

SULIT



Second Semester Examination
2018/2019 Academic Session

June 2019

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

Duration : 3 hours
(Masa : 3 jam)

Please check that this examination paper consists of **EIGHT (8)** pages of printed material including appendix before you begin the examination.

*[Sila pastikan bahawa kertas peperiksaan ini mengandungi **LAPAN (8)** muka surat yang bercetak termasuk lampiran sebelum anda memulakan peperiksaan ini.]*

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

Arahan : Kertas ini mengandungi **ENAM (6)** soalan. Jawab **LIMA (5)** 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). Define the meaning of sustainable development. Using **ONE (1)** example, explain the relation with sustainable engineering.

*Takrifkan maksud pembangunan mampan. Dengan menggunakan **SATU (1)** contoh, terangkan kaitannya dengan kejuruteraan mampan.*

[12 marks/markah]

- (b). Measurement of CH₄ concentration in air carried out at Pasir Gudang Industrial Area was found to be 100 ppb. Convert this concentration to µg/m³. Assume temperature (T) is 35 °C and pressure (P) is 1 atm.

Pengukuran kepekatan CH₄ dalam udara yang dijalankan di Kawasan Perindustrian Pasir Gudang didapati 100 ppb. Tukarkan kepekatan ini kepada µg/m³. Anggapkan suhu (T) adalah 35 °C dan tekanan (P) adalah 1 atm.

[8 marks/markah]

2. (a). During adsorption process, the adsorbates are held on the surface of adsorbent by chemical forces. Explain the transport mechanism in the adsorption process until the rate of adsorption equals the rate of desorption.

Semasa proses penjerapan, zat terjerap dipegang pada permukaan bahan penjerap oleh daya kimia. Terangkan mekanisme pengangkutan dalam proses penjerapan sehingga kadar penjerapan sama dengan kadar penyahjerapan.

[6 marks/markah]

- (b). Humans activities have severely altered the nitrogen cycle. Explain the major processes involved in this alteration.

Aktiviti manusia telah mengubah kitaran nitrogen dengan teruk. Terangkan proses-proses utama yang terlibat dalam perubahan ini.

[7 marks/markah]

- (c). Define law of mass conservation.

Takrifkan hukum pengabadian jisim.

[2 marks/markah]

- (d). A municipal wastewater treatment plant discharges $1.0 \text{ m}^3/\text{s}$ of poorly treated effluent containing 5.0 mg/L of phosphorus compounds (reported as mg P/L) into a river with an upstream flow rate of $25 \text{ m}^3/\text{s}$ and a background phosphorus concentration of 0.010 mg P/L . Determine the concentration of phosphorus (in mg/L) in the river just downstream of the plant.

Loji rawatan air sisa perbandaran melepaskan $1.0 \text{ m}^3/\text{s}$ efluen yang tidak dirawat yang mengandungi 5.0 mg/L sebatian fosforus (dilaporkan sebagai mg P/L) ke dalam sungai dengan kadar aliran hulu $25 \text{ m}^3/\text{s}$ dan kepekatan asal fosforus ialah 0.010 mg P/L . Tentukan kepekatan fosforus yang dihasilkan (dalam mg/L) di dalam sungai di hilir aliran keluar loji rawatan air sisa tersebut.

[5 marks/markah]

3. (a). Define equivalent continuous sound level (L_{eq}).

Takrifkan paras bunyi berterusan setara (L_{eq}).

[2 marks/markah]

- (b). Calculate the value of L_{eq} (100 minutes) for the following road traffic noise monitoring data measured in front of a school in a suburban area. Comment your answer based on relevant guidelines.

Kirakan nilai L_{eq} (100 minit) untuk data bunyi bising trafik jalan yang diukur di hadapan sebuah sekolah di kawasan pinggir bandar. Komen jawapan anda berdasarkan garis panduan yang berkaitan.

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Time (minutes) <i>Masa (minit)</i>	Sound Pressure (dB(A)) <i>Tekanan bunyi (dB(A))</i>
10	67
20	70
30	69
40	78
50	80
60	67
70	73
80	65
90	77
100	81
110	73
120	72
130	75

[8 marks/markah]

- (c). It was estimated that in 2020, approximately 40,000 tonnes of daily waste will be generated in Peninsular Malaysia. Discuss the:

Dianggarkan pada tahun 2020, kira-kira 40,000 tan sisa akan dihasilkan setiap hari di Semenanjung Malaysia. Bincangkan:

- (i). importance of determining the waste generation rates, and
kepentingan penentuan kadar penjanaan sisa, dan
- (ii). coning and quartering methods of waste sampling.
kaedah persampelan pengekonan dan penyukuan.

[10 marks/markah]

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4. (a). Household water supply requires treatment in a water treatment plant to ensure safe supply to consumers. With an aid of a sketch, describe the **FIVE (5)** steps of a water treatment process.

*Pembekalan air isi rumah memerlukan rawatan air di loji rawatan untuk memastikan bekalan yang selamat kepada pengguna. Dengan bantuan lakaran, terangkan **LIMA (5)** langkah dalam proses pengolahan air.*

[10 marks/markah]

- (b). Explain the principle of source, transport and receptors in toxic air pollution.

Terangkan prinsip sumber, pengangkutan dan reseptor dalam pencemaran udara toksik.

[10 marks/markah]

5. In Schedule 2 of the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) (EQ.PA.EIA) Order 2015, there are 17 projects types included. Discuss the size and quantum concepts in determining EIA requirements and their effectiveness.

Dalam Jadual 2 Perintah Kualiti Alam Sekeliling (Aktiviti yang Ditetapkan) (Penilaian Kesan Alam Sekeliling) (KAS.AYT.PKAS) 2015, terdapat 17 jenis projek diberikan. Bincangkan konsep saiz dan kuantum dalam penentuan keperluan PKAS dan keberkesanannya.

[20 marks/markah]

6. (a). Monitoring program is one of the important steps in Environmental Management Plan (EMP). Discuss **FIVE (5)** elements which should be detailed out in the monitoring program.

*Program pemantauan adalah salah satu langkah penting dalam Pelan Pengurusan Alam Sekitar (EMP). Bincangkan **LIMA (5)** elemen yang perlu diperincikan dalam program pemantauan tersebut.*

[10 marks/markah]

- (b). Environmental audit is required under Section 33A, Prohibition and Control of Pollution in the Environmental Quality Act 1974 (Act 127). Explain the importance of environmental audit in the Environmental Management Plan (EMP).

Audit alam sekitar perlu dilaksanakan di bawah Seksyen 33A, Larangan dan Kawalan Pencemaran dalam Akta Kualiti Alam Sekitar 1974 (Akta 127). Terangkan kepentingan audit alam sekitar dalam Pelan Pengurusan Alam Sekitar (EMP).

[10 marks/markah]

APPENDIX/ LAMPIRANGas 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-KMolecular Weight (MW) in gram/mole

Sulphur (S) = 32

Oxygen (O) = 16

Carbon (C) = 12

Hydrogen (H) = 1

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