

CONFIDENTIAL



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020**

COURSE NAME : INTRODUCTION TO ENVIRONMENTAL ENGINEERING TECHNOLOGY

COURSE CODE : BNP 21403

PROGRAMME CODE : BNA/BNB/BNC

EXAMINATION DATE : DECEMBER 2019/JANUARY 2020

DURATION : 3 HOURS

INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF SIX (6) PAGES

CONFIDENTIAL

TERBUKA

- Q1** (a) State **THREE (3)** new laws established in 2009 which have replaced the Environmental Quality (Sewage and Industrial Effluents) Regulations 1979.
(3 marks)
- (b) The aim of Environmental Impact Assessment (EIA) is to assess the overall impact on the environment of development projects proposed by the public and private sectors. List **THREE (3)** objectives of EIA.
(3 marks)
- (c) Air pollution can lead formation of acid rain. Explain with an aid of sketches of formation acid rain and briefly describe impact of acid rain on environment.
(6 marks)
- (d) Based on **Q1(c)**, propose **TWO (2)** solutions to overcome this issues.
(8 marks)
- Q2** (a) Briefly explain on **THREE (3)** bioindicator which are commonly used in environmental monitoring by giving **ONE (1)** example for each.
(6 marks)
- (b) Water quality analysis of water sample is provided in **Table Q2(b)**. Determine the following:
- (i) The concentration of pH ions (H^+ and OH^-) in mg/L
 - (ii) Total Hardness (TH)
 - (iii) Alkalinity in mg/L as $CaCO_3$

Given atomic weight: $Ca^{2+} = 40.1$, $Mg^{2+} = 24.3$, $Na^+ = 23$, $C = 12$, $H = 1$, $O = 16$
(8 marks)

(c) Based on the National Water Quality Standard, water service providers in Malaysia are most concerned when turbidity in the raw water source exceeds 50NTU. Thus, the final effluent of water treatment plant is targeted to be less than 1NTU.

(i) State the origin of turbidity in Malaysia river water.

(2 marks)

(ii) Discuss the implication of inefficient turbidity removal in water treatment plant to the final water quality.

(4 marks)

Q3 (a) Describe **TWO (2)** properties of coagulant used in treating water for drinking purposes.

(5 marks)

(b) A rapid sand filters is constructed to treat water with flow rate of $0.88 \text{ m}^3/\text{s}$. If the design loading is $300 \text{ m}^3/\text{d.m}^2$, determine the number of rapid sand filters required. Given that the maximum dimensions is 7.5 m and the length to width ratio is 1.2:1.

(5 marks)

(c) Two parallel flocculation basins are to be used to treat a raw water from River Y. The combined flow to the two tanks is $0.1000 \text{ m}^3/\text{s}$. The volume of each tank is 720 m^3 . Determine the detention time of each tank. Given the overflow rate of the tank is $20 \text{ m}^3/\text{d.m}^2$, design the tank in meter (m) if the width to the length ratio of the tank is 1:4, and the depth of the tank is within 3 to 4.5 m.

(10 marks)

- Q4** (a) Contrast between nitrification and denitrification in wastewater treatment in terms of their process, microbes involved, and the end product. (3 marks)
- (b) One of the district hospital in Johor with 1100 beds has a small activated sludge plant to treat its wastewater with the dimension of 10.0 m wide, 10 m long and 4.5 m deep. The daily hospital discharge is 1.2 m³/d per bed and the average soluble BOD₅ after primary settling is 500 mg/L. The plant operating parameters in two conditions of MLVSS concentrations which are 2,500 mg/L and 555 mg/L by wasting the microbial mass.
- (i) Determine the hydraulic retention time of this plant. (2 marks)
- (ii) Analyze the F/M ratio of these two conditions. (4 marks)
- (iii) Predict the treatment efficiencies as mentioned above. (2 marks)
- (c) Differentiate the characteristics of sludge produced from different processes in a domestic wastewater treatment system. (9 marks)
- Q5** (a) There are several possible indicators that can be used to assess waste management practices. Regarding to the statement above,
- (i) Identify **TWO (2)** important indicators used to monitor solid waste management in a community. (3 marks)
- (ii) Based on **Q5(a)(i)**, describe how you would assess them. (3 marks)

- (b) Compost can be made from household kitchen food waste, leaves, grass, kitchen waste, and any other organic biodegradable material. Briefly describe the preparation of compost.

(8 marks)

- (c) Discuss **THREE (3)** of the factors that must be considered in evaluating potential sites for the long term disposal of solid waste when you plan to develop new sanitary landfill in Muar area.

(6 marks)

- END OF QUESTIONS-

FINAL EXAMINATION

SEMESTER /
SESSION : SEM 1/ 2019/2020

PROGRAMME CODE : BNA/BNB/BNC

COURSE NAME : INTRODUCTION TO
ENVIRONMENTAL
ENGINEERING TECHNOLOGY

COURSE CODE : BNP21403

Table Q2 (b) : CONCENTRATION OF ION AND PH OF WATER SAMPLE

Ion	Concentration, mg/L except pH
pH	9
Ca ²⁺	150
Mg ²⁺	60
HCO ₃ ⁻	39.0
CO ₃ ²⁻	24.5