Progressive Education Society's
Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16
End Semester Examination: Nov 2023
Faculty: Science and Technology

Program: B.Sc. **Semester: III** **SET: A**
Program (Specific): B.Sc. General **Course Type: Core**
Class: S.Y.B.Sc. **Max. Marks: 35**
Name of the Course: Organic and Inorganic Chemistry
Course Code: 23-CH-302 **Time: 2Hrs**
Paper: II

Instructions to the candidate:

1) *There are 4 sections in the question paper. Write each section on separate page.*
2) *All Sections are compulsory.*
3) *Figures to the right indicate full marks.*
4) *Draw a well labelled diagram wherever necessary.*
5) *Atomic number of P =15, Cl =17*

SECTION: A

Q1) Answer the following: **5 x 1 Mark = 5 Marks**

a) State Huckel's rule of aromaticity with suitable example.

b) State Markownikoff's rule with suitable example.

c) State Saytzeff's rule with suitable example.

d) How will you prepare ethyl bromide from ethanol?

e) How will you prepare ethanol from acetaldehyde?

Q2) Answer any four of the following: **4 x 1 Mark = 4 Marks**

a) Write the general electronic configuration of **p block** elements.

b) What is the bond order of N_2 molecule?

c) Name all the elements of Group **IV A**.

d) Write molecular configuration of C_2 molecule

e) Draw the structure of H_2SO_4 molecule.

f) Sketch the **σ** MOs from **s-p** combination of orbitals.

SECTION: B

Q3) Answer any four of the following: **4 x 2 Marks = 8 Marks**

i) Hexane is miscible in benzene whereas ethanol is miscible in water. Explain.

ii) What is aromatic electrophilic substitution? Explain nitration of benzene.

iii) What is Friedel Craft alkylation? State its two limitations.

iv) Write the reactions of methyl bromide and isopropyl chloride with KCN.

v) Explain the use of Lucas reagent for the identification of types of alcohols.

vi) Write two methods of preparation of benzene.

SECTION: C

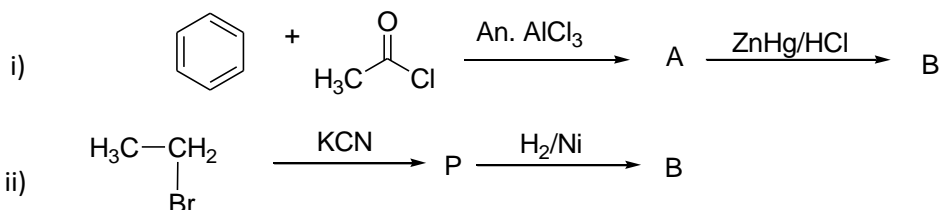**Q4) Answer any four of the following:**   **4 x 2 Marks = 8 Marks**

i) Distinguish between σ and π molecular orbitals.

ii) Explain anomalous behavior of Boron in Group **III A**.

iii) Explain why **He$_2$** molecule does not exist.

iv) Explain inert pair effect.

v) Draw the MO energy level diagram of **CO** molecule.

vi) Discuss the structure of **PCl$_5$** molecule with respect to hybridization and geometry.
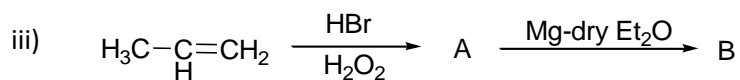
SECTION: D

Q5) Answer any two of the following: **2 x 5 Marks = 10 Marks**

a) What is S$_N$2 reaction? Discuss the mechanism and energy profile diagram with suitable example.

b) Predict the products in the following reactions. (**any 2**)

i)
$$\text{Benzene} + H_3C-\underset{\underset{Cl}{}}{\overset{O}{C}} \xrightarrow{\text{An. AlCl}_3} A \xrightarrow{\text{ZnHg/HCl}} B$$

ii)
$$H_3C-CH_2-Br \xrightarrow{\text{KCN}} P \xrightarrow{\text{H}_2/\text{Ni}} B$$

iii) $H_3C-\underset{\underset{H}{|}}{C}=CH_2$ $\xrightarrow[H_2O_2]{HBr}$ A $\xrightarrow{\text{Mg-dry Et}_2O}$ B

c) Explain trends of (i) Size of atoms (ii) Electronegativity seen in elements of Group **VII A**.

d) Discuss the bonding of **O_2** molecule with help of MO theory. Comment on its bond order, stabilization energy and magnetic property.