
UNIVERSITI SAINS MALAYSIA

Peperiksaan Semester Pertama
Sidang Akademik 2005/2006

November 2005

IUK 303 – Pengurusan Sisa Industri
[Industrial Waste Management]

Masa: 3 jam
Duration: 3 hours

Sila pastikan bahawa kertas peperiksaan ini mengandungi TUJUH (7) muka surat yang bercetak sebelum anda memulakan peperiksaan ini.

Jawab **LIMA (5)** soalan. **DUA** dari **BAHAGIAN A** dan **TIGA** dari **BAHAGIAN B**. Semua soalan boleh dijawab sama ada dalam Bahasa Malaysia atau Bahasa Inggeris.

[Please check that this examination paper consists of SEVEN (7) pages of printed material before you begin the examination.]

*[Answer **FIVE (5)** questions. **TWO** from **SECTION A** and **THREE** from **SECTION B**. All questions can be answered either in Bahasa Malaysia or English.]*

BAHAGIAN A

1. (a) Apakah organisma petunjuk? Bincangkan ciri-ciri ideal pathogen petunjuk dan nyatakan organisma-organisma yang menunjukkan ciri-ciri tersebut.
- (b) Apakah patogen air yang terlibat dalam penyakit berikut?
 - (i) Kolera
 - (ii) 'Ametic dysentery'
 - (iii) Infectious hepatitis
 - (iv) Giardiasis
 - (v) 'Swineherd's disease

(20 markah)

2. Tuliskan nota-nota ringkas mengenai perkara berikut.

(i) Kaedah Bioasai

(5 markah)

(ii) Pemulihan Sumber Sisa Pepejal

(5 markah)

(iii) 'Sanitary Landfill'

(5 markah)

(iv) Pengangkutan sisa merbahaya

(5 markah)

BAHAGIAN B

1. Satu analisis BOD₅ ke atas sampel air sisa akan dijalankan. Nilai BOD dijangkakan di antara 50 ke 350 dan pencairan dilakukan. Dalam setiap kes, botol piawai BOD 300 ml digunakan. Data direkodkan seperti jadual berikut.

- (a) Dapatkan BOD₅ untuk air sisa.
- (b) Jika anda mengetahui bahawa kadar penggunaan oksigen ialah 0.21 per hari pada 20°C, apakah BOD₃ jika ujian dijalankan pada 30°C?

(20 markah)

No. Botol	Air sisa, ml	DOI	DO ₅
1	20	8.9	1.5
2	10	9.1	2.5
3	5	9.2	5.8
4	2	9.2	7.5

2. (a) Takrifkan 'keliatan' air, dengan mengambil kira 2 klasifikasi kasar keliatan dan bincangkan keliatan.

(15 markah)

(b) Mengapa air bawah tanah sering mengandungi bahan-bahan terampai?

(5 markah)

3. Bincangkan dengan terperinci pengolahan enapcemar teraktif dalam rawatan air sisa industri.

(20 markah)

4. Bincangkan dengan terperinci pengolahan kimia dalam rawatan air sisa industri.

(20 markah)

5. Jawab semua bahagian soalan ini.

- (i) Punca-punca sisa radioaktif
- (ii) Kesan-kesan kesihatan sisa radioaktif
- (iii) Pelupusan sisa radioaktif

(20 markah)

SECTION A

1. (a) What is an indicator organism? Discuss the characteristic the ideal pathogen indicator and indicate which organisms most nearly exhibit these characteristics.
- (b) With which waterborne pathogens are the following diseases associated?
 - (i) Cholera
 - (ii) Amebic dysentery
 - (iii) Infectious hepatitis
 - (iv) Giardiasis
 - (v) Swineherd's disease

(20 marks)

2. Write short notes on the following.

(i) Bioassay method

(5 marks)

(ii) Resource Recovery of solid waste.

(5 marks)

(iii) 'Sanitary Landfill'.

(5 marks)

(iv) Transportation of Dangerous or Hazardous waste.

(5 marks)

SECTION B

1. An analysis for BOD₅ is to be run on a sample of wastewater. The BOD is expected to range from 50 to 350, and the dilutions are prepared accordingly. In each case, a standard 300 ml BOD bottle is used. The data are recorded below.

Bottle No.	Waste water, ml	DOI	DO ₅
1	20	8.9	1.5
2	10	9.1	2.5
3	5	9.2	5.8
4	2	9.2	7.5

- (a) Determine the BOD₅ of the wastewater.
- (b) If you know that the oxygen utilization rate is 0.21 per day at 20°C, what will be the BOD₃ if the test is run at 30°C?
(20 marks)
2. (a) Define “hardness” of water, note the two broad classification of hardness, and discuss the impacts of hardness.
(15 marks)
- (b) Why the undergroundwater is seldom constituents the suspended materials?
(5 marks)
3. Discuss in detail treatment of industrial waste water by Activated sludge.
(20 marks)
4. Discuss in detail ‘chemical treatment’ in industrial waste water treatment.
(20 marks)

5. Answer all parts of this question.

- (i) Sources of radioactive waste
- (ii) Effects of radioactive waste on health
- (iii) Disposal of radioactive waste.

(20 marks)