Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAM
SEMESTER 2
SESSION 2017/2018

COURSE NAME	: ENVIRONMENTAL ENGINEERING
COURSE CODE	: DAC 31302
PROGRAMME CODE	: DAA
EXAMINATION DATE	: JUNE / JULY 2018
DURATION	: 2 HOURS 30 MINUTES
INSTRUCTION	: ANSWERS **FIVE (5)** QUESTIONS ONLY

THIS QUESTION PAPER CONSISTS OF **NINE (9)** PAGES

Q1 (a) List **four (4)** activities that covered by practices and rules of Malaysian Environmental Quality.

(4 marks)

(b) Give **three (3)** factors that affected level of dissolved oxygen in water.

(3 marks)

(c) **Table 1** shows initial DO and DO after 5 days. The dilutions were prepared in a BOD bottles using raw sewage and distilled water. Given the value of the BOD_5 is 152 mg/L.

(i) Calculate the value of dilution factor, P.

(3 marks)

(ii) If the volume of BOD bottle is 300 ml was used, determine the volume of of the raw sewage water sample.

(2 marks)

(d) **Figure Q1(d)** shows the eutrofication process. Discuss **four (4)** ecological effects of eutrofication.

(8 marks)

Q2 (a) Explain **four (4)** factors that effect the self purification of water.

(8 marks)

(b) Refering to **Table 2**, determine as below.

(i) Mass of DO after mixing, DO_m (mg/L)

(3 marks)

(ii) Ultimate BOD_5, L_o (mg/L)

(3 marks)

(iii) Critical deficit, D_c

(3 marks)

(iv) Location of critical deficit, x (km).

(3 marks)

Q3 (a) List **five (5)** factors to be considered in the water treatment process selection.

(5 marks)

(b) **Figure Q3(b)** shows common flow chart of water treatment process. There are main five process in this treatment. Briefly discuss the followings process.

(i) Filteration

(3 marks)

(ii) Coagulation and Floccuation

(3 marks)

(iii) Sedimentation

(3 marks)

(c) Design flow of sedimentation tank is 0.032 m^3/s. Assume the design overflow rate for that tank is 15 m/day, determine the surface area of the sedimentation tank and calculate the depth of the sedimentation for the given overflow rate and detention time 120 minutes.

(6 marks)

Q4 (a) There are three types of method for hardzous waste management, describe any **two (2)** of these method.

(4 marks)

(b) The result from composition analysis of municipal solid waste sample shows in the **Table 3** and **Table 4** show the physical properties of solid waste. Calculate the followings:

(i) Moisture content of 150 kg of sample.

(3 marks)

(ii) Density of 1500 kg of sample.

(3 marks)

(c) Calculate the area required for a new landfill site with a projected life of 50 years for a population of 200,000 generating 30 kg per household per week. Assume the density of waste is 300 kg/m^3. A planning restriction limits the height of the landfill to 10 m. Assume 4 persons per household.

(10 marks)

Q5 (a) Define the noise pollution.

(2 marks)

(b) Describe **four (4)** major noise sources.

(4 marks)

(c) Air pollution is a phenomenon by which particle and gases contaminate the environment. Show how air pollutant will impact on the human health and environment.

(4 marks)

(d) Explain the steps on air pollution reduction.

(6 marks)

(e) Classify the air pollution and give **one (1)** example for each type.

(4 marks)

Q6 (a) Define the Environmental Impact Assessment (EIA).

(3 marks)

(b) Explain **three (3)** benefits of Environmental Impact Assessment (EIA).

(6 marks)

(c) Based on **Figure Q6(c)**, identify and briefly describe the stage of X and Y.

(6 marks)

(d) Environmental management plan (EMP) is a tool to ensure that all environmental that are likely to arise from any development are adequately addressed. Provide the important components that need to be including in the EMP.

(5 marks)

- END OF QUESTION -

FINAL EXAMINATION

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LIST OF FIGURES, FORMULAS AND TABLES :

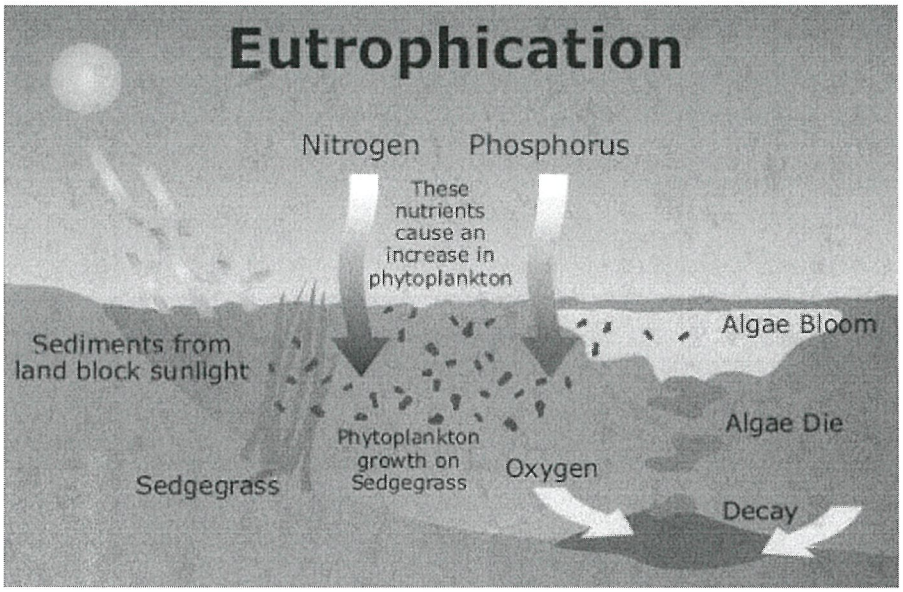

Figure Q1(d) Eutrofication Process

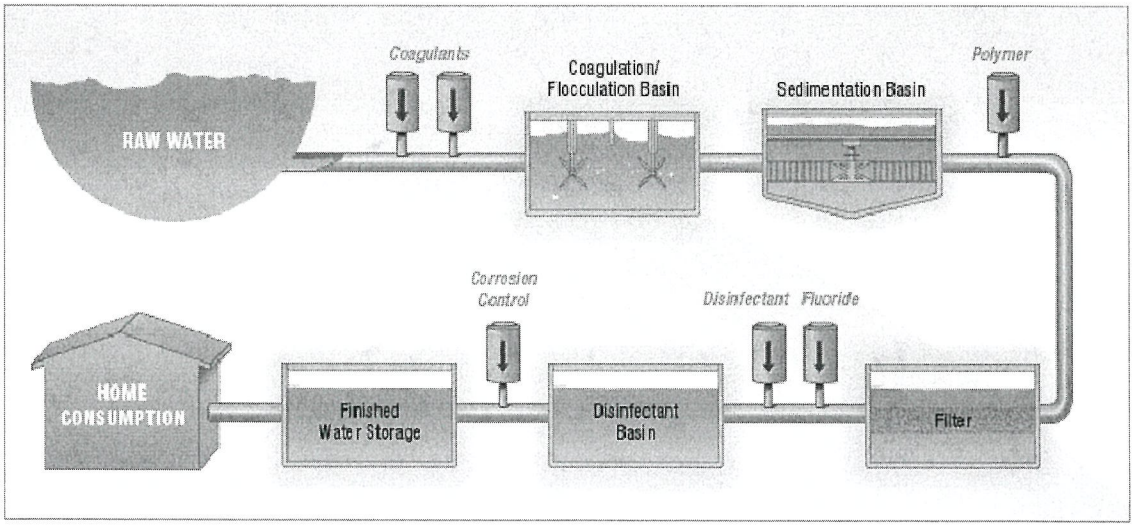

Figure Q3(b) Water treatment process

Table 1: Data of Dissolved Oxigen

DO_0 (mg/L)	DO_5 (mg/L)
8.24	5.20

Table 2: Data of Polluted River

Items	Value
River discharge	29 m^3/s
Wastewater discharge	9 m^3/s
River water DO	6.3 mg/L
Wastewater DO	0.9 mg/L
River water BOD_5	3 mg/L
Wastewater BOD_5	135 mg/L
River water temperature	21 °C
Waste water temperature	23 °C
Deoxygenation constant	0.3/day
Reoxygenation constant	0.5/day
Critical deficit time	5.7 day
After mixing velocity	0.23 m/s

$$L_o = \frac{Y_m}{1 - e^{-kt}}$$

$$t_c = \frac{1}{k_r - k_d} In\left[\frac{k_r}{k_d}\left(1 - D_o \frac{k_r - k_d}{k_d L_o}\right)\right]$$

$$D_c = \frac{k_d}{k_r} L_o e^{-k_d t_c}$$

$$x = ut_c$$

$$Q = Av$$

Table 3: Result of municipal solid waste sample analysis

Component	% by mass
Clothing/textiles	76
Wood	51
Plastics	13
Ashes/dust	5

Table 4: Physical properties of solid waste

Waste Source	Component of Waste	Typical Density (kg/m^3)	Moisture Content (% of weight)
Domestic	Food	290	70
	Paper and cardboard	70	5
	Plastics	60	2
	Glass	200	2
	Metal	200	2
	Clothing/textiles	60	10
	Ashes/dust	500	8
	Wood	240	20
		100	20
Municipal		300	20
- Uncompacted		500	25
- In compacted truck		600	25
- Normally compacted in landfill			
- Well compacted in landfill			

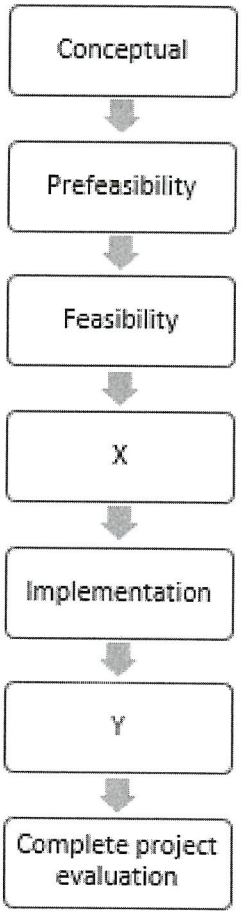

Figure Q6(c) Stages of Project for EIA