

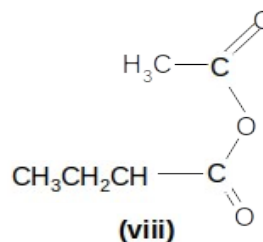
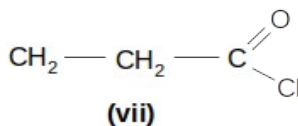
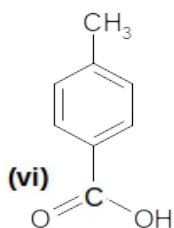
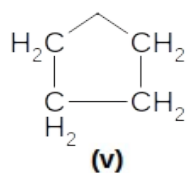
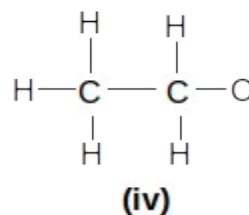
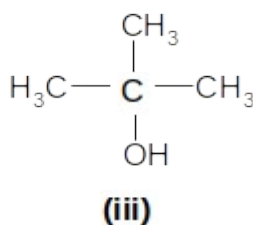
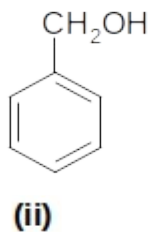
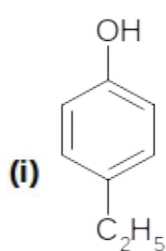


NATIONAL OPEN UNIVERSITY OF NIGERIA
14-16 AHMADU BELLO WAY, VICTORIA ISLAND LAGOS
SCHOOL OF SCIENCE AND TECHNOLOGY
MAY/JUNE 2012 EXAMINATION

CHM 305: Organic Chemistry III (3 Credit Units)
Time: 2½ Hours

INSTRUCTION: Answer question 1 and any other four Questions
(Five questions in all)

1. (a) Name the following compounds and state their functional classes.



- (b) Write the structural formulae of
(i) 3-methylbutan-2-ol (ii) 2-phenylethan-1-ol

2. In each of the following reactions of ethanol (an alcohol) described below, state
- The type of bond cleavage involved
 - The reaction conditions
 - Name of product

- (a) (i) Reaction as acid: $\text{C}_2\text{H}_5\text{OH} + \text{Na} \rightarrow$
 (ii) Esterification: $\text{C}_2\text{H}_5\text{OH} + \text{CH}_3\text{CO}_2\text{H} \rightarrow$
- (b) (i) Reaction with hydrogen halide: $\text{C}_2\text{H}_5\text{OH} + \text{HBr} \rightarrow$
 (ii) Reaction with phosphorus halide: $\text{C}_2\text{H}_5\text{OH} + \text{PCl}_5 \rightarrow$
 (iii) Dehydration: $\text{C}_2\text{H}_5\text{OH} (-\text{H}_2\text{O}) \rightarrow$
 (iv) Ether formation: $2 \text{C}_2\text{H}_5\text{OH} \rightarrow$
- (c)(i) Oxidation: $\text{C}_2\text{H}_5\text{OH} (-2\text{e}^-) \rightarrow$
 $\text{C}_2\text{H}_5\text{OH} (-4\text{e}^-) \rightarrow$
 (ii) Iodoform reaction: $\text{C}_2\text{H}_5\text{OH} + \text{I}_2 + \text{OH}^- \rightarrow$

3. (a) Discuss the method of synthesis of α - amino acids
 (b) List the classes of protein
 (c) Discuss briefly the physical and chemical properties of proteins.
4. (a) Highlight the steps involved in the synthesis of carboxylic acids from a Grignard reagent.
 (b) With the aid of appropriate examples, discuss briefly what you know about the Cannizaro reaction.
 (c) List the characteristic reactions of carboxylic acids
 (d) Choose any one of the reactions in 4c above and discuss in details.
5. (a) Describe briefly the Hoffmann Degradation
 (b) Illustrate Hofmann Degradation with a typical reaction.
 (c) State the uses of carboxylic acids and their derivatives
6. (a) Which of the following will undergo Aldol condensation? If Aldol condensation is possible, then predict the product formed
 (i) Butanal (ii) Cyclohexanone (iii) Benzaldehyde
 (b) Give structures of the ylide and carbonyl compounds needed to prepare
 (i) $\text{C}_6\text{H}_5\text{CH}=\text{CHCH}_3$ (ii) $\text{CH}_3\text{CH}_2=\text{CH}_2$
 (c) Name the three important five membered heterocyclic compounds and draw their structures

