

CONFIDENTIAL



UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

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

COURSE NAME : ENVIRONMENTAL ENGINEERING

COURSE CODE : BFC32403

PROGRAMME CODE : BFF

EXAMINATION DATE : JULY / AUGUST 2023

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

TERBUKA

CONFIDENTIAL

- Q1**
- (a) Briefly discuss the importance of civil engineering field in protecting the environment.
(5 marks)
 - (b) Use **ONE (1)** specific example of green building and discuss how the design could contribute to the sustainable environment.
(5 marks)
 - (c) Identify **TWO (2)** main sources of noise pollution and discuss their potential physical and mental impacts on humans.
(5 marks)
 - (d) Choose **ONE (1)** example of construction site operation and discuss control measures to be taken to reduce noise pollution.
(5 marks)
- Q2**
- (a) Explain the significance of rapid mixing at the beginning of flocculation stage in water treatment.
(2 marks)
 - (b) Illustrate the destabilization process of negative charge particle that form floc and sludge during coagulation/flocculation process.
(7 marks)
 - (c) Distinguish between UV and chlorine disinfection method for water treatment, and then choose the best to be in terms of pH dependence and safety.
(8 marks)
 - (d) Calculate the design flow rate of a sedimentation tank that has total effluent weir is 15 m and weir loading rate is $125 \text{ m}^3/\text{day.m}$.
(3 marks)

TERBUKA

- Q3**
- (a) State the need for secondary wastewater treatment in the conventional wastewater treatment plant.
(3 marks)
 - (b) A slaughterhouse generated 1036.8 m³/d of wastewater each day. The average soluble BOD₅ and MLVSS (X) of the treated wastewater after primary settling is 966 mg/L and 2000 mg/L, respectively. The aeration tank has effective dimensions of 8.0m (W) x 8.0m (L) x 5.0m (D). Determine the aeration period and F/M ratio.
(6 marks)
 - (c) Differentiate between the attached growth and suspended growth system of biological treatment of wastewater and gives example of each system.
(5 marks)
 - (d) Discuss the advantages and disadvantages of application sludge drying bed method for wastewater treatment sludge management.
(6 marks)
- Q4**
- (a) State the act that empowers the Federal Government to take over the management of solid waste and public cleansing from the Local Authorities in Malaysia.
(1 marks)
 - (b) Define municipal solid waste (MSW) and Integrated Solid Waste Management (ISWM).
(4 marks)
 - (c) Solid waste production can vary depending on the country and culture. Identify and explain **TWO (2)** factors that could impact the rate of solid waste generation.
(5 marks)
 - (d) Calculate how many hectares of Malaysia's land is needed for sanitary landfill. If the total area of Malaysia is 330,803 km², how much land in Malaysia being used for sanitary landfill (in %). Given:
Population: 32 million
Average municipal solid waste (MSW) generation per capita: 1.5 kg/day
MSW compacted unit weight = 500 kg/m³
Design life of the sanitary landfill = 30 years
Average fill depth: 10 m
MSW to cover ratio: 4:1
1 hectare = 10,000m²
1km² = 1,000,000 m²
(10 marks)

TERBUKA

- Q5** (a) Identify whether acid rain, SO₂, O₃, particulates and CO is secondary or primary pollutant. (5 marks)
- (b) Examine the scenario below and provide the type and major sources of the air pollutant that led to the issue. Then, states the associated health effect related to the air pollutant identified:
- i. Algae bloom formed in a lake.
 - ii. Statue made from limestone eroded. (10 marks)
- (c) Distinguish between primary and secondary National Ambient Air Quality Standard. (5 marks)

-END OF QUESTIONS-

FINAL EXAMINATION

SEMESTER/SESSION : SEM II/2022/2023

PROGRAMME CODE: BFF

COURSE NAME : ENVIRONMENTAL ENGINEERING

COURSE CODE : BFC 32403

Formula

1. $Q=V/t$
 $F/M = QSo/VX$

TERBUKA