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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2023/2024**

- COURSE NAME : ENVIRONMENTAL ENGINEERING TECHNOLOGY
- COURSE CODE : DAK 14503
- PROGRAMME CODE : DAK
- EXAMINATION DATE : JULY 2024
- DURATION : 2 HOURS 30 MINUTES
- INSTRUCTIONS :
1. ANSWER ALL QUESTIONS
 2. THIS FINAL EXAMINATION IS CONDUCTED VIA
 - Open book
 - 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 **SIX (6)** PAGES

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- Q1** Nowadays, the management of environmental issues is highly challenging due to the typical pollution from various sources. Environmental considerations are not always fully integrated into development planning or implementation.
- (a) Proper sustainability management by taking environmental considerations is important for us to ensure the ecological balance is maintained while supporting all our generations.
- (i) Define the means of environmental sustainability.
(2 marks)
- (ii) Describe three (3) types of environmental concerns that led to indicators of the sustainability development goals (SDGs).
(6 marks)
- (b) The Environmental Quality Act (EQA) 1974 is Malaysia's regulatory framework that has been implemented to ensure the quality of the environment. This is handled by the Department of Environment (DOE).
- (i) List three (3) areas of environmental pollution that need to be monitored and regulated under DOE.
(3 marks)
- (ii) Discuss the impact of three (3) areas of environmental pollution based on your answer in **Q1(b)(i)**.
(3 marks)
- (c) SWM ENVIRO Sdn Bhd has found that its landfill leachates produced a high concentration of ammonia, organics, and inorganics such as calcium carbonates. Leachate is considered highly concentrated wastewater which usually needs to be treated and analyzed for its chemical water quality.
- (i) Classify two (2) chemical water quality parameters.
(2 marks)
- (ii) Justify your reason for each answer in **Q1(c)(i)**.
(4 marks)
- (iii) Calculate the chemical oxygen demand (COD) of the wastewater from the landfill when 100 ml of wastewater has consumed 18.5 ml of 0.45N $K_2Cr_2O_7$ solution for complete oxidation.
(3 marks)
- (iv) Express the correlation between COD concentration to the level of dissolved oxygen (DO) in wastewater.
(2 marks)

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- Q2** In general, water needs to be treated in many ways depending on the sources of supplies either raw water sources or wastewater influents.
- (a) In practice, all public water supplies have different processes of treatment depending on the degree of quality of the raw water supplies.
- (i) Identify two (2) types of water sources that come from groundwater and surface water.
(2 marks)
- (ii) Sketch the possible unit processes of water treatment that need to be selected for raw water from groundwater extraction (deep-well drilling) containing a high concentration of hardness.
(4 marks)
- (iii) Briefly elaborate on the function of unit processes for each answer in **Q2(a)(ii)**.
(4 marks)
- (b) The jar test is a laboratory scale for simulates coagulation or flocculation with different chemical doses to estimate the minimum amount of coagulant agent needed to be used in wastewater treatment. Describe in detail the procedure and pattern of the graph of the jar test.
(4 marks)
- (c) **Figure APPENDIX A.1** shows the flow diagram of the municipal wastewater treatment system in Anfi Eon Textile Corporation. High concentrations of organic and inorganic compounds such as cyanide, chromium, plumbum, and others required advanced treatment to meet standards A or B and improve the quality of effluent.
- (i) Label each unit process (1) to (10) appropriately as illustrated in **Figure APPENDIX A.1**.
(5 marks)
- (ii) Describe two (2) unit processes of secondary treatment in detail based on your answer **Figure APPENDIX A.1**.
(4 marks)
- (iii) Suggest a suitable advanced treatment that is efficient and applicable in minimizing the concentration of heavy metals content in effluent.
(2 marks)

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- Q3** Solid waste management includes solid waste generation, collection, transportation, processes, and disposal in the landfill.
- (a) Landfills serve as common disposal sites for a wide variety of waste materials. However, even sanitary landfills, which are designed with environmental safeguards, can pose challenges, including the production of leachate.
 - (i) Define leachate.

(1 mark)
 - (ii) Classify two (2) typical constituents found in leachate with examples.

(4 marks)
 - (iii) Briefly explain two (2) causes of how leachate could be a problem to the environment and human health.

(4 marks)
 - (iv) Discuss two (2) advantages of sanitary landfill.

(4 marks)
 - (b) Calculate the moisture content and density of a solid waste sample with the following composition based on a 50 kg sample as shown in **Table APPENDIX A.2**.

(8 marks)
 - (c) Malaysia is the main producer of palm oil in the world. However, this industry produced a lot of waste. Briefly explain with examples how the wastes from the palm oil industry could inversely be turned into useful products and beneficial to the Malaysian economy.

(4 marks)
- Q4**
- (a) Air pollution originates from both natural sources and human activities. Identify two contributing factors to air pollution:
 - (i) Natural sources.
 - (ii) Human activities.

(4 marks)
 - (b) Pollutants can be divided into primary and secondary pollutants. Define secondary pollutants.

(1 mark)

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- (c) Acid rain refers to the deposition of acidic components in either wet or dry forms.
- (i) Identify two (2) types of gases that are involved in the formation of acid rain.
(2 marks)
- (ii) Illustrate the formation of acid rain by showing the source, and chemical reaction that is involved in the process.
(7 marks)
- (d) Hazardous waste or material could be classified into various groups and categories based on the characteristics of the hazard.
- (i) Name three (3) of the hazard classes.
(3 marks)
- (ii) Discuss four (4) key principles and practices in hazardous waste management.
(4 marks)
- (iii) Determine the role of waste stabilization and solidification techniques in the management of hazardous waste.
(4 marks)

- END OF QUESTIONS -

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APPENDIX A

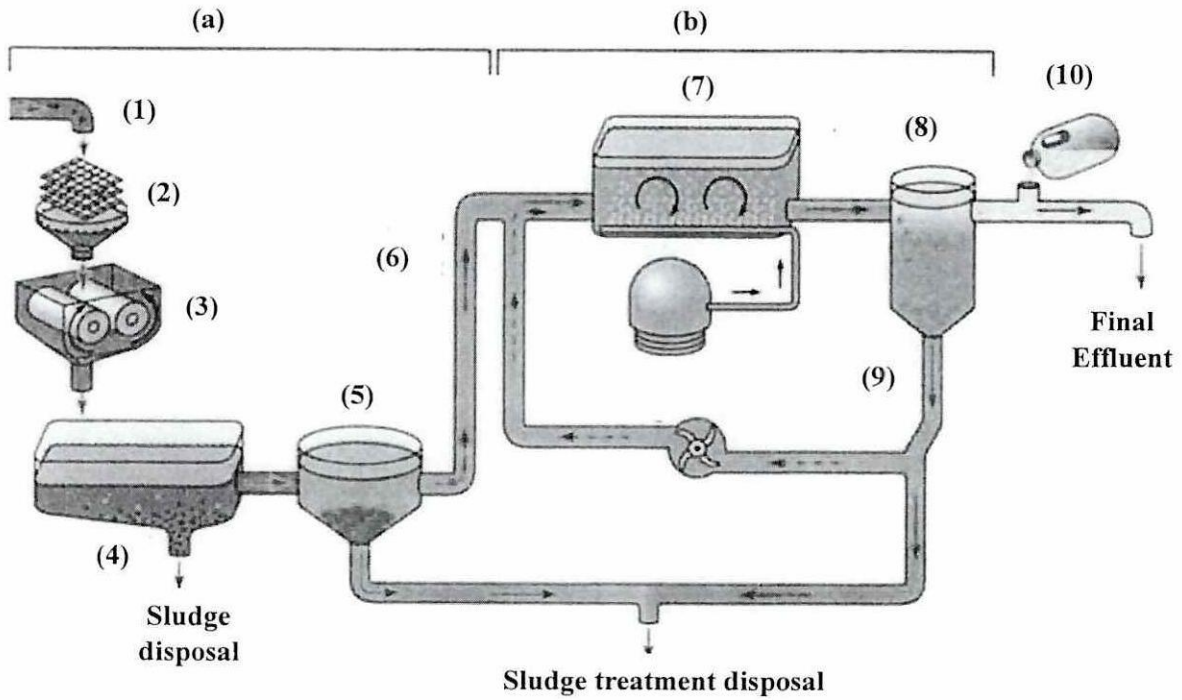


Figure APPENDIX A.1

Table APPENDIX A.2

Component	% by mass in %	Moisture content (%)	Typical density (kg/m ³)
Wood	20	20	240
Leaf	40	60	105
Paper	5	6	85
Cardboard	15	5	50
Cans	5	3	90
Food waste	10	70	290
Plastics	5	2	65