(2) Figures to the right indicate full marks of the questions.

1. Give name of the rearrangement, end product(s) and offer suitable mechanism with supporting explanation briefly of any four of the following:

(i) \[ \text{H}_2\text{C}_6\text{OCHCl} ] \quad \xrightarrow{\text{(i) OH}} \quad \text{H}_2\text{C}_6\text{OCH}_{3} \]

(ii) \[ \text{H}_3\text{CCH}_2\text{NNO} ] \quad \xrightarrow{\text{NaNO}_2/\text{HCl} \quad 0 \degree \text{C}} \quad \text{H}_3\text{CCH}_{2}\text{NNO} \]

(iii) \[ \text{OHOH} ] \quad \xrightarrow{\text{(ii) OH}} \quad \text{H}_3\text{CCH}_2\text{NNO} \]
2. Answer any **THREE** of the following: [18]

(a) Give the disconnection and plan the synthesis for the following molecules:

(i) ![Chemical structure](image)

(ii) ![Chemical structure](image)

(iii) ![Chemical structure](image)
(b) How amino group is protected using different reagents? Compare merits and demerits of these reagents.

(e) What is disconnection? Give the disconnection and plan the synthesis for the following molecules:

(i) ![Chemical Structure Image]

(ii) ![Chemical Structure Image]

(iii) ![Chemical Structure Image]

(d) Explain the following transformation using appropriate reagents:

(i) Cyclopentanone → 1-(1-hydroxycyclopentyl)ethanone

(ii) Methyl 2,2-dimethyl-6-oxocyclohexanecarboxylate → (2,2-dimethyl-6-oxocyclohexyl)methyl acetate

(iii) Propargyl alcohol → 4-hydroxy-2-butynoic acid

3. Answer any THREE of the following:

(a) Give preparation and synthetic applications of organocopper compounds.

(b) Giving mechanism, write synthesis of lithium dialkyl cuprate with synthetic applications.

(c) What is transmetallation? Give applications of organolithium compound in organic synthesis.

(d) What is hydroboration? Give mechanism of hydroboration. Suggest the method to convert ethane to amino ethane via hydroboration. Describe synthetic importance of carbonylation reaction on organoborane compound with suitable examples.
4. Answer any **THREE** of the following:

(a) Give mechanism and three synthetic applications of Orton rearrangement.

(b) Give mechanism and three synthetic applications of Demjanov rearrangement.

(c) Give preparation and synthetic applications of organozinc compounds.

(d) Give the disconnection and plan the synthesis for the following molecules:

(i) \[ \text{CH}_2\text{OH} \]

(ii) \[ \text{NMMe}_2 \]

(iii) \[ \text{Ph} \]

\[ \text{NHMe} \]