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**UTHM**  
Universiti Tun Hussein Onn Malaysia

**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
(ONLINE)  
SEMESTER I  
SESSION 2020/2021**

COURSE NAME : FOUNDATION OF CHEMICAL  
ENGINEERING TECHNOLOGY

COURSE CODE : DAK12302 / DAK 13303

PROGRAMME CODE : DAK

EXAMINATION DATE : JANUARY / FEBRUARY 2021

DURATION : 3 HOURS

INSTRUCTION : ANSWERS ALL QUESTIONS

**TERBUKA**

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

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Q1 (a) Convert this formula;

$$\frac{10(\text{cm}^2)}{(\text{min})(\text{lb}_m)(\text{ft}^2)} \text{ to all SI units.}$$

(5 marks)

(b) A smoking lounge is to accommodate 15 heavy smokers. The minimum fresh air requirement for smoking lounges is specified to be 30 L/s per person. Determine. (Hint: Use conservation of mass)

(i) The minimum required flow rate of fresh air that needs to be supplied to the lounge.

(5 marks)

(ii) The diameter of the duct if the air velocity is not to exceed 8 m/s

(5 marks)

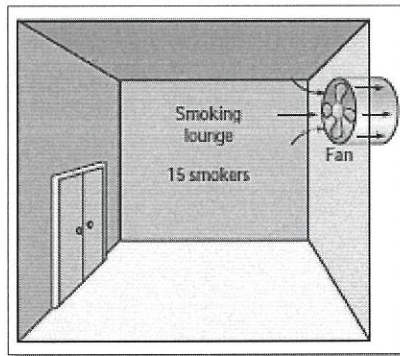


Figure Q1 (b)

(c) As a future chemical engineer, proposed **one (1)** technology and discuss the advantages of the proposed technology.

(10 marks)

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**Q2** (a) One hundred kilograms per minute of a mixture containing 60% oil and 40% water by mass are fed into a settling tank that operates at a steady state. **TWO (2)** products streams emerge from the settler, the top contains pure oil, and the bottom is 90% water by mass.

(i) Construct a diagram for this process.

(6 marks)

(ii) Calculate the flowrate for the **TWO (2)** product streams.

(9 marks)

(b) Consider separation of 100.0 gram samples of each of the following. Solve them from the lowest to the highest percent oxygen by mass.

H <sub>2</sub> O	N <sub>2</sub> O	C <sub>3</sub> H <sub>6</sub> O <sub>2</sub>	CO <sub>2</sub>
18gm	34gm	74gm	74gm

(10 marks)

**Q3** (a) There **are three (3)** types of process in chemical plant which are batch, semi-batch and continuous.

(i) Describe each of the process

(3 marks)

(ii) Sketch a diagram for each process.

(3 marks)

(b) Consider your digestive system as a block of a flow diagram. Identify and briefly describe the types and function of processing unit of

(i) Mouth

(ii) Stomach

(iii) Intestine

Describe your answer with a appropriate diagram(s).

(9 marks)

(c) Draw and label **five (5)** symbols in Piping and Instrumentation Diagram (P&ID)

(10 marks)

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**Q4** (a) The pressure gauge on a 20 m<sup>3</sup> tank of nitrogen at 25 °C reads 10 bar. Calculate the mass of nitrogen in the tank by:

(i) Direct solution of the ideal gas equation of state (5 marks)

(ii) Conversion from standard conditions (5 marks)

(b) In a distillation column, a liquid hydrocarbon containing 20% ethane (C2), 40% propane (C3) and 40% butane (C4) is to be fractionated into essentially pure components as shown in the Figure 1. By referring to Figure 1, calculate the value of E, A, P, B and the composition of C2, C3 and C4 at A.

(15 marks)

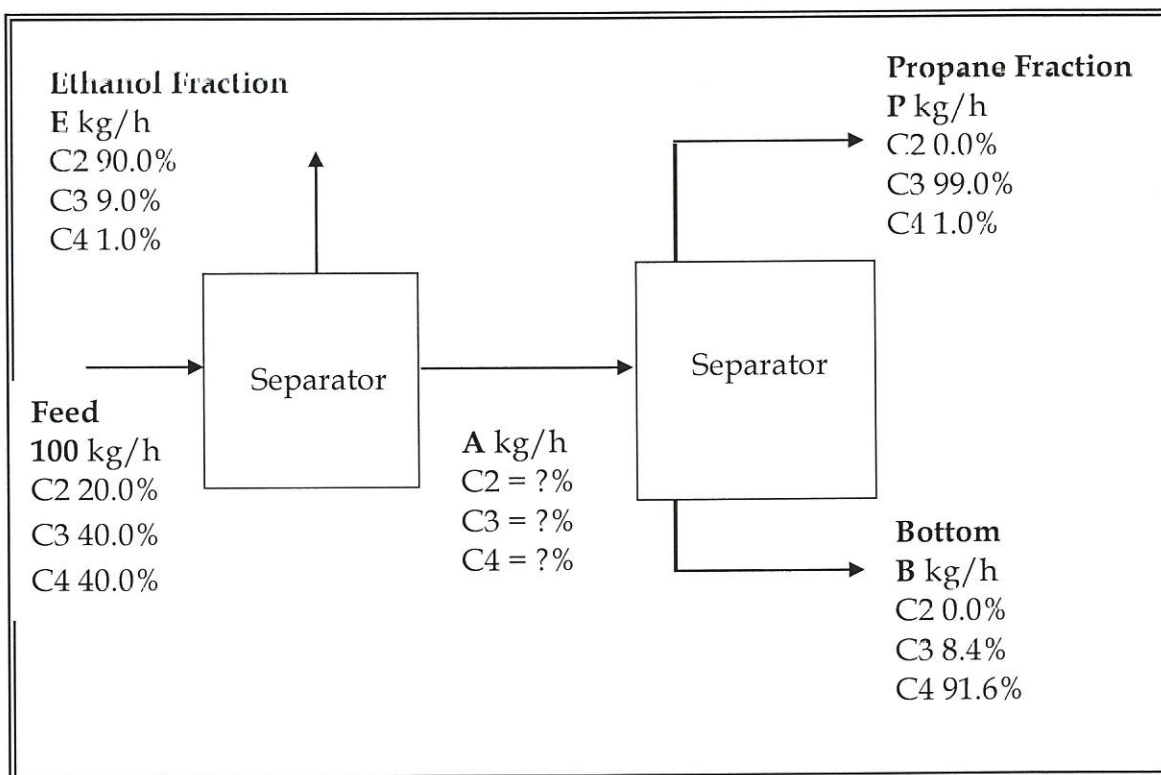


Figure 1

-END OF QUESTIONS -

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