[2½ Hours]  [ Marks : 60]

Please check whether you have got the right question paper.

N.B: 1. All questions are compulsory.
      2. Figures to the right side indicate full marks.

1. (a) Attempt any two of the following : 08
   i) Complete the following reaction. Give its name and draw its mechanism.

   \[ \text{RC≡N} \xrightarrow{\text{H}_2\text{O}} ? \]

   ii) Give one example each of
       Darzen’s glycidic ester synthesis
       Peterson’s olefination.

   iii) What are multi component reactions? How will you synthesize the
       following using Strecker Synthesis?

   iv) Give the product and name of the following reactions.

(b) Attempt any one of the following : 04
   i) What are the characteristics of Domino reactions? Explain the Nazarov
      Cyclisation.

   ii) Identify the product, name the reaction and explain the mechanism for the
      following.
2. (a) Attempt any two of the following:

i) Explain the following terms with a suitable example for each
   - Radical initiator
   - Electrophilic radical

ii) Give one example each of
   - Hunsdiecker reaction
   - McMurry coupling
   - Autooxidation
   - Oxidative coupling

iii) Discuss with suitable examples the generation of radicals by C-Co cleavage.

iv) Describe with suitable examples radical mediated C-C bond formation in aromatic compounds.

(b) Attempt any one of the following:

i) With a suitable example explain the mechanism of Mukaiyama esterification.

ii) Give one example each of
   - Persistent radical
   - Free radical substitution
   - Radical cyclisation
   - Nucleophilic radical

3. (a) Attempt any two of the following:

i) Complete the following reaction and give its name and mechanism.

\[ \text{H}_2\text{C} = \text{CH}_3 + \text{N}^+ \rightarrow ? \]

ii) With suitable example, explain how alkenes are obtained from phenyl sulfoxones and aldehydes? Give name of the reaction.

iii) Explain with suitable examples C-C bond formation by generation of carbanions in nitro and phosphonate compounds.

iv) Predict the product and name of the reaction. Discuss the mechanism involved.

\[ \begin{align*}
\text{O} & \quad \text{H}_2\text{C} - \text{C} = \text{CH}_2 \\
& \quad \text{1.} \text{H} \text{\textregistered} \\
& \quad \text{2.} \text{H}_2\text{O} \\
\end{align*} \]

(b) Attempt any one of the following:

i) Write a note on Bamford-Stevens reaction.
ii) Using phosphorus ylide, suggest the synthesis of following compound. Name the reaction involved and provide the mechanism.

![Image of a compound with a methyl group on a benzene ring]

4. (a) Attempt any two of the following:
   
i) Discuss the mechanism and stereochemistry of asymmetric hydroboration using chiral boron reagents.
   
ii) Complete the following reaction and predict its name and mechanism.

   ![Reaction with benzene, Si(CH₃)₃Cl, H₂C=CH₂, and TiCl₄]

   iii) Complete the following reaction and predict its name and mechanism.

   ![Reaction with Hg(OAc)₂, NaBH₄, and NaOH]

   iv) Complete the following reactions and identify I, II, III and IV.

(b) Attempt any one of the following:
   
i) Complete the following reaction by identifying A, B, C and D.

   ![Reaction with PhCH₂MgCl and (CH₂)₅SiCl]

   ii) Give the synthesis of 1,3-butadiene using PhSeCH₃.
5. Attempt **any four** of the following:
   
i) How will you synthesize the following by Biginelli reaction

![Biginelli reaction product](image)

ii) Give the product and mechanism of the following reaction.

![Reaction mechanism](image)

iii) Discuss the mechanism of Ugi 4 component reaction.

iv) With a suitable example, explain the mechanism of Acyloin condensation.

v) Complete the following reactions:

   1. cyclohexanone + piperidine

   2. cyclohexanone + morpholine

vi) Give structure of phosphorus and nitrogen ylides. Why are phosphorus ylides more stable than nitrogen ylides?

vii) Complete the following reaction and explain its mechanism.

![Reaction](image)

viii) Give three applications of alkyl silanes in organic synthesis.