INTI
International College Penang

FINAL
Examination Paper

(COVER PAGE)

Session	:	April 2019
Programme	:	Foundation In Science (CFSI)
Course	:	**CHM1204: Chemistry 2**
Date of Examination	:	29 July 2019 (Monday)
Time	:	11:00AM – 1:00PM Reading Time : Nil
Duration	:	2 Hours

Special Instructions :

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

Materials permitted :

Non-Programmable Scientific Calculator

Materials provided :

Periodic Table

Examiner(s)	:	**Mr. Tan Mun Keat**
Moderator	:	**Dr. Lim Gim Keat**

*This paper consists of **13** printed pages, including the cover page.*

INTI INTERNATIONAL COLLEGE PENANG

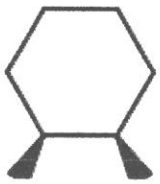
FOUNDATION IN SCIENCE (CFSI)
CHM1204: CHEMISTRY 2
FINAL EXAMINATION: APRIL 2019 SESSION

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) Using IUPAC nomenclature, name each of the following saturated hydrocarbons.

(i)



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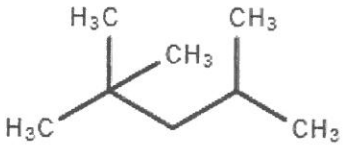

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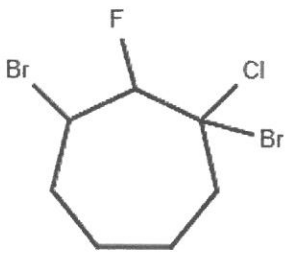

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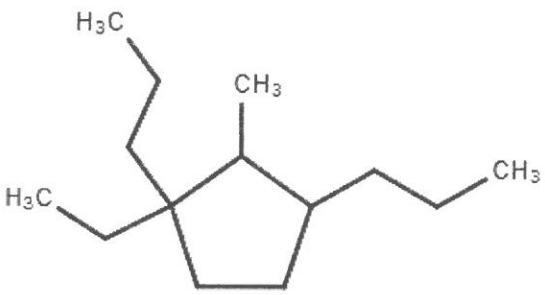


(4 marks)

(b) N-tetracosane is a straight chain alkane hydrocarbon. This hydrocarbon has 14,490,245 constitutional isomers and 252,260,276 stereoisomers. Predict the value x if the molecular formula of this hydrocarbon is $C_{24}H_x$.

(1 mark)

(c) State the unique physical property that only present in ester.

(1 mark)

(d) Write (condensed structural formula) and name the structure of the products in each of the following reactions.

(i) $CH_3CH_2COOH + NaOH \rightarrow$

(ii) $CH_3CH_2CH_2COOH + CH_3CH_2OH \overset{H^+}{\leftrightarrow}$

(iii) $CH_3CH_2COOCH_3 + H_2O \overset{H^+}{\rightarrow}$

(iv) $CH_3CH_2CH_2COOCH_2CH_3 + NaOH \overset{H_2O}{\longrightarrow}$

(8 marks)

(e) Explain why sucrose is a non-reducing sugar?

(3 marks)

(f) Sketch graphs to show the relationship between the reaction rate and the following factors that affect enzyme activity:

(i) pH (ii) Substrate concentration (iii) Enzyme concentration (iv) Temperature

(8 marks)

(TOTAL: 25 MARKS)

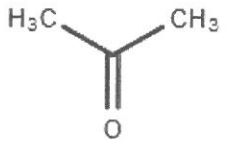
Question 2

(a) Give the IUPAC names for 5 isomeric saturated hydrocarbons that have the molecular formula C_6H_{14}.

(5 marks)

(b) Indicate whether a primary or secondary alcohol is produced when each of the following carbonyl compounds is reduced.

(i)



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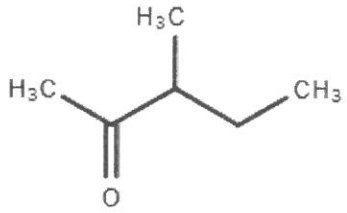

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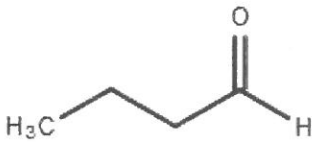

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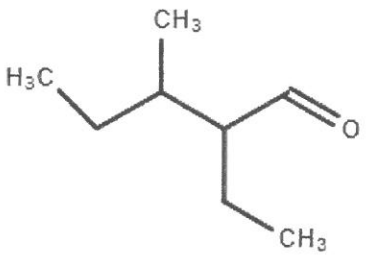
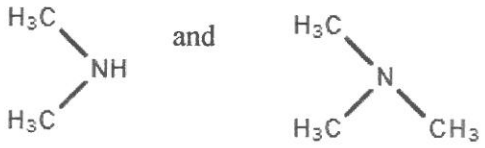


(4 marks)

(c) Which compound in each of the following pairs of amines would you expect to have a higher boiling point? Justify each answer.

(i) $CH_3CH_2NH_2$ and $CH_3CH_2CH_3$

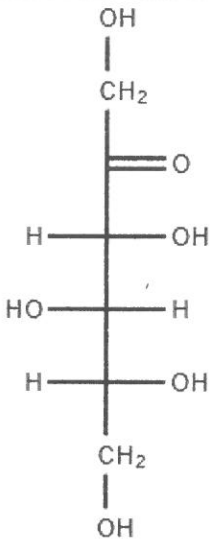
(ii)



(4 marks)

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

(i)



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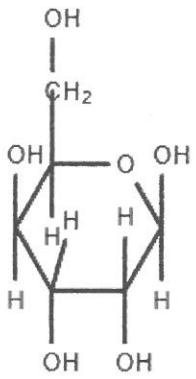

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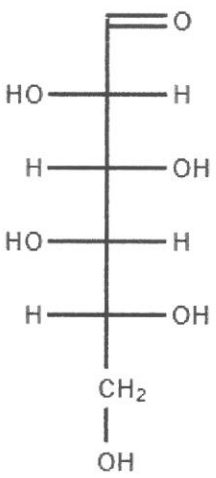

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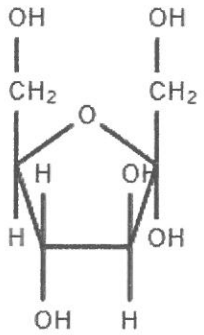


(4 marks)

(e) Compare two differences between fats and oils.

(4 marks)

(f) Name four types of stabilizing interactions can be observed in tertiary structure of proteins.

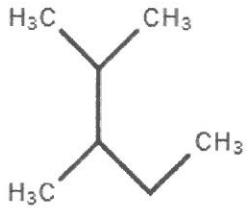
(4 marks)

(TOTAL: 25 MARKS)

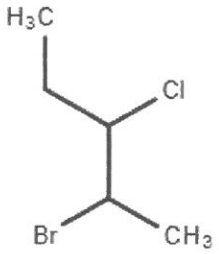
Question 3

(a) The following hydrocarbons were named wrongly. Explain why they were named wrongly and propose the correct IUPAC names of these hydrocarbons.

(i) 2-isopropylbutane



(ii) 4-bromo-3-chloropentane



(4 marks)

(b) Draw the structural formula of the product and side product in each of the following substitution reactions.

(i)

$+ CH_3Br \xrightarrow{AlCl_3}$

(ii)

$+ Br_2 \xrightarrow{FeCl_3 \text{ or } AlCl_3}$

(4 marks)

(c) Predict and explain the predominant product forms in each of the following reactions:
   (i) Alcohol dehydration of 2-butanol
   (ii) Oxidation of 2-methylpropan-2-ol

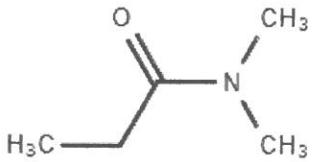
(4 marks)

(d) Propose two tests to differentiate aldehyde and ketone.

(2 marks)

(e) Amidification reaction is a method to produce amide by reacting carboxylic acid with amine under specific conditions. Predict the reactants needed to prepare the following amides.

(i)



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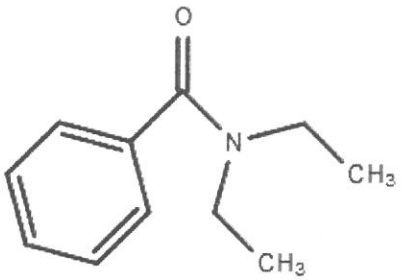
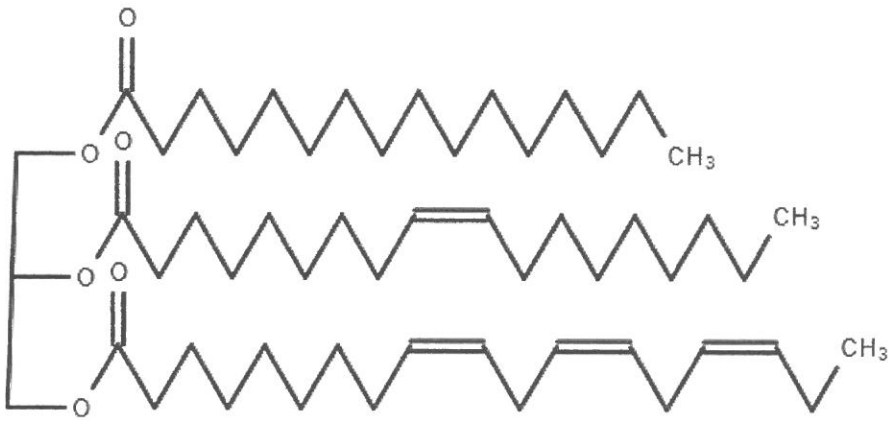


(4 marks)

(f) Draw skeletal formula for all products and name the only polysaturated fatty acid (using shorthand system) obtained from the complete hydrolysis of the following triacylglycerol under acidic conditions.



(5 marks)

(g) Name two nitrogen-containing heterocyclic bases that can be found in DNA.

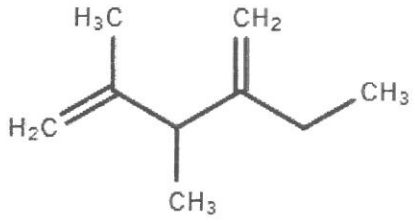
(2 marks)

(TOTAL: 25 MARKS)

Question 4

(a) Using IUPAC nomenclature, name each of the following unsaturated hydrocarbons.

(i)



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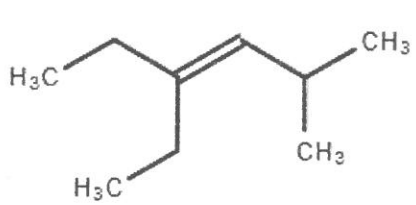

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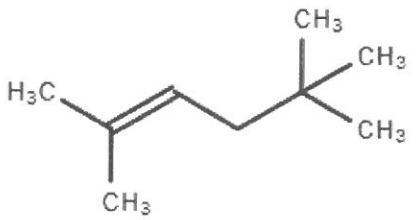

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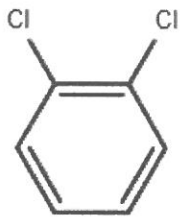


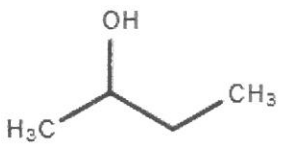
(4 marks)

(b) Explain the difference between skeletal isomer and positional isomer. Draw and give the IUPAC name for skeletal isomer and positional isomer of 2-methylbutene.

(6 marks)

(c) Circle the chiral carbon atom in each of the following molecules.

(i)



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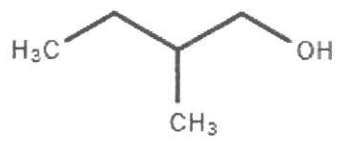

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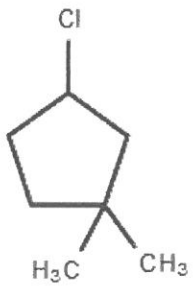

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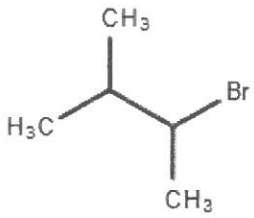


(4 marks)

(d) Suggest two possible ways to prepare alcohol.

(2 marks)

(e) Write a balanced equation for the combustion of methanol.

(2 marks)

(f) Indicate whether each of the following statement is true or false.

(i) Leading strand grows continuously towards the replication fork.
(ii) Transcription is the process in which mRNA codons are deciphered and specific protein molecule is synthesized.
(iii) Mutation is an error in base sequence in a gene that is reproduced during RNA replication.
(iv) The amounts of A and C present in DNA molecules are always equal.
(v) DNA molecule has deoxyribose as the basic sugar unit.
(vi) The first phase of protein synthesis is called transcription
(vii) Genetic engineering is the process which an organism is intentionally changed at the molecular (DNA) level so that it exhibits different traits

(7 marks)

(TOTAL: 25 MARKS)

Question 5

(a) For each of the following pairs of compounds, select the substance you expect to have the higher boiling point.

(i) Octane and hexane

(ii) Octane and 2,2,3,3-tetramethylbutane

(iii)Octane and cyclooctane

(3 marks)

(b) Draw the skeletal formula of the following molecules.

(i) Diethyl ether

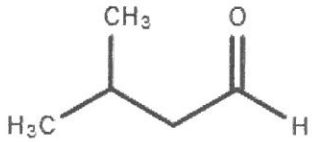
(ii) Ethyl methyl ether

(iii)Isopropyl methyl ether

(3 marks)

(c) Using IUPAC nomenclature, name each of the following carbonyl compounds.

(i)



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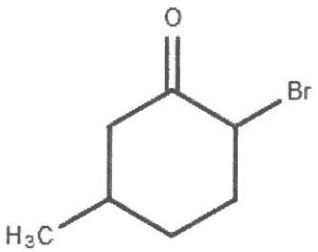

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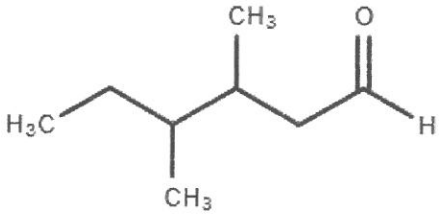

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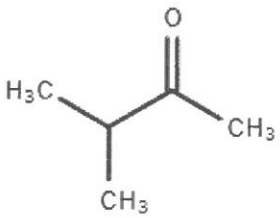
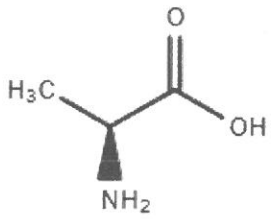


(4 marks)

(d) Classify each of the following amino acids as nonpolar, polar neutral, polar acidic or polar basic amino acids.

(i)



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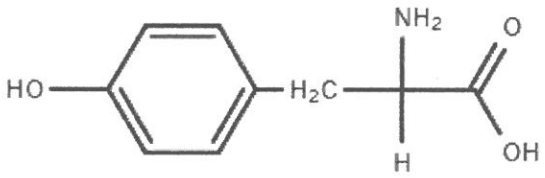

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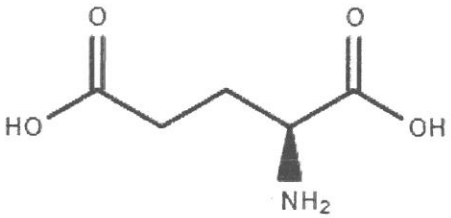

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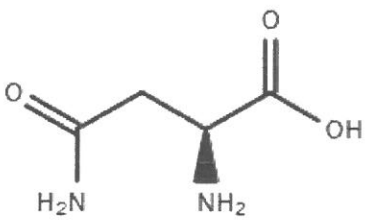

(4 marks)

(e) Name three types of transports across cell membranes

(3 marks)

(f) State five major steps in the process of translation.

(5 marks)

(g) Calculate the heat of combustion of ethane, as described in the equation $C_2H_{6(g)} + 3½O_{2(g)} \rightarrow 2CO_{2(g)} + 3H_2O_{(l)}$, given the heats of formation of ethane gas, carbon dioxide gas and water liquid are –84.7 kJ mol^{-1}, -393.5 kJ mol^{-1} and –285.8 kJ mol^{-1}, respectively.

(3 marks)

(TOTAL: 25 MARKS)

~ The End ~