INTI INTERNATIONAL UNIVERSITY
FOUNDATION IN SCIENCE (CFSI)
CHM1204: CHEMISTRY 2
FINAL EXAMINATION: MAY2016 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) Draw the skeletal structure (line-angle) for each of the following.

(i) 3-chloro-3-methylcyclobutene

(2 marks)

(ii) 1-iodo-2-phenyl-3-octyne

(2 marks)

(iii) 3-cyclopropyl-5-isopropylhexane

(2 marks)

(b) Draw the skeletal structure (line-angle) of all the products when 2-iodohexane is heated with potassium hydroxide and alcohol.

(4 marks)

(c) An alkene can be hydrated with a catalyst to produce an alcohol.

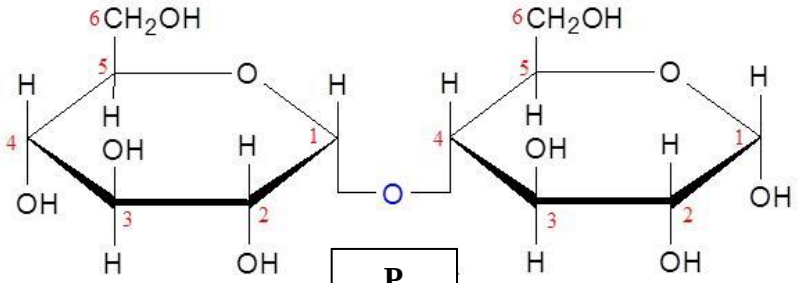
(i) Write a full chemical reaction when 2-methyl-2-pentene is hydrated.

(4 marks)

(ii) Name the rule that is used to determine the major product of the reaction.

(1 mark)

(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 formed in **P.**

(1 mark)

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

(4 marks)

(e) Sucrose is a disaccharide sugar that can be refined from sugar cane.

(i) Write the observation if sucrose is tested with Benedict's solution.

(2 marks)

(ii) State your reason for your answer in *(i)*.

(2 marks)

(TOTAL: 25 MARKS)

Question 2

(a) Explain:

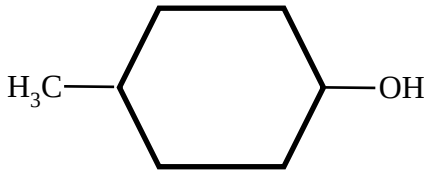
(i) Between butane and butanol, which has higher boiling point?

(2 marks)

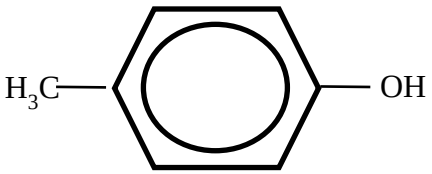
(ii) The solubility of phenol in a non-polar solvent.

(2 marks)

(b) The structural formula of two compounds, **P** and **Q** are shown below;



P



Q

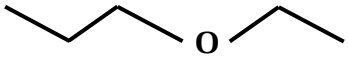
(i) State the IUPAC name for P and Q.

(4 marks)

(ii) Suggest a reaction on **P** to produce an organic compound, **W** which can cause bromine water to become colorless.

(2 marks)

(c) This is an alkoxy compound, ***X***.



(i) Give the IUPAC name for ***X*.**

(2 marks)

(ii) How to form ***X*** from alcohols?

(2 marks)

(d) Fatty acids can be classified as saturated and unsaturated fatty acids.

(i) Give TWO differences between the two classes.

(4 marks)

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

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

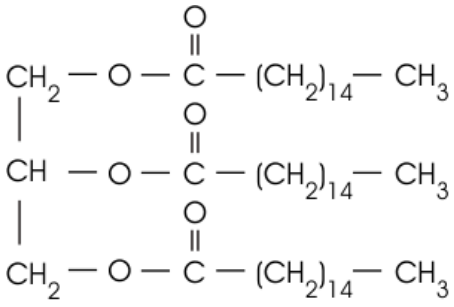
(2 marks)

(e) Soap can be formed between triglycerides with an alkali.

(i) Name the reaction to form soap.

(1 mark)

(ii) Write a complete reaction of below triglycerides to form a soap.



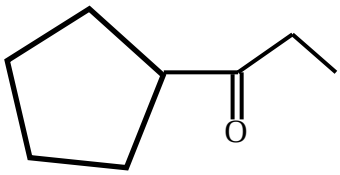
(4 marks)

(TOTAL: 25 MARKS)

Question 3

(a) Give the IUPAC names for the product if each of the following compounds undergo oxidation reaction.

(i)

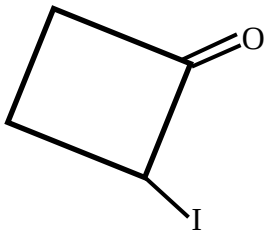


(2 marks)

(ii) $CH_3CH(CH_3)CH_2CH(CH_3)CHO$

(2 marks)

(iii)



(2 marks)

(b) **A** and **B** are carbonyl compounds consisting of three carbon atoms. When **A** and **B** undergo a reaction with potassium dichromate, it is observed that:

Compound	**Observation**
A	Orange solution
B	Blue-green solution

(i) From the observation above, give the IUPAC name for **A** and **B**.

(3 marks)

(iii) Suggest another chemical test to differentiate between **A** and **B.**

(1 mark)

(c) There are four levels of protein structure and tertiary structure is one of the levels.

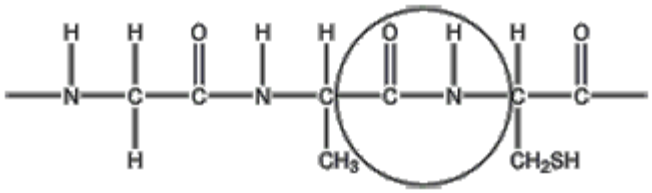
(i) State the FOUR types of attractive forces that give rise to tertiary protein structure.

(4 marks)

(ii) State TWO differences between tertiary protein structure and quaternary protein structure.

(2 marks)

(d) A protein is built up of amino acids. The amino acid molecules are held together by a bond, ***X***.



(i) State the name of ***X***.

(2 marks)

(ii) Name the reaction that forms a protein.

(1 mark)

(e) Enzyme is a protein compound that can act a catalyst in a reaction.

(i) Explain how temperature can affect the activity of enzyme.

(3 marks)

(ii) List out other factors that can affect the rate of enzyme activity.

(3 marks)

(TOTAL: 25 MARKS)

Question 4

(a) The pKa values of several compounds are given below.

1.29	**2.66**	**2.86**	**3.74**	**4.74**

(i) Match the pKa values with the respective compounds below.

	Compound	**pKa**
A	$CH_2ClCOOH$	
B	CH_2FCOOH	
C	CH_3COOH	
D	$CHCl_2COOH$	
E	HCOOH	

(5 marks)

(ii) Which of the compounds above is the strongest acid?

(2 marks)

(iii) Explain the difference in the acid strength of compounds ***A*** and ***B***.

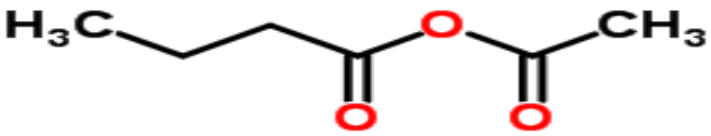
(3 marks)

(b) Arrange the following compounds in order of increasing boiling point.

butanal, butanoic acid, butane, 1-butanol

(2 marks)

(c)



P

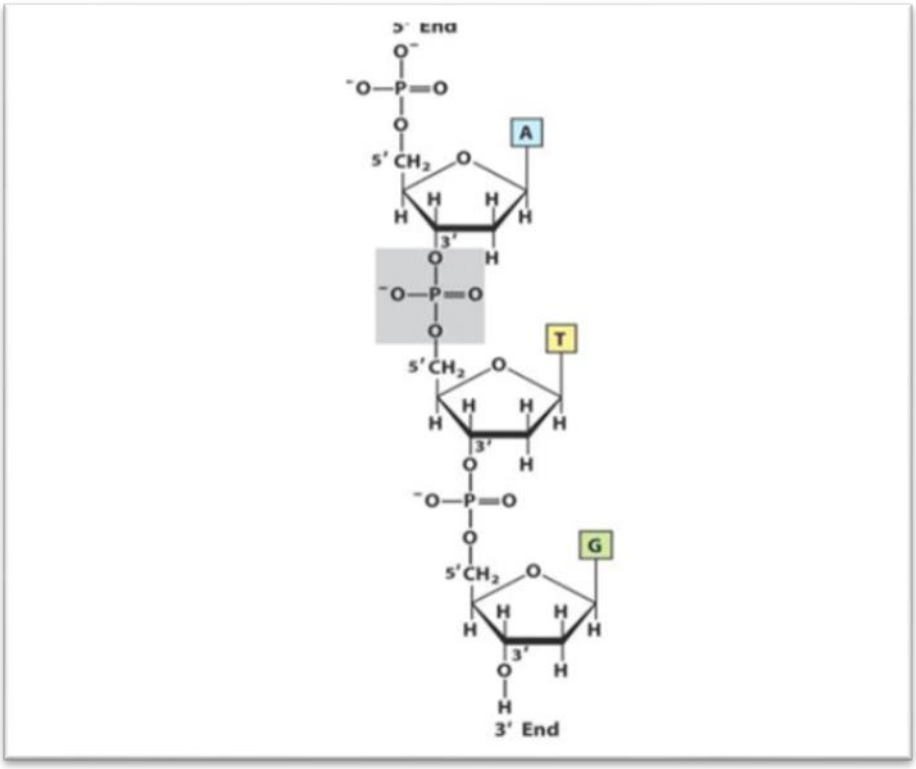
(i) Draw full equation to show how ***P*** can be formed.

(3 marks)

(ii) Give the IUPAC name of ***P***.

(2 marks)

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



(i) Give the name of the ester linkage (as seen in box) in the diagram above.

(1 mark)

(ii) Name the process of polynucleotides formation.

(1 mark)

(iii) Classify the polynucleotide strand above as DNA or RNA strand.

(1 mark)

(iv) State the full name of all the bases A, T and G in the strand above.

(3 marks)

(v) Give TWO differences between RNA molecules and DNA molecules.

(2 marks)

(TOTAL: 25 MARKS)

Question 5

(a) Give the degree (1˚, 2 ˚ or 3 ˚ amines) and IUPAC name for each of the following compounds.

(i) $CH_3CH_2CH_2NH_2$

(3 marks)

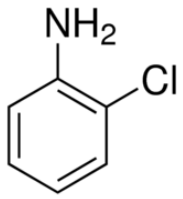
(ii) $C_6H_5CH(CH_3)CH_2NH_2$

(3 marks)

(iii) $CH_3CH(CH_3)NH(CH_3)$

(3 marks)

(iv)



(3 marks)

(b) Arrange the following compounds in increasing order of boiling point.

$CH_3CH_2CH_2OH$, $CH_3CH_2CH_2CH_3$, $(CH_3)_2CHNHCH_3$, $CH_3CH_2CH_2NH_2$

(2 marks)

(c) Outline the reaction on how to prepare N-ethyl-N-methyl-3-methylhexanamide from a carboxylic acid and an amine.

(3 marks)

(d) Give a one-sentence summary of what happen during the reactions below;

(i) Metabolic pathway

(2 marks)

(ii) Electron transport chain

(2 marks)

(e) State the FOUR stages that food molecules undergo to provide energy.

(4 marks)

(TOTAL: 25 MARKS)

-THE END-

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