

- ii. $\text{Mn}_2(\text{CO})_{10}$
 iii. $(\text{CO})_3\text{Co}(\mu\text{-CO})_2\text{Co}(\text{CO})_3$

Question Three**(6 marks)**

- a) State two factors that favour disproportionation reactions in transition metals.
- b) Give an example of disproportionation reaction in aqueous solution. **(2 marks)**
- c) Give the products or reactants or conditions labeled in letters and balance (where possible) the following chemical reactions: **(2 marks)**
- $\text{V}_2\text{O}_5(\text{s}) + \text{OH}^-(\text{aq}) \longrightarrow \text{A} + \text{B}$ **(10 marks)**
 - $\text{Pm}(\text{s}) + \text{N}_2(\text{g}) \xrightarrow{\text{heat}} \text{C}$
 - $\text{CrCl}_3 + \text{CO} + \text{Al} \longrightarrow \text{D} + \text{E}$
 - $\text{Co}_2(\text{CO})_8 \xrightarrow{h\nu} \text{F} + \text{G}$
 - $\text{CH}_2=\text{CH}_2 \xrightarrow{\text{I}} \text{CH}_3\overset{\text{O}}{\parallel}\text{CH}$
- d) Define the term π -acid ligands. **(2 marks)**
- e) Predict and explain which of the following complexes has the shortest C-O bond.

- $[\text{V}(\text{CO})_6]^-$
- $\text{Cr}(\text{CO})_6$
- $[\text{Mn}(\text{CO})_6]^+$

(4 marks)**Question Four**

- a) Define the following terms in organochemistry and use specific reactions to illustrate.
- Oxidative addition reaction
 - Hydride elimination reaction **(4 marks)**
- b) Show how $(\text{CH}_3)_2\text{CHCH}_2\text{CHO}$ can be prepared from $(\text{CH}_3)_2\text{C}=\text{CH}_2$ by the hydroformylation process. **(7 marks)**

