

SULIT



Second Semester Examination
2017/2018 Academic Session

May/June 2018

**EAP216 – Introduction to Environmental Engineering
(Pengenalan kepada Kejuruteraan Alam Sekitar)**

Duration : 3 hours
(Masa : 3 jam)

Please check that this examination paper consists of **NINE (9)** pages of printed material including appendix before you begin the examination.

[Sila pastikan bahawa kertas peperiksaan ini mengandungi **SEMBILAN (9)** muka surat yang bercetak termasuk lampiran sebelum anda memulakan peperiksaan ini.]

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

Arahan : Kertas ini mengandungi **ENAM (6)** soalan. Jawab **LIMA (5)** soalan di soalan.]

In the event of any discrepancies, the English version shall be used.

[Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi Bahasa Inggeris hendaklah digunakan.]

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1. (a). One liter (1 L) of water is analyzed and found to contain 15 mg of trichloroethylene (TCE). Calculate the TCE concentration in mg/L and ppm_m.

Satu liter (1 L) air dianalisis dan didapati mengandung 15 mg trichloroethylene (TCE). Kira kepekatan TCE dalam mg/L dan ppm_m.

[4 marks/markah]

- (b). Measurement of SO₂ concentration in air carried out at Seberang Prai Industrial Area was found to be 150 ppb_v. Convert this concentration to the units of µg/m³. Assume temperature (T) is 28 °C and pressure (P) is 1 atm.

Pengukuran kepekatan SO₂ dalam udara yang dijalankan di Kawasan Perindustrian Seberang Prai didapati 150 ppb_v. Tukarkan kepekatan ini kepada unit µg/m³. Anggapkan suhu (T) adalah 28 °C dan tekanan (P) adalah 1 atm.

[6 marks/markah]

- (c). The usage of resin containing formaldehyde in treating fabrics will increase the exposure to formaldehyde gas in retail shops. Measurement conducted at a textile retail shop in Parit Buntar recorded formaldehyde concentration range from 0.1 ppm – 0.65 ppm. If the inside volume of the textile retail shop is 1200 m³, calculate the range mass (in grams) of the formaldehyde.

Assume T = 298 K and P = 1 atm. Molecular weight of formaldehyde is 30.

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Penggunaan resin yang mengandungi formaldehid dalam merawat fabrik akan meningkatkan pendedahan kepada gas formaldehid di kedai-kedai jualan. Pengukuran yang dilakukan di sebuah kedai jualan tekstil di Parit Buntar mencatatkan julat kepekatan formaldehid dari 0.1 ppm - 0.65 ppm. Jika isipadu dalam kedai jualan tekstil adalah 1200 m³, hitung julat jisim (dalam gram) formaldehid tersebut.

Anggapan $T = 298\text{ K}$ dan $P = 1\text{ atm}$. Berat molekul formaldehid ialah 30.

[10 marks/markah]

2. (a). Equilibrium is a state considered as final/stopping place of reaction. Describe dynamic equilibrium condition in a chemical reaction with an aid of diagram.

Keseimbangan adalah keadaan yang dipertimbangkan sebagai tempat tindakbalas akhir/berhenti. Terangkan keadaan keseimbangan dinamik dalam tindak balas kimia dengan bantuan gambarajah.

[6 marks/markah]

- (b). Activated carbon is widely used in water and wastewater treatment plant. Describe Granulated Activated Carbon (GAC) and the advantages as well as the disadvantages of using GAC.

Karbon teraktif digunakan secara meluas dalam loji rawatan air dan air sisa. Terangkan Karbon Teraktif Berbutir (GAC) dan kelebihan serta kekurangan menggunakan GAC.

[6 marks/markah]

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- (c). With the help of a sketch, describe nitrogen cycle and state one effect of excessive nitrogen in the environment.

Dengan bantuan lakaran, terangkan kitaran nitrogen dan nyatakan satu kesan nitrogen yang berlebihan dalam alam sekitar.

[8 marks/markah]

3. (a). The Penang Solid Waste Management Project considered four options including Business-As-Usual, Composting, Refuse-Derived-Fuel and Incineration as its waste management strategy. Sketch the incineration option and comment its suitability as a waste management strategy taking into consideration the advantages and disadvantages of the option.

Projek Pengurusan Sisa Pepejal Pulau Pinang mengambil kira empat pilihan termasuk Keadaan-Seperti-Biasa, Pengkomposan, Bahan Api-Perolehan-Sisa dan Penunuan sebagai strategi pengurusan sisa. Lakarkan pilihan penunuan dan komen kesesuaiannya sebagai strategi pengurusan sisa dengan mempertimbangkan kelebihan dan kekurangan pilihan tersebut.

[10 marks/markah]

- (b). Calculate the values of L_{10} , L_{50} , and L_{90} based on the following data:

Kirakan nilai- nilai L_{10} , L_{50} , and L_{90} berdasarkan data berikut:

[6 marks/markah]

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Time (minutes) Masa (minit)	Noise level, dB(A) Paras bunyi bising, dB(A)
10	64
20	60
30	62
40	70
50	67
60	69
70	68
80	72
90	74
100	70

- (c). List **TWO (2)** methods to control noise with an example of each.

*Senaraikan **DUA (2)** kaedah untuk mengawal bunyi dengan memberikan satu contoh kepada setiap satu.*

[4 marks/markah]

4. (a). Describe the categories of air pollution sources.

Terangkan kategori punca pencemaran udara.

[10 marks/markah]

- (b) To ensure the quality of water supply and sanitation systems, the characteristics of water and wastewater in Malaysia are regulated under two standards. Identify:

Untuk memastikan kualiti bekalan air dan sistem sanitasi, ciri-ciri air dan air kumbahan di Malaysia dikawal selia di bawah dua piawaian. Kenalpasti:

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- (i). **FIVE (5)** classes under the National Water Quality Standard

LIMA (5) kelas di bawah Piawaian Kualiti Air Negara

[5 marks/markah]

- (ii). **TWO (2)** effluent discharge standards under the Environmental Quality Act (EQA) 1974.

DUA (2) piawaian pelepasan effluen di bawah Akta Kualiti Alam Sekeliling (EQA) 1974.

[2 marks/markah]

- (c). There are essentially five steps in a water treatment process starting with coagulation/flocculation, sedimentation, filtration, disinfection and finally corrosion control. Describe the coagulation/flocculation step.

Pada asasnya terdapat lima langkah dalam proses rawatan air bermula dengan penggumpalan/pemberbukuan, sedimentasi, penapisan, pembasmian kuman dan akhirnya kawalan kakisan. Terangkan langkah penggumpalan/pemberbukuan.

[3 marks/markah]

5. *In Schedule 1 of EQ.PA.EIA Order 2014, there are 21 projects types included. Discuss the size and quantum concepts in determining EIA requirements and their effectiveness.*

Dalam Perintah KAA.AYT.PKAS 2014, terdapat 21 jenis projek dalam Jadual. Bincangkan konsep kuantum dan saiz dalam penentuan keperluan PKAS dan keberkesanannya.

[20 marks/markah]

6. A semi-aerobic landfill type is proposed to be developed over an area of approximately 10 ha. at Bandar Baharu, Kedah to cater disposal of domestic and commercial wastes as well as garden refuse. The proposed site for this project is located about 8-km northeast (straight line) of Parit Buntar Town, approximately 20 minutes drive from the town. The site is generally situated in a rural setting; with both rural settlements and agriculture land uses adjacent to the site. Land use around the site includes a mix of secondary jungle, agricultural (mostly abandoned rubber and cocoa orchard) and rural residential and commercial.

Tapak pelupusan semi-aerobik dicadangkan untuk dibangunkan di atas tanah berkeluasan kira-kira 10 hektar di Bandar Baharu, Kedah untuk menampung pembuangan sisa domestik, sisa komersial dan juga sisa taman. Tapak yang dicadangkan untuk projek tersebut terletak 8 km pada arah Timur Laut daripada bandar Parit Buntar, lebih kurang 20 minit pemanduan daripada bandar tersebut. Secara amnya, tapak tersebut terletak di kawasan luar bandar; dengan kawasan penempatan dan pertanian bersebelahan tapak cadangan. Penggunaan tanah di sekitar tapak termasuk campuran hutan sekunder, pertanian (kebanyakannya getah dan kebun koko yang ditinggalkan) serta kediaman luar bandar dan komersial.

- (i). From the proposed project, identify and discuss **FIVE (5)** main issues in need of attention to ensure the environment is preserved.

*Dari projek yang dicadangkan, kenalpasti dan bincangkan **LIMA (5)** isu utama yang memerlukan perhatian untuk memastikan persekitaran dipelihara.*

[10 marks/markah]

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- (ii). Propose a monitoring program required for this project based on issues identified in question (i) that might affect receptors around the project area.

Cadangkan suatu program pemantauan yang diperlukan untuk projek ini berdasarkan isu-isu yang dikenalpasti dalam soalan (i) yang mungkin menjejaskan reseptor di sekitar kawasan projek.

[10 marks/markah]

APPENDIX /LAMPIRAN**Gas constant (R)**

0.08205 L-atm/mole-K

8.205 x 10⁻⁵ m³-atm/mole-K82.05 cm³-atm/mole-K1.99 x 10⁻³ kcal/mole-K

8.314 j/mole-K

1.987 cal/mole-K

62,358 cm³-torr/mole-K62,358 cm³-mm Hg/mole-K**Molecular Weight (MW)**

Sulphur (S) = 32

Oxygen (O) = 16

Carbon (C) = 12

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