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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESI 2021/2022**

COURSE NAME : ENVIRONMENTAL ENGINEERING
COURSE CODE : BFC 32403
PROGRAMME CODE : BFF
EXAMINATION DATE : JANUARY / FEBRUARY 2022
DURATION : 3 HOURS
INSTRUCTION : 1. ANSWER **ALL** QUESTIONS.
2. THIS FINAL EXAMINATION IS AN **ONLINE** ASSESSMENT AND CONDUCTED VIA **CLOSE BOOK**.

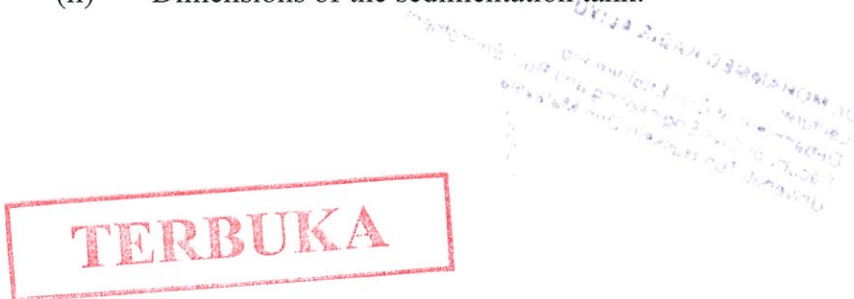
THIS QUESTION PAPER CONSISTS OF **SIX (6)** PAGES

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- Q1** (a) As an environmental officer, you are required to conduct water quality sampling at Sungai Semenyih for ammonia testing. Explain the method of collection and preservation of water samples and why it should be considered during water quality measurement. (6 marks)
- (b) Discuss **THREE (3)** procedures to prevent cross-contamination during water sampling. (6 marks)
- (c) **Figure Q1(c)** shows two streams converge named as Lepas River and Dua River. Determine the flow, temperature, and dissolved oxygen in the merged stream at point **X** Sungai Tembung. Based on the data analysis, give comment on the water quality conditions after mixing. (8 marks)

- Q2** (a) State the mechanism of coagulation process in water treatment plant. (3 marks)
- (b) Sketch with labels the flow of treatment processes for surface water from the intake to the distribution point. (6 marks)
- (c) As an engineer, you have to design a sedimentation tank for Berjaya City residential area with a design overflow rate of $35 \text{ m}^3/\text{m}^2 \cdot \text{d}$ and the detention time is 80 minutes. Design criteria are given as follows:
 Water flow rate = $0.8 \text{ m}^3/\text{s}$
 Width of each tank unit = 15 m
 Typical overflow rate = $16 \text{ m}^3/\text{m}^2 \cdot \text{d}$
 Minimum number of sedimentation tank units = 2
 Calculate:
- (i) Surface area of a settling tank. Compare the calculated surface area of the typical overflow rate. Give your comment. (5 marks)
- (ii) Dimensions of the sedimentation tank. (6 marks)



Q3 (a) Distinguish the different role of primary and secondary treatment of wastewater.

(4 marks)

(b) A house with seven (7) occupants located in a sub urban village used a septic tank to treat all their household wastes. Water supply used for cleansing is 160 L per person per day. The ambient temperature is not less than 25°C for most of the years. If the house practise the desludging every three (3) years and the suggested maximum sludge accumulation rates (S) is 40 L per person per year.

(i) Determine the volume of liquid entering the tank each day

(2 marks)

(ii) Volume of sludge and scum

(2 marks)

(iii) Total volume of the septic tank

(2 marks)

Given:

$$A = P \times q$$

$$B = P \times N \times F \times S$$

Refer **Table Q3(b)**

(c) The following data were reported on the operation of primary settling tank and activated sludge system of Wastewater Treatment Plant:

Primary Settling Tank:

	Influent	Removal Efficiency
BOD	186 mg/L	35%
Suspended Solid (SS)	275 mg/L	60%

Activated Sludge System:

Flow	: 0.08 m ³ /s
Aeration Tank Dimension	: 7.5 wide, 30m long, 4m deep (2 tanks are operated in series)
Mixed Liquor Suspended Solid	: 3,000 mg/L
Effluent BOD	: 25 mg/L
Suspended Solids	: 40 mg/L

Determine:

(i) Hydraulic Retention Time

(2 marks)

(ii) F/M ratio

(4 marks)

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(iii) Suspended solids and BOD removal efficiencies (2 marks)

(iv) Provide justification on the efficiency of the wastewater treatment plant based on above results. (2 marks)

Given:

$$\theta = \frac{V}{Q}$$

$$\frac{F}{M} = \frac{QS_o}{VX}$$

Q4 (a) (i) Explain how do you contribute to solid waste management at your household (4 marks)

(ii) Provide definition of approach toward integrated solid waste management. (4 marks)

(b) Explain any **SIX (6)** criteria of sanitary landfill site selection for domestic solid waste management system. (6 marks)

(c) A certain landfill serves a population of 253,000. Each week 325 trucks bring a total of 2180 tons of MSW. The volume of the landfill is 11,240,000 m³. At the present time 63% of the landfill is used. The ratio of cover to compacted fill is 1.9. Suggest the planning for landfill closure. Assume the density of the compacted waste to be 490 kg/m³. (6 marks)

Q5 (a) What pollutants have impact on air quality and how do they enter the atmosphere? (4 marks)

(b) Discuss briefly the effects of air pollution to human health, animals and plants. (5 marks)

(c) Provide certain control measures that can be adopted to reduce the air pollutants emitted by automobiles (4 marks)

(d) Apart from being a nuisance, noise pollution resulted from construction projects can have damaging effects on people and the environment. Describe ways that noise pollution can harm you and your community. And suggest ways that can be used to protect workers from hazardous noise exposure. (7 marks)

-END OF QUESTIONS-



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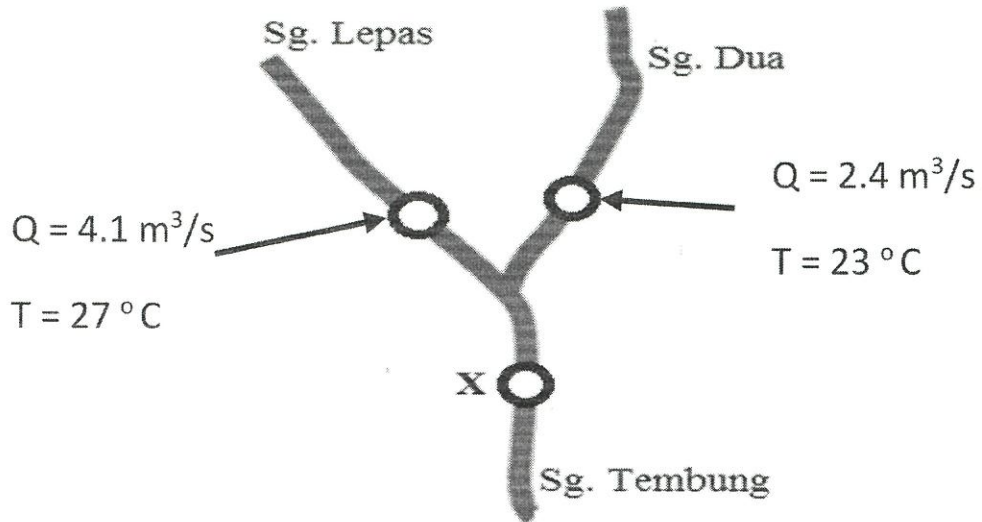


Figure Q1(c)

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Table Q3 (b)

Number of years between desludging	Value of F		
	Ambient temperature		
	>20°C throughout year	>10°C throughout year	<10°C during winter
1	1.3	1.5	2.5
2	1.0	1.15	1.5
3	1.0	1.0	1.27
4	1.0	1.0	1.15
5	1.0	1.0	1.06
6 or more	1.0	1.0	1.0

