UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2015/2016

COURSE NAME	:	INTRODUCTION TO CHEMICAL ENGINEERING TECHNOLOGY
COURSE CODE	:	BNQ 10103
PROGRAMME	:	1 BNN
TEST DATE	:	DECEMBER 2015/ JANUARY 2016
DURATION	:	2 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

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

Q1   "Chemical engineer technologist" may be called "universal engineers" because their scientific and technical mastery is so extensive.

(a)   Describe the term *chemical engineering technology*.

(3 marks)

(b)   Demonstrate the jobs opportunity for chemical engineering technologist.

(5 marks)

(c)   Assess **FOUR (4)** importance of units and conversions.

(4 marks)

(d)   Show **THREE (3)** examples of derived dimension.

(3 marks)

(e)   Analyze which of these equations are dimensionally homogenous:

i. $x(m) = x_o(m) + 0.304(m/ft)v(ft/s)t(s) - 5m^2 + 0.5a(m/s^2)[t(s)]^2$

ii. $P(kg/ms^2) = 10135(Pa/atm) \ 1(kg/ms^2/Pa)P_o(atm) + p(kg/m^3)v(m/s)$

(4 marks)

(f)   Define and differentiate empirical formula and molecular formula. Provide an example for each formula.

(6 marks)

Q2   (a)   Calculate the mass of zinc in a 50.00 g sample of zinc nitrate, $Zn(NO_3)$.

(3 marks)

(b)   0.039 mol of calcium carbonate ($CaCO_3$) is required in an experiment. Calculate mass of $CaCO_3$ needs to be weighed out.

(3 marks)

(c)   A chemist needs 58.75 grams of urea, calculate how many grams of ammonia are needed to produce this amount?
$$2NH_3(g) + CO_2(g) \rightarrow (NH_2)_2CO(aq) + H_2O(l)$$

(3 marks)

(d)   List the law of conservation of mass in material balances.

(3 marks)

(e)   List the general balance equation of material balances.

(2 marks)

(f)   **Figure Q2** describes a distillation column problem for a mixture containing Y and Z. Assess and fined all flows and compositions.

(11 marks)

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Q3   Process flow sheets are compact and precise diagrams that present a large amount of technical information about chemical processes.

(a)   Differentiate **THREE (3)** major types of chemical process flow sheets.

(6 marks)

(b)   Differentiate between *batch*, *semi-batch* and *continuous* process.

(6 marks)

(c)   Describe the term *Biotechnology*

(2 marks)

(d)   Describe the applications of biotechnology in the following areas:
   i.   Agricultural industry
   ii.   Bioprosessing

(6 marks)

(e)   Explain the example of bioproduct developments & productions

(5 marks)

Q4   Safety or loss prevention is the prevention of accidents through the use of appropriate technologies to identify the hazard of a chemical plant and eliminate them before an accident occurs.

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

(4 marks)

(b)   Sketch **THREE (3)** symbols indicating different classes of hazardous substances.

(6 marks)

(c)   Accident and loss statistic are important measures of the effectiveness of safety programs.

(i)   Describe **TWO (2)** methods of a safety measurement.

(4 marks)

(ii)   A process has reported FAR of 3. If an employee works standard 8 hr shift 300 days per year, calculate the deaths per person per year.

(2 marks)

(iii)   Demonstrate **TWO (2)** effects of prolong chemical exposure.

(4 marks)

(d)   The dose-response curve describes the relationship between degree of exposure to a chemical (dose) and the magnitude of the effect (response) in the exposed organism. Illustrate and interpret the dose-response curve.
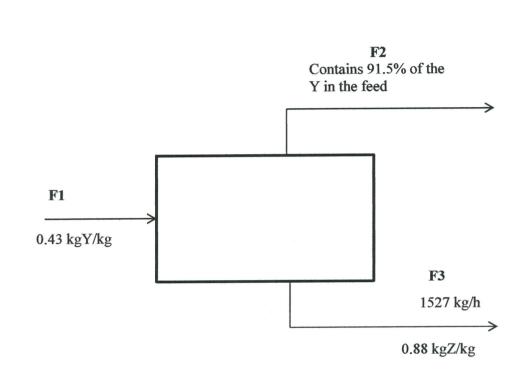
(5 marks)

-    **END OF QUESTION** -

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                               ENGINEEERING TECHNOLOGY

F2
Contains 91.5% of the
Y in the feed

F1

0.43 kgY/kg

F3

1527 kg/h

0.88 kgZ/kg

FIGURE Q2