UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2022/2023

COURSE NAME	:	WASTE MANAGEMENT TECHNOLOGY
COURSE CODE	:	BNS 20202
PROGRAMME CODE	:	BNS
EXAMINATION DATE	:	JULY/ AUGUST 2023
DURATION	:	3 HOURS
INSTRUCTIONS		1. ANSWER ALL QUESTIONS
		2. THIS FINAL EXAMINATION IS CONDUCTED VIA **CLOSED BOOK.**
		3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

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

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Q1 (a) List **TWO (2)** types of solid waste in Malaysia.

(4 marks)

(b) Identify **THREE (3)** types of waste categorized under controlled solid waste.

(6 marks)

(c) Environmental law dictates a "cradle to grave" in managing waste in Malaysia. Explain "cradle to grave" terms.

(5 marks)

(d) Categorize below waste into scheduled waste or solid waste category.
   (i) Food waste
   (ii) Contaminated container with oil waste
   (iii) Constructions waste
   (iv) Contaminated glove with blood from hospital
   (v) Broken Laptop

(10 marks)

Q2 (a) Identify **TWO (2)** advantages of proper waste management

(2 marks)

(b) List **THREE (3)** types of waste to energy analysis.

(3 marks)

(c) Explain the process of incinerator technology in waste to energy concept.

(10 marks)

(d) Outline **FIVE (5)** advantages of Incineration technology.

(10 marks)

Q3 (a) Define the life cycle assessment (LCA) concept.

(3 marks)

(b) **Figure Q3 (b)** shows open loop recycling applied to three different product systems. First, material flow in each product system is assumed to be 1 kg. Second, the environmental load of each life cycle stage is arbitrarily set at; raw material acquisition, manufacturing and use, disposal, and recycling as 300, 0, 200, and 100 Environmental load (EL)/kg material flow, respectively. Note that the manufacturing and use stages are not subjected to allocations so their environmental load was set to zero.

Calculate allocation of the environmental load by applied the cut-off method.

(12 marks)

(c)   **Figure Q3 (c)(i)** illustrates Transfer Center receives 600. tons/day of solid waste (trash and recyclables) from a local community 1 and 400. tons/day from community 2. It is assumed 25% of this total is recyclables, and that at maximum capacity the local incinerator can burn 200 tons/day.

Analyze amount of solid waste should the Transfer Center plan on transporting to local landfills by using equation given in **Figure Q3 (c)(ii).**

(10 marks)

Q4   (a)   Outline **THREE (3)** methods of demolition for waste minimization.

(9 marks)

(b)   One of the major contributors to illegal dumping is the poor collection management system especially in the rural area which there are limited access route to the location. Whereby, it should be designed and operated in an integrated way, so that it can be properly managed. Discuss **FIVE (5)** impacts of illegal dumping.

(10 marks)

(c)   Illustrates **SIX (6)** layers of waste management hierarchy.

(6 marks)

-END OF QUESTIONS –

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FINAL EXAMINATION
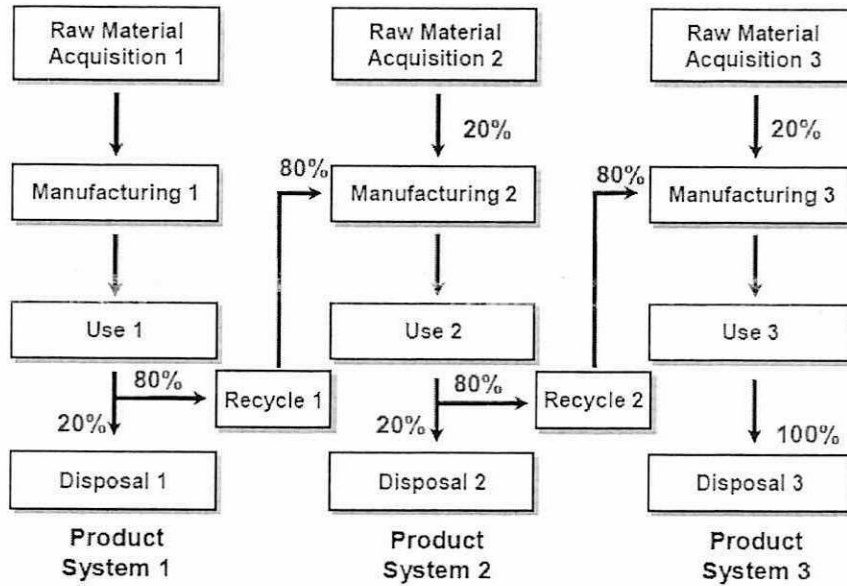
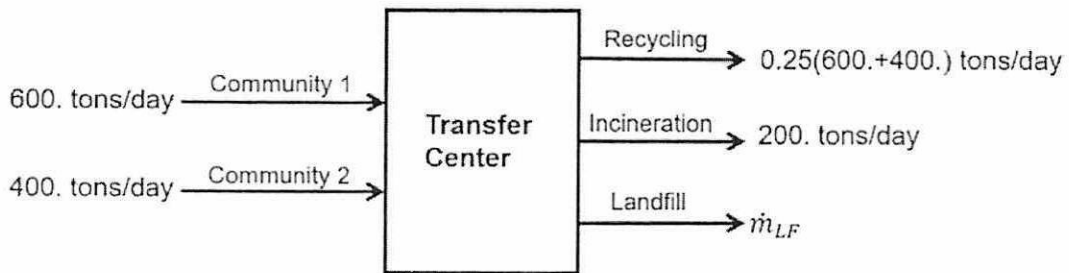SEMESTER / SESSION   : SEM II 2022/2023   PROGRAMME CODE : BNS
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FigureQ3(b)

FigureQ3 c(i)

$$\left(\dot{m}\right)_{CV} = 0 = \sum \left(\dot{m}\right)_{in} - \sum \left(\dot{m}\right)_{out}$$

Figure Q3(c)(ii)