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Universiti Tun Hussein Onn Malaysia

**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER I  
SESSION 2022/2023**

COURSE NAME : ENVIRONMENTAL ENGINEERING

COURSE CODE : BFC32403

PROGRAMME CODE : BFF

EXAMINATION DATE : FEBRUARY 2023

DURATION : 2 HOURS 30 MINUTES

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

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

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- Q1**
- (a) Discuss the importance of the Environment Impact Assessment (EIA) report in construction project development. (6 marks)
- (b) List the **SIX (6)** water quality parameters that include in Water Quality Index Classification. (6 marks)
- (c) An industry discharge  $1.05 \text{ m}^3/\text{s}$  of treated wastewater with an ultimate Biological Oxygen Demand (BOD) and dissolve oxygen (DO) of  $30 \text{ mg/L}$  and  $1.0 \text{ mg/L}$  into the Selangkah river, respectively. The river has a flow of  $7.08 \text{ m}^3/\text{s}$  and velocity of  $0.5 \text{ m/s}$ . Before the discharge, the BOD and DO of the river is  $3.5 \text{ mg/L}$  and  $8.5 \text{ mg/L}$ , respectively.
- (i) Examine the critical distance which shows the critical DO. Given the saturation DO is  $8.5 \text{ mg/L}$ ,  $k_d$  and  $k_r$  are  $0.61 \text{ day}^{-1}$  and  $0.76 \text{ day}^{-1}$ . (6 marks)
- (ii) If the industry discharges with higher volume than  $1.05 \text{ m}^3/\text{s}$  with the similar ultimate BOD, comment on the possible location of the new critical distance. (2 marks)
- Q2**
- (a) Classify **FIVE (5)** activities in your locality that contribute to air pollution. (5 marks)
- (b) Analyse the future alternative sources of energy for more sustainable light, heat, and power. (5 marks)
- (c) Explain the importance of dissemination by the media of the Air Quality Index (AQI) values in the communities in which you have lived (5 marks)
- (d) Discuss briefly **FIVE (5)** main harmful effects of noise pollution at construction site. (5 marks)

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- Q3** (a) State the main objectives of water the treatment system. (2 marks)
- (b) A jar test was conducted on untreated water with an initial turbidity of 10 NTU and a  $\text{HCO}_3^-$  concentration of 50 mg/L as  $\text{CaCO}_3$ . Alum is added as dry alum (molecular weight of 594 g/mole). By using the **Table 1** data obtained from a jar test;
- (i) Compute the optimum alum dosage for turbidity removal. (3 marks)
- (ii) Theoretical amount of alkalinity that will be consumed at the optimal dosage. (4 marks)
- (c) Rapid and slow sand filter are the most common methods used in filtration process.
- (i) Explain the purpose of filtration process. (2 marks)
- (ii) Differentiate these systems in terms of design criteria of the process such as filtration rate, bed depth, run length, maximum raw water turbidity and regeneration method. (5 marks)
- (d) Explain the importance of the disinfection process in drinking water treatment and give options available for disinfection processes. (4 marks)

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- Q4**
- (a) In Malaysia, hazardous waste is known as Scheduled Waste. Explain why the term Scheduled Waste is used in Malaysia and state **FOUR (4)** characteristics of Scheduled Waste. (7 marks)
- (b) Recycling activities become more successful if consumers sort recyclable items properly and which includes cleaning before sending them to the recycling centre. Discuss these common issues that arise in the community and suggest the best solutions for more effective recycling activities. (7 marks)
- (c) Town Cyberjaya was expanded from 2550 houses in 2010 to 8650 houses in 2022. The residents in that town produced 50 500 kg/day of municipal solid waste in 2010. Each of the house occupied by 5 residents, calculate:
- (i) Waste produced per capita/day in 2010. (2 marks)
- (ii) Total waste in 2022 by using the similar capita/day in 2010. (2 marks)
- (iii) The percentage increment of waste produced from 2010 to 2022. (2 marks)

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- Q5** (a) What is the wastewater flow equalization? Briefly discuss the importance of flow equalization in a wastewater treatment plant. (4 marks)
- (b) Design a primary settling tank is to handle maximum hourly wastewater flow of  $0.6 \text{ m}^3/\text{s}$  at an overflow rate of  $62 \text{ m}^3/\text{d}/\text{m}^2/\text{day}$  as the following:
- (i) Surface area of the tank. (3 marks)
  - (ii) Hydraulic retention time (HRT) if the tank depth is 3.5 m. (2 marks)
  - (iii) Give comments on your HRT value either within the acceptable range or not as the design criteria for HRT is between 1.5-2.5 hrs. (1 mark)
- (c) Explain the characteristics of sludge produced from primary and secondary clarifier in a wastewater treatment system. (4 marks)
- (d) Discuss **TWO (2)** treatment methods of sludge produced from a wastewater treatment plant. (6 marks)

**-END OF QUESTIONS-**

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**FINAL EXAMINATION**

SEMESTER/SESSION : SEM 1/2022/2023  
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**TABLE 1**

Alum dose, mg/L	5	10	15	20	25	30
Turbidity, NTU	8	6	4.5	3.5	5	7

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