Student name:

Student No:

(1) Give structures of the starting materials and of compounds A through H.

A)

2-Butanol
$$\xrightarrow{PBr_3}$$
 A (C_4H_9Br) \xrightarrow{NaCN} B (C_5H_9N) $\xrightarrow{H_2O}$ C $(C_5H_{10}O_2)$

$$\frac{1) \operatorname{LiAlH}_{4}}{2) \operatorname{H}_{2} O} \rightarrow \operatorname{D} \left(\operatorname{C}_{5} \operatorname{H}_{12} O \right)$$

$$\stackrel{\text{O}}{\longleftarrow}$$
 $\stackrel{\text{CH}_3\text{OH}}{\longrightarrow}$ $\stackrel{\text{E}}{\longleftarrow}$ $\stackrel{\text{CH}_3\text{CH}_2\text{OH}}{\longleftarrow}$ $\stackrel{\text{F}}{\longleftarrow}$

- (2) Indicate the reagents needed for each of the following syntheses. More than one-step may be needed.
- A) Propanoyl chloride from propanol.
- B) *N*,*N*-Diethylaniline from benzoic acid.