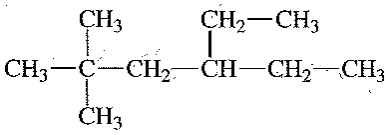
INTI INTERNATIONAL UNIVERSITY

FOUNDATION IN SCIENCE (CFSI)
CHM1204: CHEMISTRY 2
FINAL EXAMINATION: JANUARY 2014 SESSION

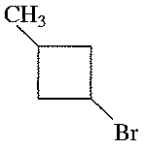
Instructions: This paper consists of **FIVE (5)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Question 1

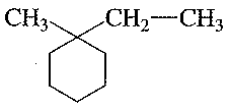
(a) Give the IUPAC name for each of the following compounds :

(i) 

(1 mark)

(ii) 

(1 mark)

(iii) 

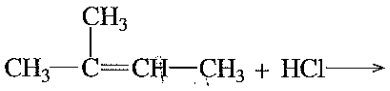
(1 mark)

(b) Consider the compound ethylcyclopentane.

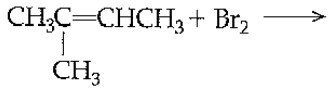
(i) Draw the condensed structural formula. (2 marks)

(ii) Write the balanced equation for the complete combustion of ethylcyclopentane. (2 marks)

(c) Predict the major organic product for each of the following reactions :

(i) 

(2 marks)

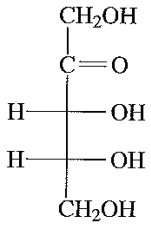
(ii) 

(2 marks)

(d) Would you expect ethanol (CH_3CH_2OH) to have higher or lower boiling point than ethanal (CH_3CHO)? Explain.

(2 marks)

(e) Ribulose has the following Fisher projection :



(i) Identify the compound as D- or L-ribulose.

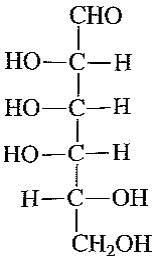
(2 marks)

(ii) Draw the Fisher projection of its mirror image.

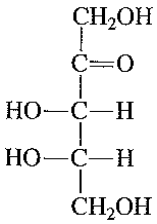
(2 marks)

(f) Classify each of the following monosaccharides as an aldose or a ketose.

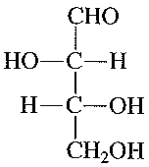
(i)



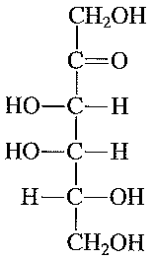
(ii)



(iii)



(iv)



(4 marks)

(g) Indicate whether each of the following compound is chiral or achiral.

(i) 1-Chloro-2-methylpentane
(ii) 2-Chloro-2-methylpentane
(iii) 2-Chloro-3-methylpentane
(iv) 3-Chloro-2-methylpentane (4 marks)

Question 2

(a) Draw the structural formula for each of the following compounds:

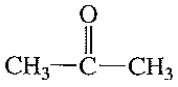
(i) 3-methoxypentane

(2 marks)

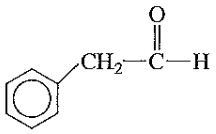
(ii) *trans*- 1,4-cyclohexanediol

(2 marks)

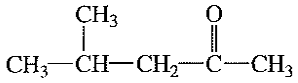
(b) Write the structural formula of the organic product when hydrogen in the presence of nickel catalyst reduces each of the followings :

(i) 

(2 marks)

(ii) 

(2 marks)

(iii) 

(2 marks)

(c) Linolenic is an essential fatty acid with structural notation of $18{:}3^{\Delta 9,12,15}$ omega-3.

(i) Draw the structure of linolenic fatty acid.

(2 marks)

(ii) Triacylglycerol can be produced from the reaction between one molecule of glycerol with three molecules of linolenic acids.

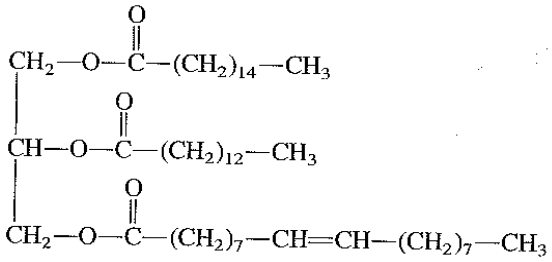
(1) Draw the structure of the triacylglycerol produced.

(2 marks)

(2) Write the chemical equations for the triacylglycerol that undergoes complete saponification with potassium hydroxide. You may draw structural formula in your equations.

(3 marks)

(d) Draw condensed structural formula for all products you would obtain from the complete hydrolysis of the following triacylglycerol.



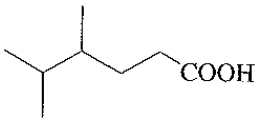
(4 marks)

(e) Write an equation for the oxidation of 1-propanol and name each product.

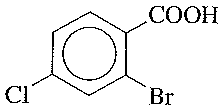
(4 marks)

Question 3

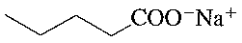
(a) Assign an IUPAC name to each of the following compounds.

(i) 

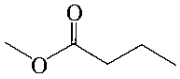
(2 marks)

(ii) 

(2 marks)

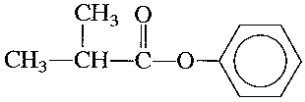
(iii) 

(2 marks)

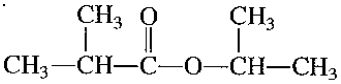
(iv) 

(2 marks)

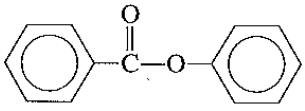
(b) Write the structural formulas of the products when each of the following esters is hydrolyzed under acidic conditions.

(i) 

(2 marks)

(ii) 

(2 marks)

(iii) 

(2 marks)

(c) Draw the structural formula of the amino acid valine that predominates in solution at each of the following pH values.

(i) pH = 7.0 (2 marks)
(ii) pH = 12 (2 marks)
(iii) pH = 2.0 (2 marks)

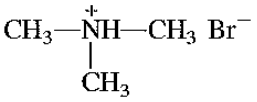
(d) What are the two functional groups involved in the formation of a peptide bond?

(2 marks)

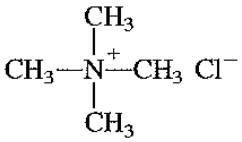
(e) Draw the structural formula for the tripeptide Ala-Gly-Val. (3 marks)

Question 4

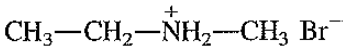
(a) Classify each of the following salts as an amine salt or quaternary ammonium salts :

(i) 

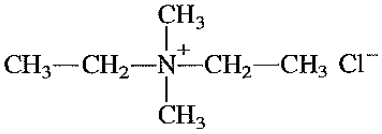
(2 mark)

(ii) 

(2 marks)

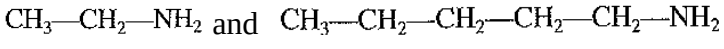
(iii) 

(2 marks)

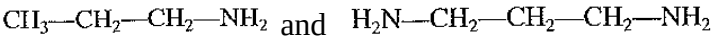
(iv) 

(2 marks)

(b) Which compound in each of the following pairs of amines would you expect to be more soluble in water? Justify each answer.

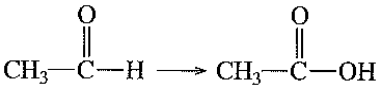
(i) 

(2 marks)

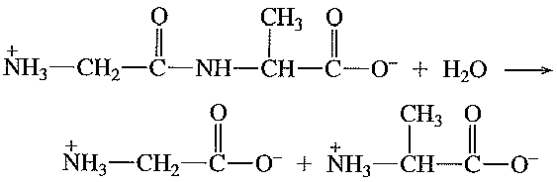
(ii) 

(2 marks)

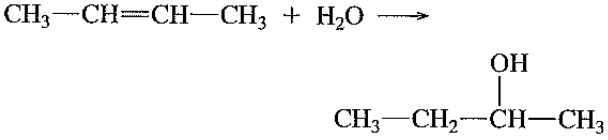
(c) What is the class of the enzyme that would catalyze each of the following reactions?

(i) 

(2 marks)

(ii) 

(2 marks)

(iii) 

(2 marks)

(d) How does reversible inhibition differ from irreversible inhibition?

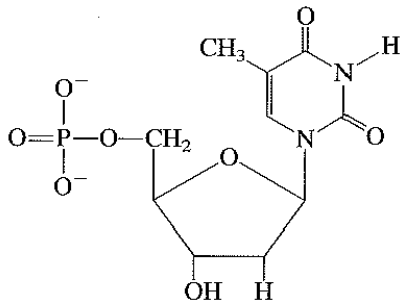
(2 marks)

(e) Predict the sequence of bases in the complimentary DNA strand to the single DNA strand below.

5’ C-G-A-A-T-C-C-T-A 3’

(2 marks)

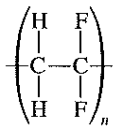
(f) Draw the structures of the three products produced when the nucleotide below undergoes hydrolysis.



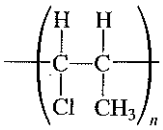
(3 marks)

Question 5

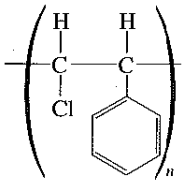
(a) Draw the structural formula of the monomer(s) from which each of the following polymers was made :

(i) 

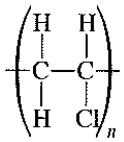
(2 marks)

(ii) 

(2 marks)

(iii) 

(2 marks)

(iv) 

(2 marks)

(b) Compound A is 1-propanol. When compound A is heated with strong acid, it dehydrates to form compound B (C_3H_6). When compound A is oxidized, compound C (C_3H_6O) forms. Give the condensed structural formulas and names of compound B and C.

(4 marks)

(c) Classify each of the following chemical processes as anabolic or catabolic.

(i) Synthesis of a polysaccharide from monosaccharides.

(1 mark)

(ii) Hydrolysis of a pentasaccharide to monosaccharides.

(1 mark)

(iii) Formation of nucleotide from phosphate, nitrogenous base and pentose sugar.

(1 mark)

(iv) Hydrolysis of a triacylglycerol to glycerol and fatty acids.

(1 mark)

(d) Indicate whether each of the following conversions represents oxidation or reduction.

(i) $CoQH_2 \rightarrow CoQ$

(1 mark)

(ii) $NAD^+ \rightarrow NADH$

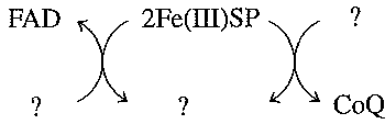
(1 mark)

(iii) Cyt c (Fe^{2+}) → cyt c (Fe^{3+})

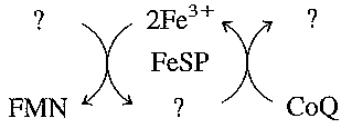
(1 mark)

(e) Fill in the missing substances in the following electron transport chain reaction sequences.

(i)



(ii)



(6 marks)

--THE END--

CHM1204(F)/JAN2014/Syukrina Imtiyaz Binti Abdul Samat