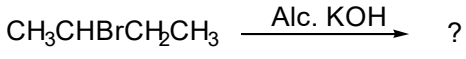
   iii. Oxymercuration-demercuration Reaction (3 x 2)

6. a) Complete the Following Reactions

i. 

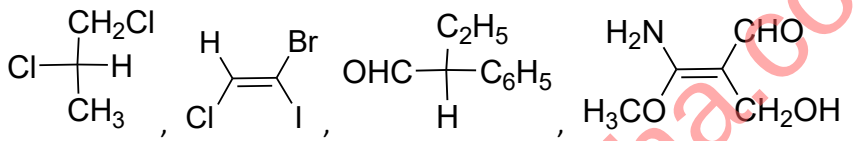
ii. 

iii. 

iv. 

(1.5 x 6 = 9)

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



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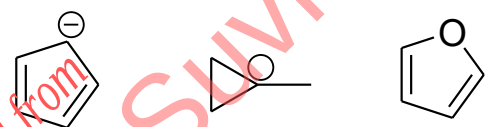
c) Which of the following is Aromatic and Why?



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d) Discuss the effect of Electron releasing group on the inductive effect. 2