Second Semester Examination
2021/2022 Academic Session

July/August 2022

EAP216 – Introduction to Environmental Engineering

Duration : 3 hours

Please ensure that this examination paper consists of **SIX (6)** pages of printed material before you begin the examination.

Instructions: This paper contains **SIX (6)** questions. Answer **ANY FIVE (5)** questions.

All questions **MUST BE** answered on a new page.

1. (a) The following analysis values were obtained from a chemical analysis of mineral water.

Ca^{2+} = 70 mg/L
Mg^{2+} = 30 mg/L
Na^{+} = 125 mg/L
HCO_3^{-}= 165 mg/L
SO_4^{2-} = 173 mg/L
Cl^{-} = 202 mg/L

Determine the ion balance for this chemical analysis and identify that the analysis is in the acceptable range (10%) according to Standard Methods for the Examination of Water and Wastewater, APHA, 1999.

[10 marks]

(b) In evaluating a chemical's fate and treatment, an equilibrium approach is used whenever reactions are very fast and the final conditions resulting from the reactions are of interest. Select **TWO (2)** equilibrium processes that are important in environmental engineering. Discuss the selected processes.

[10 marks]

2. (a) A pond is used to treat dilute municipal wastewater before the liquid is discharged into a river. The inflow to the pond has a flow rate of 4**X**00 m^3/day and a BOD concentration of 25 mg/L. The volume of the pond is 20,000 m^3. BOD decays in the pond with a first-order rate constant equal to 0.25/day. With the help of a sketch, determine the BOD concentration in mg/L at the outflow of the pond. (**X** value is taken from the final digit of your index number).

[10 marks]

(b) Describe with a diagram, human perturbation carbon cycle with activities that increase carbon content in the environment.

[10 marks]

3. (a) A noise measurement exercise was carried out at a residential area due to construction site nearby during daytime working hours as shown in **Table 1**. Calculate L_{Aeq} for the monitoring data. (**X** is last digit of your Index Number).

Table 1

Duration (minutes)	**Sound Level dB(A)**
10	71
20	73
30	69
40	65
50	7**X**
60	7**X**

[10 marks]

(b) The water supply for drinking water in Malaysia comes primarily from rivers. To provide clean and safe drinking water to consumers, river water undergoes a series of treatments.

Sewage is effluent from household usage that ends up in a sewage treatment plant (STP). Here, the wastewater goes through a series of treatments to release clean effluent into a waterbody (as required by law).

Briefly describe the differences in treatment methods for these two types of water.

[10 marks]

4. (a) It is difficult to get public participation and cooperation in the waste management system if the awareness on the importance of proper waste handling and disposal is lacking.

i) Describe the importance of a proper waste management system.

[4 marks]

ii) Suggest **THREE (3)** ways to increase public awareness on the importance of proper waste management.

[6 marks]

(b) Name the components in the trilogy of air pollution. Then, explain the component that is important in its dispersion.

[10 marks]

5. Briefly discuss **TEN (10)** significant elements of the environment in the vicinity of a project site and study boundaries.

[20 marks]

6. (a) Define 'Environmental Contingency Plan' and discuss the importance of this plan in the Environmental Management Plan (EMP).

[6 marks]

(b) Kerian District Council plans to upgrade Kuala Gula in Bagan Serai, Perak as shown in **Figure 1** as an international tourism spot to boost the economy and create more jobs. Certain mangrove area needs to be cleared. The Kuala Gula Bird Sanctuary, which is important for more than 60 species of waterbird, including migratory birds, need to be protected as this will be a major tourist attraction.

Explain the environmental issues relevant to this project.

[14 marks]

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Figure 1

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