Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2021/2022

COURSE NAME	:	WASTE MANAGEMENT TECHNOLOGY
COURSE CODE	:	BNS 20202
PROGRAMMECODE	:	BNS
EXAMINATION DATE	:	JULY 2022
DURATION	:	3 HOURS
INSTRUCTION		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 **FIVE (5)** PAGES

Q1 (a) Environmental law dictates a "cradle to grave" in managing waste in Malaysia. Define "cradle to grave" terms.

(5 marks)

(b) Besides life cycle assessment, identify another **TWO (2)** types of waste to energy analysis.

(4 marks)

(c) Sarah is a newly hired health, safety and environment officer at an industrial plant located at Pasir Gudang, Johor. During carried out an audit, she observed poor practices of discharging wastewater into local river. As immediate action, she makes a proposal to management to purchase an analyzer detection system to check the water quality and cleaning equipment However, her immediate boss was refused due to budget constraint for another project

Based on this situation, evaluate the consequences of this incompliance to the company and suggest **TWO (2)** recover measures can be taken to minimize the impact.

(6 marks)

(d) Sanitary landfills are an improvement over the landfills (or dumps) of the past since significant (and often expensive) measures are taken to protect the surrounding environment. Based on **Figure Q1 (d),** explain the process of incinerator technology in waste to energy concept.

(10 marks)

Q2 (a) Identify **TWO (2)** types of solid waste in Malaysia.

(4 marks)

(b) Explain **TWO (2)** benefits associated with Refuse-derived fuel systems.

(8 marks)

(c) Discuss **FOUR (4)** advantages of proper waste management towards society, economic and environment.

(8 marks)

(d) Illustrates **FIVE (5)** layers of waste management hierarchy.

(5 marks)

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

(2 marks)

(b) **Figure Q3 (b)** shown open loop recycling applied to three different product systems. First, material flow in each product system is assumed to be 1 kg. Second, 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.

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

(12 marks)

(c) Describe **THREE (3)** key elements in life cycle interpretation.

(6 marks)

(d) **Figure Q3 (d)(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 waste is recyclables, and that at maximum capacity the local incinerator can burn is 200 tons/day.

Compute amount of solid waste can be transported to local landfills from the Transfer Center plant processes by using equation given in **Figure Q3 (d)(ii).**

(5 marks)

Q4 (a) Identify **FIVE (5)** barriers in Practicing Waste Minimization in Malaysia.

(5 marks)

(b) Differentiate between destruction and demolition concepts and give **THREE (3)** examples methods of each.

(10 marks)

(c) **Figure Q4 (c)** shown of illegal dumping issues in Malaysia. One of the major contributors to illegal dumping is 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. Describe **FIVE (5)** concerns of illegal dumping.

(10 marks)

-END OF QUESTIONS –

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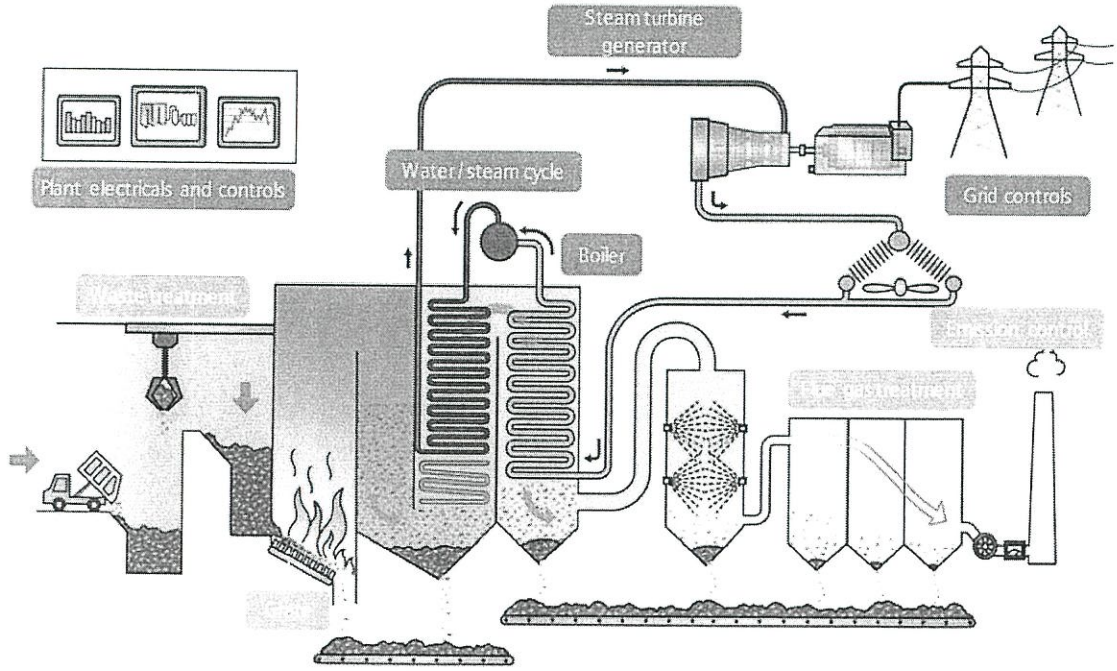

Figure Q1 (d)

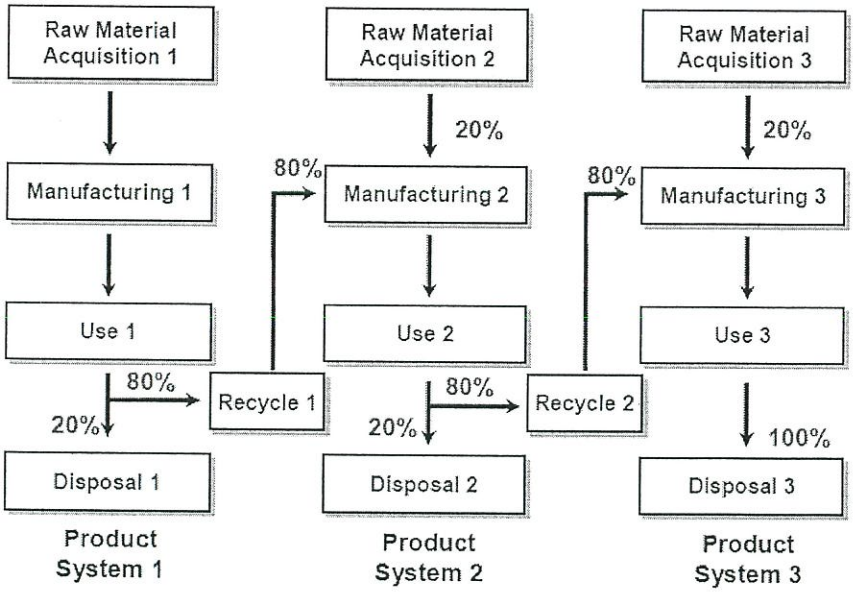

Figure Q3 (b)

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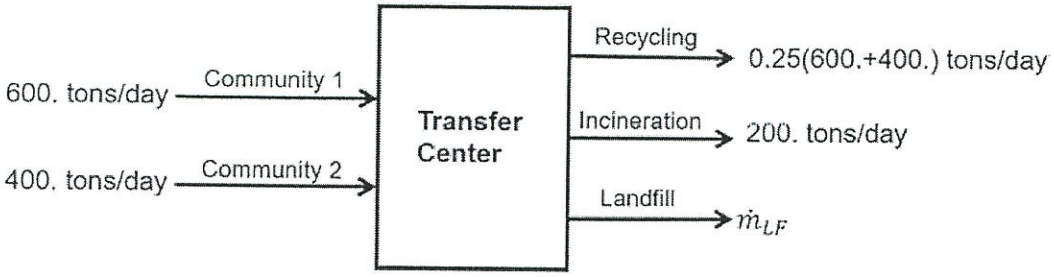

Figure Q3 (d)(i)

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

Figure Q3 (d)(ii)

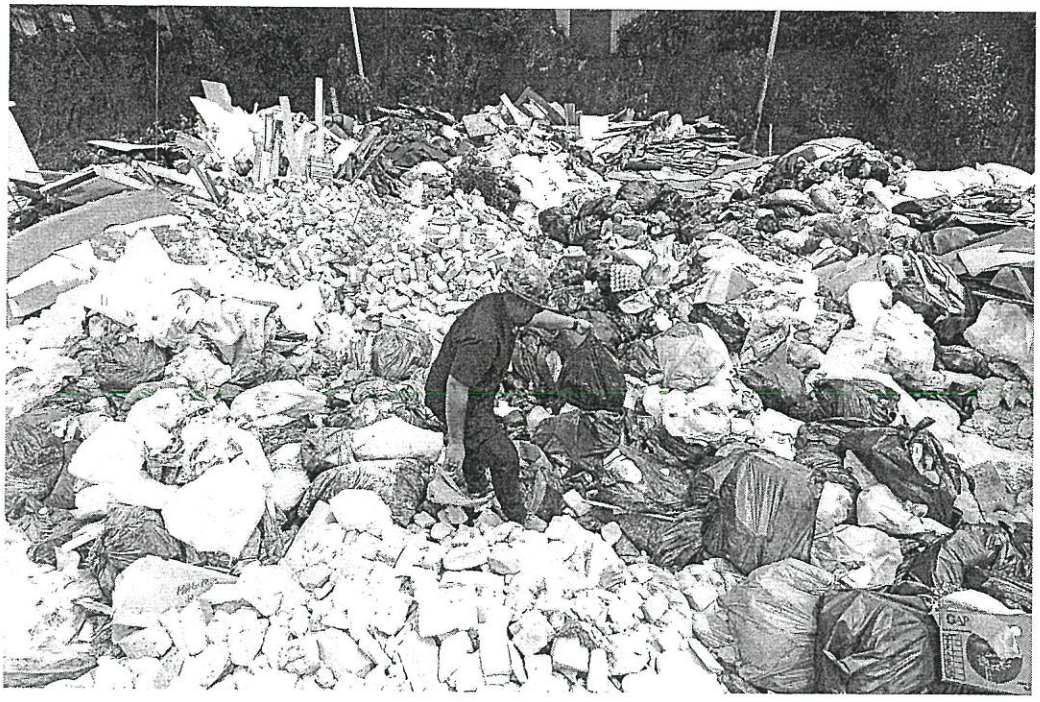

Figure Q4 (c)