



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAM
SEMESTER 2
SESSION 2016/2017**

COURSE NAME : ENVIRONMENTAL ENGINEERING
COURSE CODE : DAC 31303
PROGRAMME CODE : DAA
TARIKH PEPERIKSAAN : JUNE 2017
DURATION : 3 HOURS
INSTRUCTION : ANSWERS FOUR (4) QUESTIONS ONLY

TERBUKA

THIS QUESTION PAPER CONSISTS OF FOURTEEN (14) PAGES

SOALAN BAHASA MELAYU

- S1 (a) Namakan **dua (2)** jenis kekerasan air. (2 markah)
- (b) Huraikan perbezaan antara BOD dan COD. (4 markah)
- (c) Berdasarkan nilai Indeks Kualiti Air dalam **Jadual 1**, berikan status air sungai bagi Sungai A, Sungai B dan Sungai C mengikut pengelasan kualiti sungai Jabatan Alam Sekitar (JAS).

Jadual 1

Sungai	Indeks Kualiti Air
A	40
B	85
C	70

(6 markah)

- (d) **Jadual 2** menunjukkan nilai DO awal dan nilai DO selepas 5 hari. Pencairan sisa kumbahan dan air suling telah dilakukan menggunakan botol BOD 300 mL. Kirakan nilai BOD₅ purata sampel sisa kumbahan ini.

Jadual 2

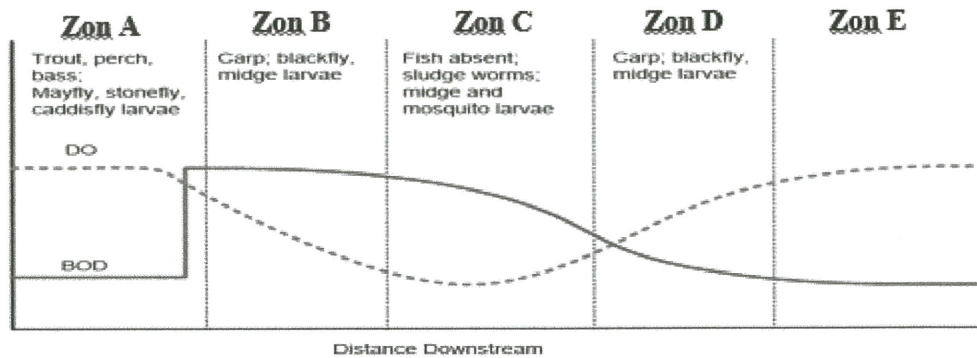
No. Botol	Benih (ml)	DO Awal (mg/L)	DO Akhir (mg/L)
1	2	8.02	7.04
2	3	7.88	6.87
3	4	7.93	5.48
4	5	7.84	4.78

(10 markah)

- (e) Nyatakan **tiga (3)** parameter fizikal untuk mengukur kualiti air. (3 markah)

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- S2 (a) Jelaskan *deoxygenation* dan *reoxygenation* pada satu aliran sungai. (4 markah)
- (b) **Rajah 1** menunjukkan kesan oksigen sag kepada komuniti biologi. Kenalpasti zon A, B, C, D dan E.



Rajah 1

(10 markah)

- (c) Penulenan sendiri adalah proses semulajadi yang kompleks. Nyatakan jenis-jenis proses yang berlaku secara berterusan dalam proses penulenan sistem air semulajadi. (3 markah)
- (d) Satu pengukuran BOD dilakukan ke atas sampel air sisa. Sebanyak 5 ml sampel air sisa dimasukkan ke dalam botol BOD. Air suling diisi bagi memenuhi botol BOD bersaiz 300 ml BOD berkenaan. Nilai kepekatan DO direkodkan dalam **Jadual 3**. Kirakan nilai BOD_5 bagi sampel air sisa ini.

Kepekatan	Hari 1	Hari 5
DO (mg/L)	6.85	2.34

Jadual 3

(4 markah)

- (e) Senaraikan **empat (4)** faktor-faktor yang mempengaruhi penulenan sendiri air sungai. (4 markah)

(4 markah)

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TARIKH ADALAH: 17/10/2023
 HARI: 17/10/2023
 WAKTU: 10:36
 NOMBOR: 3
 NAMA:

- S3 (a) Nyatakan **dua (2)** jenis sumber air. (2 markah)
- (b) Jelaskan dan lakarkan proses *coagulation and flocculation* dalam loji rawatan air. (12 markah)
- (c) Terangkan kelebihan menggunakan tangki HDPE (*High Density Polyethylene*) sebagai takungan simpanan air. (4 markah)
- (d) Jelaskan **dua (2)** jenis sisa kumbahan domestik. (4 markah)
- (e) Terangkan tujuan proses saringan dalam rawatan awal sisa kumbahan. (3 markah)



- S4 (a) Terangkan istilah-istilah berikut.
- (i) Abu
 - (ii) Sampah
 - (iii) Kumbahan.
- (6 markah)
- (b) Keputusan analisis komposisi sisa pepejal perbandaran ditunjukkan dalam **Jadual 4**. Tentukan
- (i) kandungan lembapan dalam 100 kg sampel
 - (ii) ketumpatan bagi 1000 kg sampel

Jadual 4

Komponen	% mengikut berat
Makanan	70
Kertas	20
Tin	5
Kayu	5

(8 markah)

- (c) Ilustrasikan hirarki pengurusan sisa pepejal.
- (8 markah)
- (d) Nyatakan **tiga (3)** kaedah rawatan haba sisa pepejal.
- (3 markah)

TERBUKA

- S5 (a) Senaraikan **empat (4)** kaedah laluan trak dalam proses pengumpulan sisa pepejal. (4 markah)
- (b) Kenalpasti kaedah sistem pengawalan air permukaan untuk tapak pelupusan sisa pepejal. (4 markah)
- (c) Jelaskan kesan pengurangan, guna semula dan kitar semula terhadap rekabentuk dan operasi tapak pelupusan sisa pepejal. (5 markah)
- (d) Senaraikan **empat (4)** jenis sisa yang boleh dikompos. (4 markah)
- (e) Berikan takrifan sisa berbahaya. (2 markah)
- (f) Terangkan **tiga (3)** kaedah rawatan kimia sisa berbahaya. (6 markah)

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- S6 (a) Berikan takrifan pencemaran bunyi. (2 markah)
- (b) Jelaskan dengan rajah ciri-ciri bising berikut.
(i) Kekerapan (*frequency*)
(ii) Amplitud (10 markah)
- (c) Terangkan **lima (5)** sumber utama bising. (5 markah)
- (d) Namakan **tiga (3)** langkah utama prosedur Penilaian Impak Alam Sekitar (EIA) yang diterima pakai oleh Malaysia. (3 markah)
- (e) Rancangan Pengurusan Alam Sekitar (*Environmental Management Plan, EMP*) adalah alat untuk memastikan semua isu alam sekitar yang timbul hasil pembangunan diambil kira. Sediakan senarai kandungan penting yang perlu dimasukkan ke dalam Rancangan Pengurusan Alam Sekitar. (5 markah)

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SOALAN TAMAT

QUESTIONS IN ENGLISH

Q1 (a) Name **two (2)** types of water hardness. (2 marks)

(b) Describe the difference between BOD and COD. (4 marks)

(c) Based on the Water Quality Index (WQI) value in **Table 1**, give the river status of the River A, River B & River C according to Department of Environment (DOE) river quality classification.

Table 1

River	Water Quality Index (WQI)
A	40
B	85
C	70

(6 marks)

(c) **Table 2** shows initial DO and DO after 5 days. The dilutions were prepared in 300 mL BOD bottles using raw sewage and distilled water for each bottle. Calculate the average BOD₅ of this thi raw sewage sample.

Table 2

Bottle No.	Seed (ml)	Initial DO (mg/L)	Final DO (mg/L)
1	2	8.02	7.04
2	3	7.88	6.87
3	4	7.93	5.48
4	5	7.84	4.78

(10 marks)

(d) State **three (3)** physical parameter to evaluate water quality. (3 marks)

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AMID/...
...
...
...

Q2 (a) Explain the deoxygenation and reoxygenation of a stream. (4 marks)

(b) **Figure 1** shows impact oxygen sag to biological community. Identify zone A, B, C, D and E.

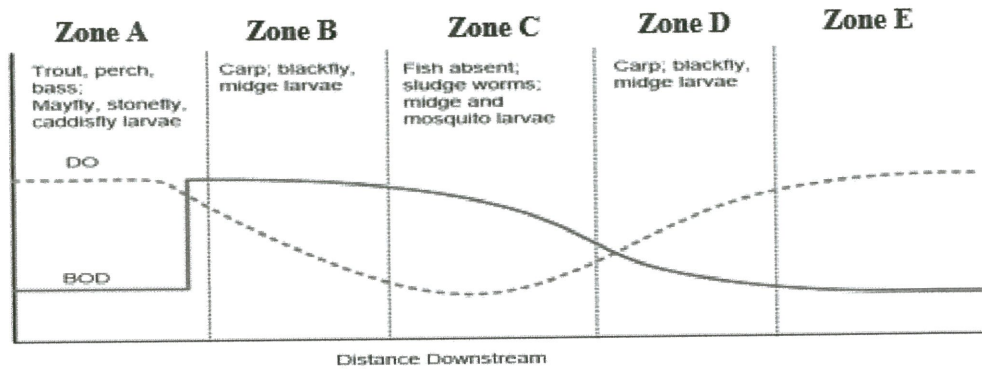


Figure 1

(10 marks)

(c) Self purification of natural water systems is a complex process. State type of process working simultaneously in self purification of natural water systems. (3 marks)

(d) A BOD measurement is to be carried out for wastewater sample. The waste water sample inserted to BOD bottle is 5 ml. The 300 ml BOD bottle will be filled up with dilution water. DO value of the sample was recorded in **Table 3**. Calculate the BOD5 for this waste water sample.

Concentration	Day 1	Day 5
DO (mg/L)	6.85	2.34

Table 3

(4 marks)

(e) List **four (4)** factors that affecting stream self-purification. (4 markah)



- Q3** (a) *State two (2) type of water resources.* (2 marks)
- (b) *Explain and sketch the coagulation and flocculation process in water treatment plant.* (12 marks)
- (c) *Describe the advantages of using HDPE (High Density Polyethylene) tanks as water storage reservoir.* (4 marks)
- (d) *Explain two (2) types of domestic sewage.* (4 marks)
- (e) *Describe the purpose of screening process in sewage preliminary treatment.* (3 marks)

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- Q4** (a) Describe the following term.
(i) Ashes
(ii) Refuse
(iii) Sewage

(6 marks)

- (b) Result from composition analysis of municipal solid waste sample shows in **Table 4**. Determine
(i) the moisture content of 100 kg of sample
(ii) the density of 1000 kg of sample

Table 4

Component	% by mass
Food	70
Paper	20
Tin	5
Woods	5

(8 marks)

- (c) Illustrate the solid waste management hierarchy..

(8 marks)

- (d) State **three (3)** thermal method treatment of solid waste.

(3 marks)

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- Q5**
- (a) *List four (4) truck routing method in solid waste collection process*
(4 marks)
 - (b) *Identify the surface water control systems for landfill.*
(4 marks)
 - (c) *Explain the impacts of reduction, reuse, and recycle on landfill design and operation.*
(5 marks)
 - (d) *List four (4) type of waste that can be composted.*
(4 marks)
 - (e) *Define the hazardous waste*
(2 marks)
 - (f) *Describe three (3) chemical treatment method of hazardous waste.*
(6 marks)

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- Q6** (a) *Define noise pollution.* (2 marks)
- (b) *Explain with diagram the following of noise characteristic.*
(i) *Frequency*
(ii) *Amplitude* (10 marks)
- (c) *Describe five (5) major noise sources* (5 marks)
- (d) *Name three (3) major steps of Environmental Impact Assessment (EIA) procedure adopted by Malaysia.* (3 marks)
- (e) *Environmental Management Plan (EMP) is a tool to ensure that all environmental issues that are likely to arise from any development are adequately addressed. Provide a list of the important components that need to be include in the EMP.* (5 marks)

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END OF QUESTION

PEPERIKSAAN

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 COURSE : ENVIRONMENTAL ENGINEERING

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SENARAI FORMULA DAN JADUAL (LIST OF FORMULA AND TABLE) :

Data on Moisture Content and Typical Density of Municipal Solid Waste (MSW)

Component	Moisture Content (% of weight)	Typical Density (kg/m ³)
Food	70	290
Paper	5	70
Plastics	2	60
Tin	2	200
Woods	20	240
Clothing/Textiles	10	60
Ashes/Dust	8	500

$$MC = \frac{(w - d)}{w} \times 100\%$$

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