Exercise 107 - Reactivity

Question

Consider the follwing functional groups and rank them in order of decreasing reactivity. Explain your reasoning.

i)
$$\bigcup_{C}^{O}$$
 \bigcup_{C}^{O} \bigcup

iii)
$$\begin{array}{c} O \\ H_3C \end{array}$$
 $\begin{array}{c} O \\ O \\ OCH_3 \end{array}$ $\begin{array}{c} O \\ H_3C \end{array}$ $\begin{array}{c} O \\ O \\ OCH_3 \end{array}$ $\begin{array}{c} O \\ H_3C \end{array}$ $\begin{array}{c} O \\ O \\ O-CH_3 \end{array}$

Question

Some the following reactions won't work. Which ones and why?