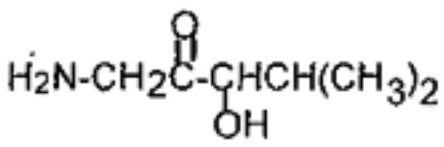
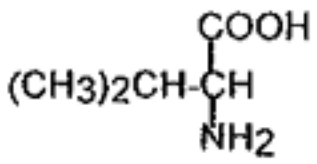
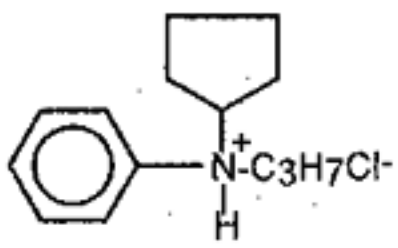
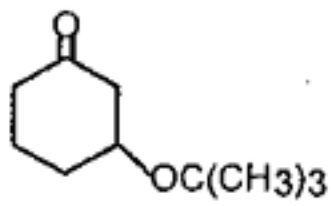
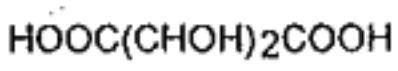
1. What are the IUPAC names of the following compounds (2% for each)?

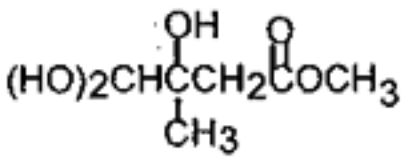
(a) 

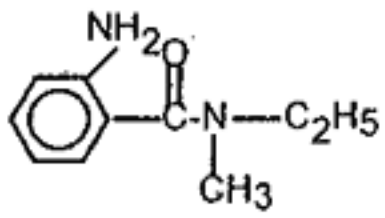
(b) 

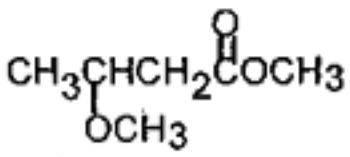
(c) 

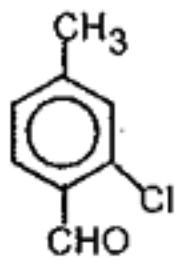
(d) 

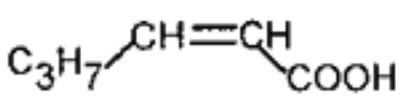
(e) 

(f) 

(g) 

(h) 

(i) 

(j) 

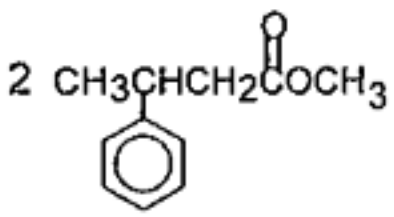
(背面仍有題目,請繼續作答)

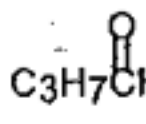
2. Write the structures of products of the following reactions (2% for each).

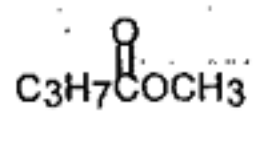
(a)  + C_3H_7COH $\xrightarrow{HCl}$ _____

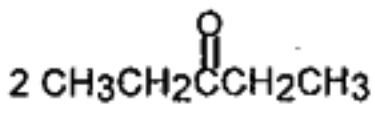
(b) $CH_2=CH-CH=CH_2$ +  ⟶ _____

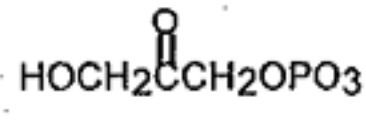
(c) $C_3H_7CH=CHC_3H_7$ $\xrightarrow{O_3}$ $\xrightarrow{H_2O_2}$ _____

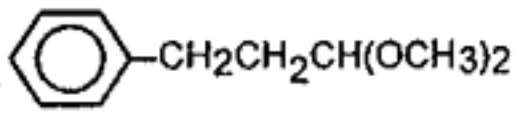
(d) 2  $\xrightarrow{OCH_3^-}$ _____

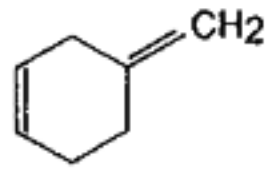
(e)  + 2 C_3H_7OH $\xrightarrow{H_3O^+}$ _____

(f)  ⟶ _____

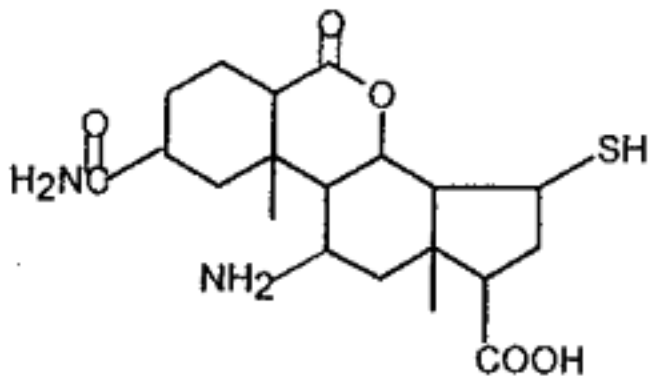
(g)  $\xrightarrow{OH^-}$ _____

(h)  $\xrightarrow{OH^-}$ _____

(i)  $\xrightarrow{H^+}$ _____

(j)  ⟶ _____

3. Please identify the functional groups of the follwing compound and write down the name of functional groups (5%).



Answer the following questions (2% for each; minus 0.5% for wrong answer)

___4. Which of the following system does not exist as buffer in human body?
(a) Phosphate system
(b) Carbonate system
(c) Protein system
(d) NADH system

___5. The products of basic hydroly sis of an ester are
(a) another ester + water
(b) alcohol + acid
(c) acid + water
(d) carboxylate salt + alcohol

___6. The ion formed from a carboxylic acid is called the
(a) carboxylate anion
(b) carboxylate cation
(c) ester
(d) amide

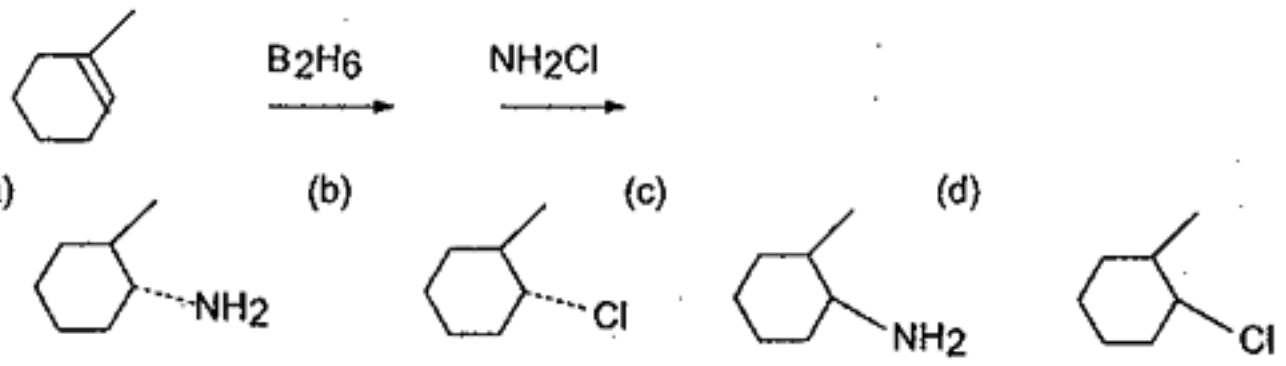
___7. Asthma would cause?
(a) CO_2 to increase, hence increased pH.
(b) CO_2 to increase, hence decreased pH.
(c) CO_2 to decrease, hence increased pH.
(d) CO_2 to decrease, hence decreased pH.

___8. What ester would you need to produce $C_3H_7\overset{O}{\overset{\|}{C}}CH(C_2H_5)\overset{O}{\overset{\|}{C}}OC_2H_5$?
(a) $C_3H_7COOCH_3$
(b) $C_3H_7COOC_2H_5$
(c) $C_2H_5COOC_2H_5$
(d) $C_3H_7COOC_3H_7$

(背面仍有題目,請繼續作答)

___9. Which of the following compounds gives a highest pKa?
(a) $C_6H_5NH_2$
(b) $C_6H_5SO_2NH_2$
(c) $C_6H_5CONH_2$
(d) $CH_3(CH_2)_5NH_2$

___10.



___11. Which of the following would you not expect to be a reaction of benzene?
(a) chlorination
(b) hydrogenation
(c) sulfonation
(d) nitration

___12. Oxidation of a secondary alcohol will yield a(n):
(a) aldehyde
(b) ketone
(c) carboxylic acid
(d) no reaction

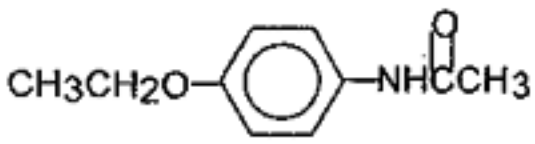
___13. Which molecule shown is heterocyclic?
(a) aniline
(b) phenol
(c) benzoic acid
(c) pyridine

___14. What product is obtained from the oxidation of CH_3CH_2SH?
(a) $CH_3\overset{\overset{O}{\|}}{C}OH$
(b) CH_3CH_2-S-CH_2-CH_3
(c) CH_3CH_2-S-S-CH_2-CH_3
(d) CH_3CH_2-S-S-H

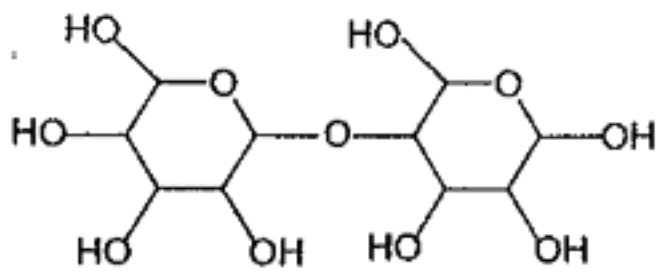
___15. In NMR spectum, the largest downfield shift will be exhibited by the proton or protons in which compound?
(a) R-CH3
(b) R-CH3O
(c) R-CH2-Cl
(d) R-COOH

___16 What is the intermediate involving aldol condensation?
(a) carbocation
(b) radical
(c) enol
(d) carboanion

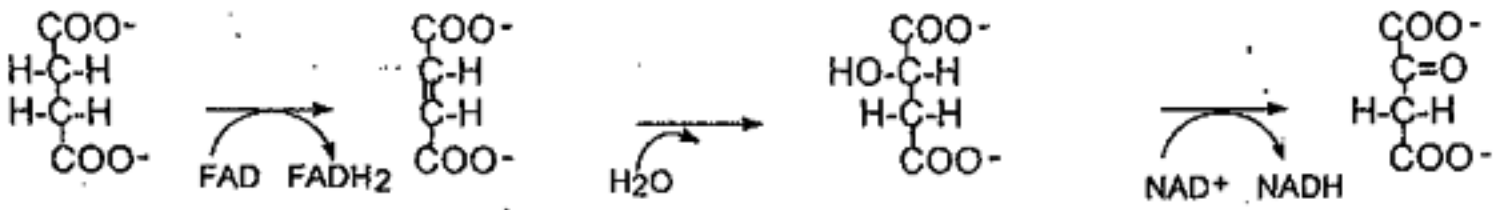
17. Show how phenacetin, a drug once used in headache remedies, can be prepared from the reaction of an anhydride and amine (5%).



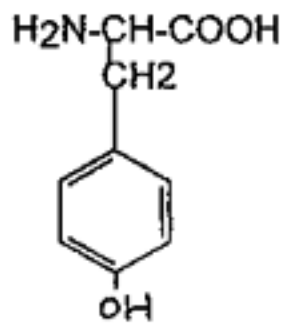
18. What is the results of complete acid hydrolysis of maltose (5%)?



19. (1) Categorize each of the following reactions as addition, oxidation, or elimination.
(2) Describe in words the chemical changes that take place in the following series of biochemical change (6%).



20. Please sketch the spectrum of tyrosine in D_2O and explain its chemical shift, scalar coupling, and intensity (6%).



(背面仍有題目,請繼續作答)

21. Propose a structure for the compound based on the UV, IR, Mass, and NMR spectra and explain what kinds of structural informations from these spectra (7%) ?