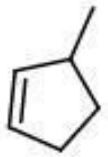
INTI INTERNATIONAL UNIVERSITY
FOUNDATION IN SCIENCE (CFSI)
CHM1204: CHEMISTRY 2
FINAL EXAMINATION: JUNE 2015 SESSION

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

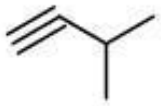
(a) Give the IUPAC name for each of the following organic compounds:

(i)



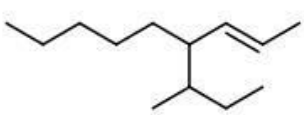
(2 marks)

(ii)



(2 marks)

(iii)



(2 marks)

(b) A mixture of cyclohexane and bromine in an inert solvent is exposed to ultraviolet light. The bromine water is gradually decolorized and colorless fumes are produced.

(i) Draw the structural formula of cyclohexane.

(1 marks)

(ii) Write the equations for the reactions that occur.

(2 marks)

(iii) Name the chemical reaction that occur.

(1 mark)

(c) Draw the skeletal formula (line-angle formula) for each of the following.

(i) t*rans*-1,3-dibromocyclopentane

(2 marks)

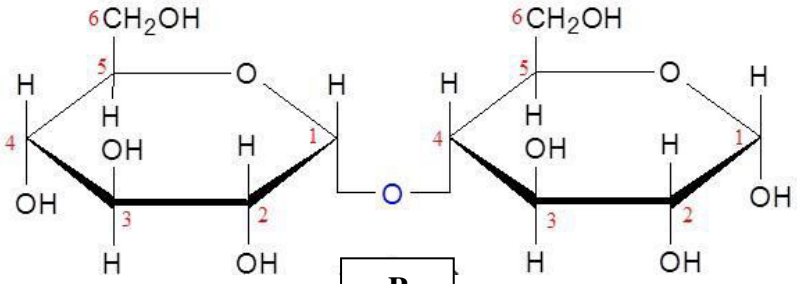
(ii) 3,3,5 – triiodoheptyne

(2 marks)

(iii) 2,5 – ethyl –1,3- hexadiene

(2 marks)

(d) **P** is a dissacharide sugar formed by glycosidic linkage formed from two units of α-D-glucose molecules shown below:



P

(i) Name the compound, **P.**

(1 mark)

(ii) Name the type of glycosidic linkage above.

(1 mark)

(iii) Draw the structure of α-D-glucose.

(2 marks)

(iv) The α-D-glucose exists as a pair of enantiomers. Draw the structure of enantiomers in Fischer projection form.

(4 marks)

(e) Name the product formed from hydrolysis reaction of starch with water.

(1 marks)

(TOTAL = 25 MARKS)

Question 2

(a) Benzaldehyde is found in nuts. This compound can be produced from alcohol, X through oxidation reaction.

(i) Draw the structural formula of benzaldehyde.

(2 marks)

(ii) Draw the structural formula of the alcohol, X and classify it as primary, secondary or tertiary.

(3 marks)

(iii) Write the oxidation equation for the formation of benzaldehyde. Provide all the reagents and condition needed.

(4 marks)

(b) Carbonyl compounds, A – E, are tested with Tollens' reagent and Fehling's solution. Which of the following compounds will be tested positive

A	$CH_3CH_2CH_2COCH_3$
B	CH_3CH_2CHO
C	CH_3COCH_3
D	C_6H_5CHO
E	$CH_3COCH_2CH_3$

(i) with Tollens' reagent?

(2 marks)

(ii) with Fehling's solution?

(3 marks)

(c) Linolenic is an essential fatty acid with structure as shown below:

(i) Give the **FULL** structural notation of linolenic acid above.

(2 marks)

(ii) Classify the fatty acid as saturated, monounsaturated or polyunsaturated fatty acids.

(1 mark)

(iii) State the physical state of linolenic fatty acid at room temperature.

(2 marks)

(iv) Triacylglycerol or fat molecule is formed with linolenic fatty acids and glycerol molecule, $C_3H_8O_3$.

1. Name the process involved in forming triacylglycerol.

(1 mark)

2. Draw the structure of triacylglycerol formed.

(2 marks)

(d) Give the elements that are found in lipid molecule.

(3 marks)

(TOTAL = 25 MARKS)

Question 3

(a) Draw the structures of the aldehydes or ketones formed by the oxidation of the compounds given below:

(i) 1-cyclopentanol

(2 marks)

(ii) 2-benzyl-1-ethanol

(2 marks)

(b) Compounds A and B are alcohol compounds with four carbon atoms. These compounds undergo oxidation process with potassium dichromate as oxidizing agent. From the oxidation process, it is observe that:

Compound	Result/ Observation
A	Green solution
B	Orange solution

(i) From the observations listed above, identify which of the compounds is tertiary alcohol.

(3 marks)

(ii) Draw the structural formula for the tertiary alcohol in (b)(i).

(2 marks)

(c) Arrange the compounds in (i) and (ii) below in order of increasing

(i) *Solubility in water*
hexanol, 2,4-hexanediol, 3,5-dihydroxyheptanol

(2 marks)

(ii) *Boiling point*
Butane, 3-hydroxy-2-butanol, 2-butanol, butanal, butene

(2 marks)

(d) Draw the displayed formula for each of the following compounds:

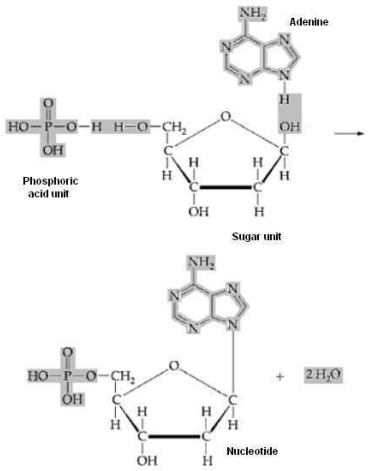
(i) *cis*-4-chlorocyclohexanol

(2 marks)

(ii) o-ethyl-p-bromophenol

(2 marks)

(e) The diagram below represents the formation of nucleotides.



(i) Name the process of nucleotides formation.

(2 marks)

(ii) Polynucleotide strands are formed when nucleotides are linked by phosphor-ester linkage.

(1) Classify the polynucleotide strand formed as DNA or RNA single strand.

(2 marks)

(2) Give your reason for your answer in (1).

(2 marks)

(f) Give one function for each DNA and RNA nucleic acids.

(2 marks)

(TOTAL = 25 MARKS)

Question 4

(a) *N, N* -diethylpropanamide, *N*-methylethanamide and propanamide are three types of amide compounds of different degrees.

(i) Classify each of the amides as primary, secondary and tertiary amide.

(3 marks)

(ii) Arrange these amides in the order of ascending (increasing) solubility in water.

(2 marks)

(iii) These amides have basic properties. Outline the equation with structural formula when propanamide reacts with aqueous hydrochloric acid, HCl(aq).

(4 marks)

(b) Benzamide is an aromatic amide. Draw the structural formula of benzamide.

(2 marks)

(c) Ethanamide undergoes base-catalysed hydrolyses with sodium hydroxide. Outline the equation.

(2 marks)

(d) Draw the structural formulas of each of the amides and amines listed below:
(i) *N*-methyl-*N*-ethylbenzamide

(2 mark)

(ii) *N*-chloro-*N*-methylaniline

(2 mark)

(e) Define and give ONE example for each of the following processes.

(i) Metabolism

(2 marks)

(ii) Anabolism

(2 marks)

(iii) Catabolism

(2 marks)

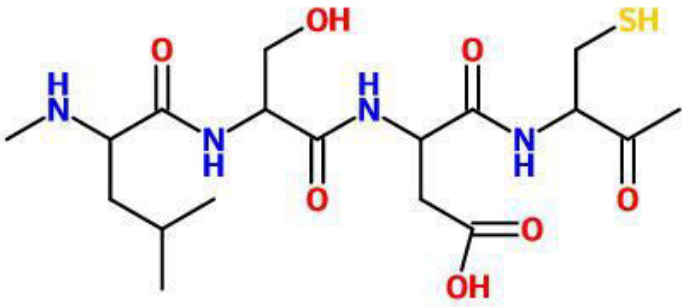
(f) Give ONE function of the electron transport system of the mitochondria.

(2 marks)

(TOTAL = 25 MARKS)

Question 5

(a) The structural formula of a section of protein is shown below:



Leu – Ser – Asp – Cys

(i) Draw the D-isomer and L-isomer of serine in Fishcer Projection.

(2 marks)

(ii) Draw the structural formula of aspartic acid when it is placed in each of the following solution.

(1) pH 5

(2 marks)

(2) pH 10

(2 marks)

(iii) Define protein denaturation.

(3 marks)

(iv) List 4 denaturing agents:

(2 marks)

(v) Explain why protein cannot perform its biological function at a very high temperature?

(2 marks)

(b) The strength of carboxylic acids are shown in the table below:

Acid	A	B	C
pK_a	2.45	3.17	4.86

(i) Given the carboxylic acids are ethanoic, Iodoethanoic and chloroethanoic, identify which carboxylic acids are A, B and C.

(3 marks)

(ii) Among all the acids, which is the strongest acid? Explain your selection.

(3 marks)

(iii) Predict which carboxylic acids form white precipitate the **slowest** when sodium chloride is added into each of the carboxylic acid compounds.

(2 marks)

(c) Draw the structural formula for each of the following compound

(i) Cyclopropyl benzoate

(2 marks)

(ii) Ethanoic propanoic anhydride

(2 marks)

(TOTAL = 25 MARKS)

--THE END--

CHM1204(F)/JUN2015/NadiAbdShukor