Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2016/2017

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COURSE NAME	:	INTRODUCTION TO CHEMICAL ENGINEERING TECHNOLOGY
COURSE CODE	:	BNQ 10103
PROGRAMME CODE	:	BNN
EXAMINATION DATE	:	DECEMBER 2016 / JANUARY 2017
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWERS **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

Q1 Chemical engineering technologist may be referred as "universal engineers" because their scientific and technical mastery is so extensive.

(a) Describe the program of "Chemical Engineering Technology" and "Chemical Engineering" that offered for undergraduate students in university.

(4 marks)

(b) Differentiate between "chemical process" and "specific process".

(4 marks)

(c) As an engineering technologist at a chemical/biochemical plant, you are required to decide a suitable process for the chemical/biochemical production. Explain in detail the differences between "batch process" and "continuous process".

(6 marks)

(d) Demonstrate **THREE (3)** important contributions which have been made by chemical engineering technologists to the society.

(6 marks)

Q2 Temperature and pressure are critical process variables that affect process performance which determine how fast a chemical reaction will proceed to completion or how pure the products obtained from a separation device will be.

(a) Show the "ideal gas equation".

(1 marks)

(b) Describe the term "empirical formula" and "molecular formula". Provide an example for each formula.

(4 marks)

(c) Describe the term "molarity" and "normality".

(4 marks)

(d) Assess normality of following conditions:

(i) Acid reaction for Nitric acid
(ii) Nitrate precipitation reaction for Nitric acid
(iii) Aluminium reaction for Al2$(SO_4)_3$
(iv) Sulfide precipitation reaction for $Al_2(SO_4)_3$

(4 marks)

(e) Calculate mass of glucose ($C_6H_{12}O_6$) needs to be weighed out, if 3.2 mole of glucose is required in an experiment. [H:1, C:12, O:16].

(3 marks)

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(f) Calculate the mole of ammonia and carbon dioxide required to produce 125 grams of urea. [N:14, H:1, C:12, O:16].
$NH_3(g) + CO_2(g) \longrightarrow (NH_2)_2CO(aq) + H_2O(l)$

(4 marks)

Q3 Balanced equations for chemical reactions allow chemists and chemistry students to calculate various amounts of reactants and products.

(a) Show the general balance equation for material balances.

(1 marks)

(b) According to **Figure Q3(b)**, a mixture containing 37% P and Q by mass is fed to a distillation column. 92.5% of the P in the feed is produced in overhead stream and 2035 kg/h of product leaves in the bottom stream. Calculate all flows and compositions.

(11 marks)

(c) Demonstrate **THREE (3)** major types of chemical process flow sheets.

(6 marks)

(d) Differentiate between "steady state" and "unsteady state process".

(2 marks)

Q4 Chemical natural resources are those material and substances, which occur naturally in the environment. They are those resources that are readily and naturally available on our planet, and can be used in their natural and undisturbed form.

(a) Differentiate between abiotic and biotic natural resources and provide **TWO (2)** examples for each.

(4 marks)

(b) Define the term "Biotechnology".

(2 marks)

(c) Relate **TWO (2)** examples of natural resources with the application in biotechnology.

(4 marks)

(d) Demonstrate the example of bioproduct developments and productions.

(4 marks)

(e) Explain how bioproduct development can minimize the environmental problem such as global warming and flooding.

(6 marks)

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Q5 Safety and health in chemical process industry and ethical issues is very important to understand in order to ensure the safety of workers and employers.

(a) Describe **FOUR (4)** objectives of industrial safety and health.

(4 marks)

(b) Define the term "safety or loss prevention", "risk" and "hazards".

(3 marks)

(c) Demonstrate typical techniques used in **FOUR (4)** major approaches to inherent safety.

(8 marks)

(d) A process has reported FAR of 5. If an employee works standard 8 hr shift 300 days per year, calculate the deaths per person per year.

(5 marks)

--END OF QUESTIONS--

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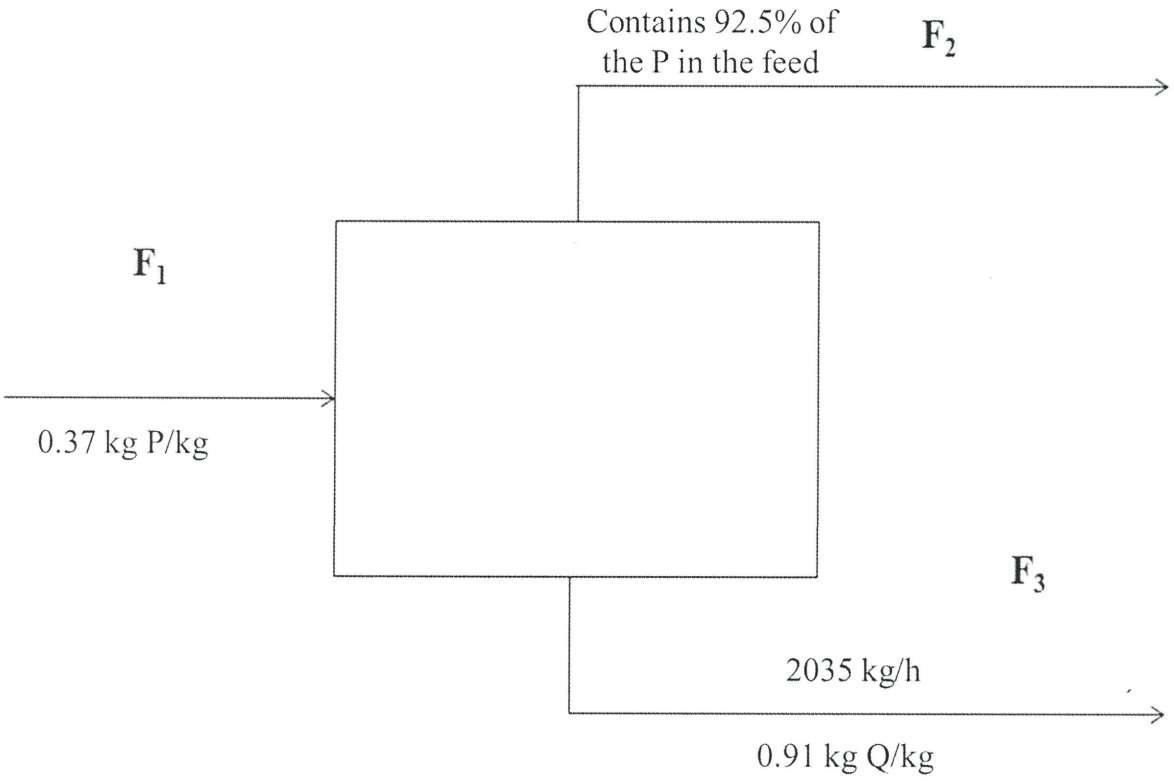

Figure Q3(b)

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