UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2014/2015

COURSE NAME	:	CHEMISTRY FOR BIODIVERSITY AND CONSERVATION
COURSE CODE	:	BWJ 10303
PROGRAMME	:	1 BWW
EXAMINATION DATE	:	DECEMBER 2014 / JANUARY 2015
DURATION	:	3 HOURS
INSTRUCTION	:	1. ANSWER **ALL** QUESTIONS IN **SECTION A** 2. ANSWER ONLY **ONE (1)** QUESTION FROM **SECTION B**

THIS QUESTION PAPER CONSISTS OF **SIX (6)** PAGES

SECTION A

Q1 (a) For the following chemical reaction

$$2A + 3B \rightarrow C$$

(i) The reaction is first order with respect to A and zeroth order respect to B. What is the order of the reaction?

(1 mark)

(ii) At a certain time and temperature when the initial concentrations are $[A] = 1.6 \times 10^{-2}$ M and the rate is 4.1×10^{-4} M/s. Calculate the rate constant of the reaction.

(5 marks)

(iii) What is the half-life of the reaction?

(4 marks)

(b) The specific heat of liquid bromine is 0.226 J/g.K. Calculate the heat (J) that is required to raise the temperature of 10.0 mL of bromine from 25.00 °C to 27.30 °C? The density of liquid bromine: 3.12 g/mL.
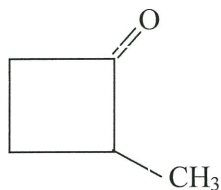
(6 marks)

(c) Point out the equilibrium shift of the reaction below if,

$$2C_2H_2 (g) + 5 O_2 (g) \rightarrow 4 CO_2 (g) + 2 H_2O (g) + heat$$

(i) Temperature is increased
(ii) Pressure is reduced.

(4 marks)

Q2 (a) (i) Show the steps of drawing hydrocarbon compound: 1,2-dimethylcyclohexene.

(ii) Give the IUPAC name of the following compound:

(4 marks)

(b) (i) By using M and N as two types of monomers, illustrate 4 types of copolymers possibly generated from them.

(ii) Classify the illustrations in (i).

(8 marks)

(c) (i) Discuss four (4) common separation methods used in the purification and characterization of organic compounds.

(ii) Choose one (1) method in (i) to establish the route for a bioactivity-guided-separation of ginkgo biloba plant.

(8 marks)

Q3 (a) (i) Define air pollution.

(1 mark)

(ii) Name four (4) common air pollutants and for each, recall their criteria.

(4 marks)

(b) (i) Summarize the risks of water pollution.

(4 marks)

(ii) Represent the route of soil pollution sources in Malaysia.

(4 marks)

(c) (i) Polluted water may record pH as low as 2.5. Establish all balanced reactions that produce acid rain, given pollutants were: SO_3, NO_2 and CO_2.

(3 marks)

(ii) Discuss in depth what do you understand by photochemical smog.

(2 marks)

(iii) Point out the hydrocarbon forming photochemical smog and its major source.

(2 marks)

Q4 (a) Name any chemical used in Malaysian food preservative and list two side effects of the chemical chosen.

(3 marks)

(b) (i) Redraw and identify below substructures in the leaf cross-section in **Figure Q4(b)**.
Xylem, stomate, epidermis, cuticle, 2 types of mesophylls.

(3 marks)

(ii) Illustrate human circulatory system. Using the illustration, construct the factors that influence cardiac output (CO).

(7 marks)

(c) (i) Simplify how DNA sequencing is applied in resolving forensic cases.

(4 marks)

(ii) By choosing one specific crop in Malaysia, highlight how biotechnology can improve its plantations as well as its production.

(3 marks)

SECTION B

Q5 (a) (i) Express the possible chemical compound formed from the ions below:
Na^+, Ba^{2+}, Al^{3+}, Cl^-, NO_3^-, SO_3^{2-}

(2 marks)

(ii) Discuss why sodium has a lower first ionization energy than neon.
(Z: Na = 11, Ne = 10)

(2 marks)

(b) (i) How to tell whether a compound is ionic or covalent?

(2 marks)

(ii) Demonstrate a labelled diagram showing the bonding in O_2.
(Z: O = 8)

(5 marks)

(iii) Relate the type of bonding in sodium chloride that allows them to dissolve in water.

(3 marks)

(c) Choose Boyle's or Avogadro's Law to solve the problems below:

(i) Sulfur dioxide (SO_2), a gas that plays a central role in the formation of acid rain, is found in the exhaust of automobiles and power plants. Consider a 1.53- L sample of gaseous SO_2 at a pressure of 5.6×10^3 Pa. If the pressure is increased to 1.5×10^4 Pa at a constant temperature, what will be the new volume of the gas?

(ii) A cylinder with a movable piston contains 2.00 g of helium, at room temperature. More helium was added to the cylinder and the volume was adjusted so that the gas pressure remained the same. How many grams of helium were added to the cylinder if the volume was changed from 2.00 L to 2.70 L? (R.A.M. He = 4.0, the temperature was held constant.)

(6 marks)

Q6 (a) (i) Redraw the amino acids structure in **Figure Q6(a)** and match them with their name and abbreviation in **Table Q6**.

Table Q6: Name and abbreviation of amino acid

Name	Abbreviation
glutamine	Glu
serine	Ser
alanine	Ala
Cysteine	Cys

(2 marks)

(ii)   By using two (2) of the structures in **Figure Q6(a)**, illustrate the formation of one (1) peptide bond.

(2 marks)

(b)   (i)   Show how heat denatures the folded protein in **Figure Q6(b)**.

(3 marks)

(ii)   By using the denatured protein structure in (b)(i), simulate whether renature is possible.

(2 marks)

(iii)   Summarize an explanation for (i) and (ii) phenomena.

(5 marks)

(c)   (i)   Choose one (1) enzyme that act specifically in a metabolism.

(1 mark)

(ii)   Organize a chemical reaction catalyzed by enzyme (i).

(3 marks)

(iii)   Reason out the role of enzyme (i) in the mechanism of reaction (ii).

(2 marks)

-    **END OF QUESTION -**

PEPERIKSAAN AKHIR

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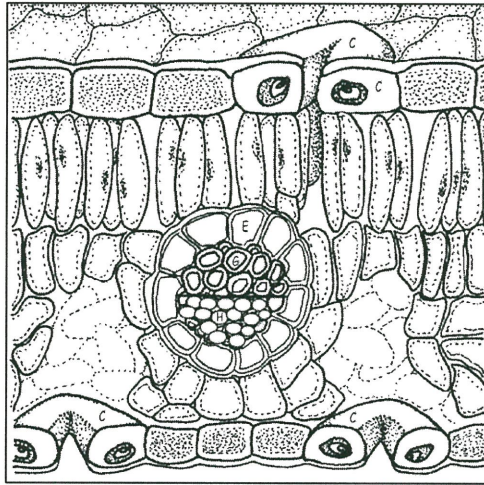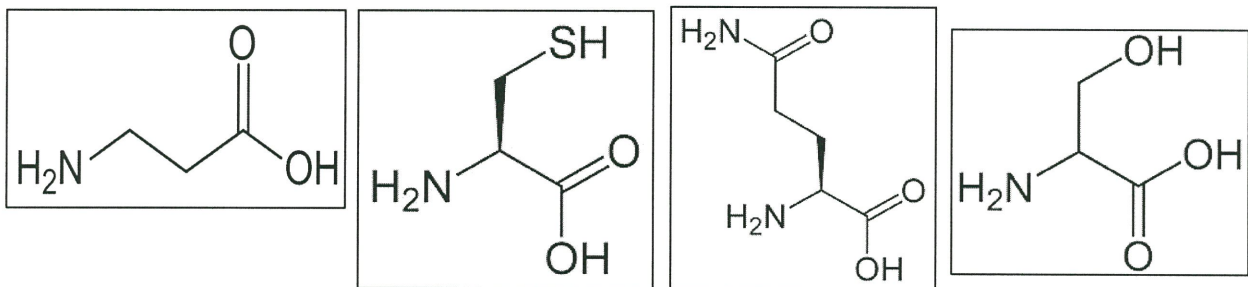   BIODIVERSITY & CONSERVATION
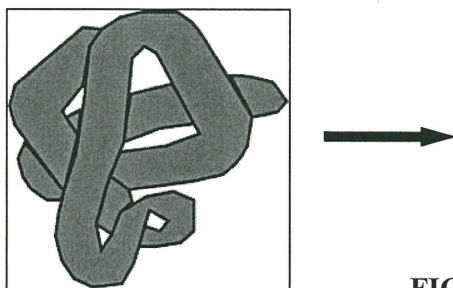

Figure Q4(b)

FIGURE Q6(a)

FIGURE Q6(b)