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**UNIVERSITI TUN HUSSEIN ONN
MALAYSIA**

**FINAL EXAMINATION
SEMESTER II
SESSION 2014/2015**

COURSE NAME : CHEMICAL PROCESS AND
SUSTAINABILITY
COURSE CODE : DAK 32103
PROGRAMME : 2 DAK
EXAMINATION DATE : JUNE 2015/ JULY 2015
DURATION : 3 HOURS
INSTRUCTION : A) ANSWER **ALL** QUESTIONS IN
PART A AND
B) ANSWER **TWO (2)**
QUESTIONS ONLY IN PART B

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

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SECTION A

- Q1**
- (a) Briefly describe bioethanol. (4 marks)
- (b) Sugar fermentation is one of the common method for ethanol extraction. Discuss the process. (4 marks)
- (c) (i) State **THREE (3)** method of hydrolysis in bioethanol production. (3 marks)
- (ii) There are several processes in bioethanol production. Briefly explain process of Concentrated Acid Hydrolysis and Dilute Acid Hydrolysis. (6 marks)
- (d) Bioethanol is a need of future. Give **FOUR (4)** advantages and **FOUR (4)** disadvantages of bioethanol. (8 marks)
- Q2**
- (a) Discuss the differences between the biomass and fossil fuel. (4 marks)
- (b) Biofuel can be divided into three categories. Determine each categories. (6 marks)
- (c) Describe
- (i) **TWO (2)** important characteristics of algae. (2 marks)
- (ii) Advantages using algae to produce biodiesel. (4 marks)
- (d) Algae Biodiesel is a good replacement for standard crop biodiesels like soy and canola. Briefly discuss **THREE (3)** way to extract oil from algae. (9 marks)

SECTION B

- Q3** (a) Describe
- (i) Ecological footprint. (3 marks)
 - (ii) Biocapacity. (3 marks)
 - (iii) Carbon footprint. (3 marks)
- (b) Many gases contribute to the greenhouse effect. Give **FOUR (4)** examples of greenhouse gases. (4 marks)
- (c) Ecological footprint comprises of six components. Identify and elaborate all **SIX (6)** component of footprint. (12 marks)
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- Q4** (a) Describe Sustainable Development and identify its **TWO (2)** key concepts. (4 marks)
- (b) Cumene is clear, colorless liquid with sharp aromatic odor.
- (i) Draw and label the chemical structures of cumene. (3 marks)
 - (ii) Draw the chemical structures of Primary Alkylation and Secondary Alkylation reaction. (6 marks)
- (c) (i) Describe environmental impact indicators. (2 marks)
- (ii) Define Centre for Waste Reduction Technologies (CWRT) and list **THREE (3)** important aspects of the CWRT. (5 marks)
 - (iii) List **FIVE (5)** similar indicators developed by CWRT metrics. (5 marks)

- Q5** (a) Homogeneous catalysts is the same physical phase as reagents. List **FIVE (5)** important types of reaction in homogeneous catalysis.
(5 marks)
- (b) Catalyst is a substance that starts or speeds up a chemical reaction while undergoing no permanent change itself. Identify **FOUR (4)** types of catalyst that commonly used.
(4 marks)
- (c) (i) Define dendrimers.
(2 marks)
- (ii) Illustrate and label the dendrimers.
(4 marks)
- (d) (i) Briefly describe enzymes.
(2 marks)
- (ii) Give **FOUR (4)** types of biocatalysts and identify each use.
(8 marks)
- Q6** (a) (i) Define concept of Green chemistry.
(2 marks)
- (ii) List **SIX (6)** matters that should be reduce in Green Chemistry.
(6 marks)
- (b) Identify **FIVE (5)** major uses of Green chemistry.
(5 marks)
- (c) List all **TWELVE (12)** basics principles of Green Chemistry.
(12 marks)

- END OF QUESTION -