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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2013/2014**

COURSE NAME : INTRODUCTION TO CHEMICAL
ENGINEERING TECHNOLOGY

COURSE CODE : DAK 10202

PROGRAMME : 1 DAK

EXAMINATION DATE : DECEMBER 2013/JANUARY 2014

DURATION : 2 HOURS

INSTRUCTION : ANSWER **THREE (3)**
QUESTIONS ONLY

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

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- Q1.** (a) Briefly describe the role of chemical engineering technologist in creating a cleaner energy to society. (4 marks)
- (b) Define the term of dimension and give **FOUR (4)** examples of base dimensions. (5 marks)
- (c) Describe the derived dimension of density and of volume in terms of the base dimensions. (2 marks)
- (d) Ammonia burns in oxygen to form nitric oxide (NO) and water vapor according to reaction below.



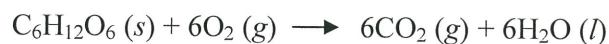
How many volumes of NO are obtained from one volume of ammonia at the same temperature and pressure?

(5 marks)

- (e) Solve the volume (in liters) occupied by 80.0 g of hydrochloric acid at standard temperature and pressure (STP). (7 marks)
- (f) Calculate the molar density of a gas at:
- (i) ideal: 0°C and 1 atm
- (ii) 90°C and 2.50 atm

(2 marks)

- Q2.** (a) List **SIX (6)** prefixes of the Standard International Systems of Units (SI) units. (3 marks)
- (b) Briefly describe **THREE (3)** major types of chemical process flow diagrams. (3 marks)
- (c) Calculate the volume of CO₂ produced at 37°C and 1.00 atm when 5.60 g of glucose are used up in the reaction:



(5 marks)

(d) Discuss about each of the process unit:

- (i) Mixer
- (ii) Reactor
- (iii) Splitter
- (iv) Separator

(8 marks)

(e) Explain the terms below:

- (i) Batch process
- (ii) Continuous-flow process
- (iii) Semi-batch process

Sketch a diagram for each process.

(6 marks)

Q3. (a) Consider your digestive system as a block of a flow diagram. Identify and briefly describe the type and function of processing unit (mixer, splitter and separator) of:

- (i) Mouth
- (ii) Stomach
- (iii) Intestine

Describe your answer with appropriate diagram(s).

(9 marks)

(b) Mr. Dewa is planning to produce a food product and market it locally. Choose a product and discuss the business planning in terms of the production of the product, the processing involved and related issues with safety and ethics. Describe your answer with appropriate flow sheet / flow diagram.

(16 marks)

Q4. (a) Define the following hazard analysis:

- (i) FMEA
- (ii) ETA
- (iii) HAZOP
- (iv) HEA

(8 marks)

(b) A fault tree for a failure of a processing unit is shown in **Figure Q4**. Relevant data is presented in **Table 1**.

Table 1: Failure Data / Probability of Events

Item	Failure Data / Probability of Events
1. Failure of Automatic ESD	0.055 per year
2. Failure of Manual ESD	0.008 per year
3. Failure of Operator	3 per 1000 demands, 3 demands per year
4. Failure of Relief Valve	3 per 1000 demands, 3 demands per year

- (i) Based on the fault tree (**Figure Q4**), discuss how the top event may occur.
(4 marks)
- (ii) Determine the probability of the top event.
(13 marks)

- END OF QUESTION -

FINAL EXAMINATION

SEMESTER / SESSION : SEM I / 20132014
 COURSE NAME : INTRODUCTION TO CHEMICAL ENGINEERING TECHNOLOGY
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PROGRAMME : DAK

Periodic Table of the Elements

<http://chemistry.about.com>
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 About Chemistry

1A																2A										3A										4A										5A										6A										7A										8A																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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