Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2022/2023

COURSE NAME	:	ENVIRONMENTAL ENGINEERING TECHNOLOGY
COURSE CODE	:	DAK 14503
PROGRAMME CODE	:	DAK
EXAMINATION DATE	:	JULY / AUGUST 2023
DURATION	:	2 HOURS 30 MINUTES
INSTRUCTION	:	1. ANSWER **ALL** QUESTIONS.
		2. THIS FINAL EXAMINATION IS A **PHYSICAL** ASSESSMENT AND CONDUCTED VIA **CLOSE 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 **SEVEN (7)** PAGES

Q1 (a) Based on the current environmental situation, it can be seen that an increase in pollution has occurred and caused numerous destructive issues to the earth. Identify **two (2)** types of pollution with suitable examples.

(4 marks)

(b) Government of Malaysia always plays a great role in making progress towards environmental sustainability. The Department of Environment Malaysia (DOE) is established under the Ministry of Natural Resources, Environment and Climate Change.

(i) Describe the main role of DOE and discuss their responsibility to comply with the environmental laws.

(3 marks)

(ii) List **two (2)** agencies or laws that are responsible for the reduction and control of excessive toxic and dangerous products and wastes.

(2 Marks)

(c) The quality of water can be evaluated based on three main characteristics: physical, chemical, and biological parameters. SAJ Ranhill set up a new raw water treatment plant and assessed the raw water quality based on the water quality index (WQI).

(i) Point out the purpose of the turbidity evaluation for raw water.

(2 marks)

(ii) Express your opinions on the relationship between alkalinity, dissolved oxygen (DO), and chemical oxygen demand (COD) to the WQI of raw water quality.

(6 marks)

(d) The ammoniacal nitrogen analysis is used to evaluate the quality of water in natural bodies and identify the presence the toxic pollutant in landfill. Discuss **four (4)** steps involve in the ammoniacal nitrogen test to detect the concentration of ammonia.

(4 marks)

(e) A seeded 5-day BOD (BOD_5) test was applied to wastewater samples. About 20 mL of the wastewater sample was added directly into a 300 mL BOD incubation bottle. The initial DO of the diluted sample was 10.4 mg/L, and the final DO after five (5) days was 3.9 mg/l. The corresponding initial and final DO of the seeded dilution water was 9.1 and 7.9, respectively. Compute the value of BOD_5 of the wastewater sample.

(4 marks)

Q2 (a) **Figure Q2 (a)** depicts the coagulation and flocculation process. This process is a conventional process in water treatment to remove impurities from the water.

(i) Recognize the types of impurities that are removed via coagulation and flocculation.

(3 marks)

(ii) Distinguish and interpret the mechanisms of coagulation and flocculation in a concise manner.

(6 marks)

(b) The wastewater generated from the Factory FLEXTRONIC shows poor quality water and does not comply with Standard A or B, thus needs to be treated. The composition of untreated wastewater of Factory FLEXTRONIC is shown in **Table 1.**

(i) Illustrate and label appropriately the flow diagram that is involved in each unit process in wastewater treatment to improve the quality of effluent.

(8 marks)

(ii) Recommend **two (2)** types of advanced treatment that are applicable in this wastewater treatment and then, elaborate in a concise manner.

(4 marks)

(c) Climate change is one of the major challenges and has become more critical till 2023. From shifting weather patterns that threaten food production, to rising sea levels that increase the various risks to the human and environment. By suggesting an example of environmental issues, express **two (2)** opinions regarding the proper way on the impact of climate change on the global.

(4 marks)

Q3 (a) Environmental Protection Agency has set National Ambient Air Quality Standard (NAAQS) in compliance with the Clean Air Act. Define the means of the primary and secondary standards of NAAQS.

(2 marks)

(b) Air Pollutant Index (API) is a tool to measure the quality of air. The pre-commissioning inspections of air pollution control have been conducted toward factories X and Y by the Department of Environment (DOE) inspector to get written approval prior to factory operation. As referred to the **Table 2.**

(i) Identify which factory is highly potential to get approval from DOE.

(1 mark)

(ii) Justify your answer in detail about the consequence of the excessive emission of pollutants into the air based on the answer **Q3(b)(i)**.

(3 marks)

(iii) Differentiate the methods for controlling the amount of gaseous and particulate emissions with a simple explanation.

(6 marks)

(c) KITARcycles activity is one of the programs related to the awareness of environmental sustainability. Engagement with the community has encouraged all levels of people to be alert toward the impact of solid waste generation and its management.

(i) Describe **three (3)** classifications of sources of solid wastes.

(3 marks)

(ii) Draw the basic flow diagram of solid waste management.

(4 marks)

(d) The amount of municipal solid waste per week for the residency area of City A and City A are 177, 100, and 325, 220 kg/person. week, respectively. The size of residency for both cities is equal with the capacity of 2500 homes. Assuming each house consists of 8 residents.

(i) Define the means of municipal solid waste.

(2 marks)

(ii) Determine the average amount of municipal solid waste that might be generated by each resident in a day.

(4 marks)

Q4 (a) Biomedical waste is also one of the causes of hazards that can affect human life.

(i) Define the means of biomedical waste with a suitable example.

(2 marks)

(ii) List **two (2)** types of biomedical waste.

(2 marks)

(iii) Recognized the authority and relevant law responsible to handle the proper management of biomedical waste.

(2 marks)

(b) Sameer has planned to conduct the experiment work by using chemicals. Before he starts, he ensures to check the chemical data sheet of each chemical. Most of the chemical bottles showed the symbols as illustrated in **Figure Q4(c).** Interpret in detail each characteristic of the symbols with examples of that chemicals.

(9 marks)

(c) The massive explosion in Beirut in 2020 is one of the hazardous accidents. Highly toxic and explosive hazardous compounds need to be handled in a proper way to preserve the environment.

(i) Based on the case, identify the possible chemical that caused the explosion.

(1 mark)

(ii) Suggest a suitable treatment technology technique for this hazardous waste.

(3 marks)

(iii) Discuss in detail the management process of this hazardous waste in terms of storage and transportation procedures.

(6 marks)

–END OF QUESTIONS –

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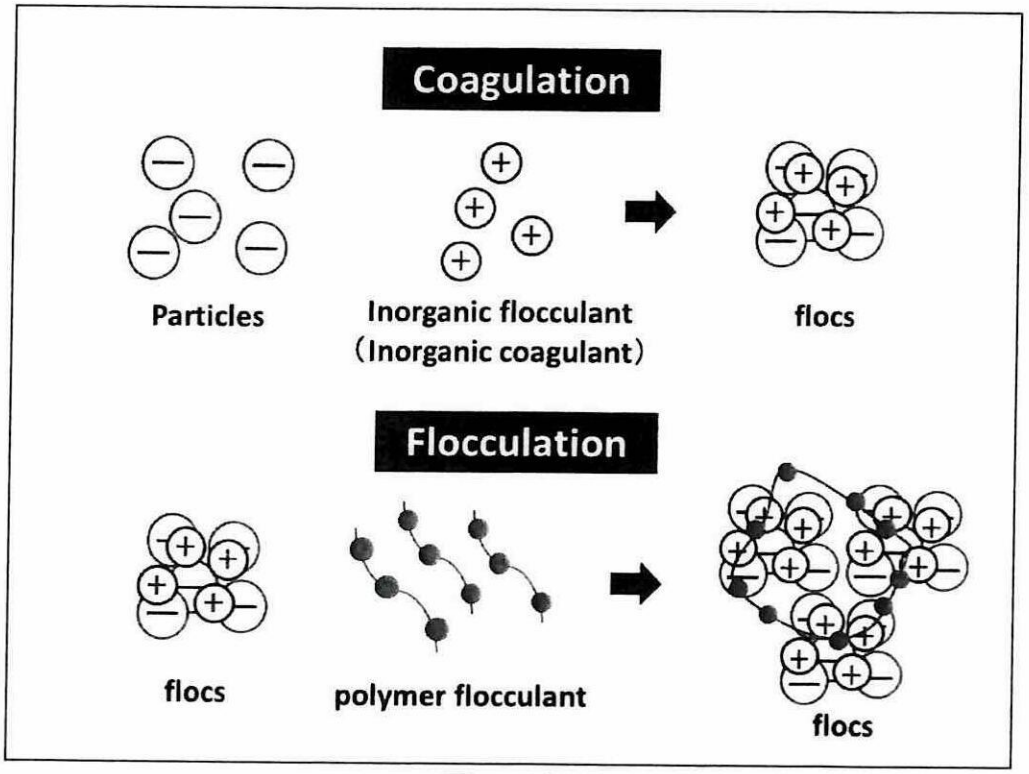

Figure 2(a)

Table 1: Composition of untreated wastewater

Parameters	Concentration (mg/L)	Standard A (mg/L)	Standard B (mg/L)
Total Solids	3000	< 50	< 100
BOD_5	130	< 20	< 50
COD	250	< 50	< 100
Nitrogen	280	< 20	< 50
Phosphorus	178	n/a	n/a
Lead	0.20	< 0.1	< 0.5
Arsenic	0.67	< 0.05	< 0.10
Cyanida	0.75	< 0.05	< 0.10

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Table 2

Pollutants	The concentration of pollutants per day (µg/m^3)		Average Time	Malaysian Guideline (µg/m^3)
	Factory X	Factory Y		
Carbon Monoxide (CO),	25	8.8	8 hour	10
Sulphur Dioxide (SO_2)	128	92.5	24 hour	105
Nitrogen Dioxide	300	115	24 hour	-
Ozone	96.5	45.6	8 hour	120
Lead	1.46	0.83	3 month	1.5
Particulate Matter, PM_{10}	78.5	31.5	1 year	50
Total Suspended Particulate (TSP)	252	67	1 year	90
Dust fall	865.5	121	1 year	133mg/m^2 per day

(a) (b) (c)

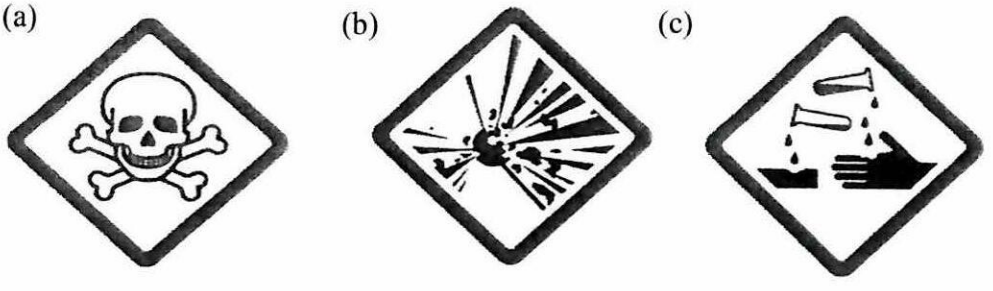

Figure Q4 (c)