SULIT

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENGAJIAN TINGGI

JABATAN KEJURUTERAAN AWAM

PEPERIKSAAN AKHIR

SESI I : 2022/2023

DCC40152 : WATER SUPPLY & WASTE WATER ENGINEERING

TARIKH : 20 DISEMBER 2022
MASA : 08.30 PAGI - 10.30 PAGI (2 JAM)

Kertas ini mengandungi **SEPULUH (10)** halaman bercetak.

Bahagian A: Struktur (2 soalan)
Bahagian C: Esei (4 soalan)

Dokumen sokongan yang disertakan : Tiada

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SECTION A: 25 MARKS
BAHAGIAN A: 25 MARKAH

INSTRUCTION:
This section consists of **TWO (2)** structured questions. Answer **ALL** questions.

ARAHAN:
*Bahagian ini mengandungi **DUA (2)** soalan berstruktur. Jawab **SEMUA** soalan.*

QUESTION 1
SOALAN 1

CLO1
C2

a) Water characteristics can be divided into three; physical, chemical and microbiological. Describe the biological characteristics of water as listed below:
Ciri-ciri air boleh dibahagikan kepada tiga; fizikal, kimia dan biologi. Huraikan ciri-ciri biologi air yang disenaraikan di bawah:-

i. Bacteria
Bakteria

ii. Virus
Virus

[5 marks]
[*5 markah*]

CLO1
C2

b) Describe in details **FIVE (5)** chemical characteristics of water.
*Huraikan dengan terperinci **LIMA (5)** sifat kimia air.*

[10 marks]
[*10 markah*]

CLO1 C3

c) i) Surface waters include lakes, reservoirs, and wetlands. Explain benefits of wetland.

Air permukaan termasuk tasik, takungan, dan tanah lembap. Terangkan kebaikan tanah lembap.

[4 marks]
[*4 markah*]

ii) Human daily activities result in a reduction of fresh water and degradation of water quality. Explain how human impact result in a reduction of fresh water and degradation of water quality.

Aktiviti harian manusia akan mengakibatkan kemerosotan kualiti air dan pengurangan air bersih. Terangkan bagaimana impak manusia menyebabkan kemerosotan kualiti air dan pengurangan air bersih.

[6 marks]
[*6 markah*]

QUESTION 2

SOALAN 2

CLO1 C2

a) Explain **TWO (2)** physical processes that occur in raw water treatment process.

*Terangkan **DUA (2)** proses fizikal yang berlaku dalam proses rawatan air mentah.*

[5 marks]
[*5 markah*]

CLO1 C2

b) Sedimentation and filtration are two processes of water treatment. Describe the purpose of sedimentation and filtration.

Pemendapan dan penurasan adalah dua proses rawatan air. Jelaskan tujuan pemendapan dan penurasan.

[10 marks]
[*10 markah*]

CLO1
C3

c) i) Explain **FOUR (4)** objectives of water treatment.
*Terangkan **EMPAT (4)** objektif rawatan air.*

[4 marks]
[*4 markah*]

ii) Determine **TWO (2)** factors of water treatment plant layout.
*Tentukan **DUA (2)** faktor susun atur loji rawatan air.*

[6 marks]
[*6 markah*]

SECTION B: 50 MARKS
BAHAGIAN B: 50 MARKAH

INSTRUCTION:
This section consists of **FOUR (4)** essay questions. Answer **TWO (2)** questions only.

ARAHAN:
*Bahagian ini mengandungi **EMPAT (4)** soalan esei. Jawab **DUA (2)** soalan sahaja.*

CLO1
C2

QUESTION 1
SOALAN 1

a) Describe **FIVE (5)** classifications of water demand.
*Terangkan **LIMA (5)** klasifikasi permintaan air*

[5 marks]
[5 *markah*]

CLO1
C3

b) According to the data in Table 1, calculate the population of TTDI Jaya for the year 2020 and 2040 by using Arithmetical Method.
Merujuk kepada data di Jadual 1, kirakan unjuran penduduk bagi TTDI Jaya pada tahun 2020 dan 2040 dengan menggunakan Kaedah Aritmetik.

Table 1

Year	1970	1080	1990	2000	2010
Population	12550	14756	18215	21943	26434

Jadual 1

Tahun	*1970*	*1080*	*1990*	*2000*	*2010*
Populasi	*12550*	*14756*	*18215*	*21943*	*26434*

[8 marks]
[8 markah]

CLO1
C3

c) The following data was obtained from Taman Bukit Baharu in 2007. Calculate the water demand in 2012.

Data Given:

Total household = 6000 households

Average household member = 6 people

Per capita water consumption = 270 liters/day

Population growth = 2.65% per year

Design factor = 2.4

Percentage of NRW = 15%

Water supply coverage = 97%

$P_n = P_o\ (1 + r)^n$

Data-data berikut diperolehi daripada Taman Bukit Baharu pada tahun 2007. Kirakan permintaan air (WD) pada 2012.

Data diberi:

Kirakan permintaan air (WD) pada tahun 2012.

Jumlah isi rumah = 6000 isi rumah

Purata ahli isi rumah = 6 orang

Penggunaan perkapita air = 270 liter/hari

Pertumbuhan penduduk = 2.65% setiap tahun

Factor reka bentuk = 2.4

Peratus NRW = 15%

Liputan bekalan air = 97%

Pn = Po (1 + r) ^{n}

[12 marks]
[*12 markah*]

QUESTION 2

SOALAN 2

CLO1
C2

a) Describe the function of balancing tank in water distribution system.
Huraikan fungsi tangki pengimbang dalam sistem pengagihan air.

[5 marks]
[*5 markah*]

CLO1
C3

b) Water distribution method can be divided into three types. Explain briefly any **TWO (2)** types of water distribution method with the aid of a diagram.
*Kaedah pengagihan air boleh dibahagikan kepada tiga jenis. Terangkan secara ringkas **DUA (2)** jenis kaedah agihan air dengan bantuan gambarajah.*

[8 marks]
[*8 markah*]

CLO1
C3

c) Leakage in the distribution system caused by several factors. Explain **FOUR (4)** factors that influence pipe leakage.

*Kebocoran dalam sistem agihan disebabkan oleh beberapa faktor. Terangkan **EMPAT (4)** faktor yang mempengaruhi kebocoran paip.*

[12 marks]
[*12 markah*]

QUESTION 3

SOALAN 3

CLO1
C2

a) Explain **TWO (2)** types of manholes.

*Terangkan **DUA (2)** jenis lurang.*

[5 marks]
[*5 markah*]

CLO1
C3

b) Interpret the types of sewerage system below with the aid of a diagram:

i. Separated System

ii. Combined System

Huraikan jenis-jenis sistem kumbahan di bawah dengan bantuan gambarajah:

i. Sistem berasingan

ii. Sistem bergabung

[8 marks]
[*8 markah*]

CLO1
C3

c) A housing scheme consists of four rows of terrace house where each line has 20 units house, and the number of occupant is 6 people. According to Manning Formula, calculate the required sewer diameters by assumption of the flow is full. State whether the flow is appropriate or not.

Slope = 1: 40

Water requirement per capita = 250 liters/person/day

Manning coefficient = 0.014

Flow-rate factor: 6 = population <10,000

4.5 = population >10,000

Self cleansing speed = 0.45 m/s

Skim perumahan terdiri daripada empat baris rumah teres di mana setiap baris mempunyai 20-unit rumah, dan bilangan penghuni ialah 6 orang. Berpandukan Formula Manning, kira diameter pembetung yang diperlukan dengan andaian aliran penuh. Nyatakan sama ada aliran itu sesuai atau tidak.

Kecerunan		*= 1: 40*
Permintaan air berkapita		*= 250 liters/orang/hari*
Pekali Manning		*= 0.014*
Faktor Kadar Alir:	*6*	*= untuk populasi <10,000*
	4.5	*= untuk populasi >10,000*
Halaju pembersihan kendiri		*= 0.45 m/s*

[12 marks]
[*12 markah*]

QUESTION 4

SOALAN 4

CLO1
C2

a) Explain **TWO (2)** physical characteristics of sewage.
*Huraikan **DUA (2)** ciri fizikal kumbahan.*

[5 marks]
[*5 markah*]

CLO1
C3

b) The purpose of sludge stabilization is to reduce volume, stabilize the organic matter and eliminate pathogenic organisms for reuse or dispose purposes. Explain the processes involved in sludge stabilization.
Tujuan penstabilan enapcemar adalah untuk mengurangkan isipadu, menstabilkan bahan organik dan menghapuskan organisma patogen untuk penggunaan semula atau pelupusan. Terangkan proses-proses yang terlibat dalam penstabilan enapcemar.

[8 marks]
[*8 markah*]

CLO1
C3

c) There are two types of wastewater treatment units, which are septic tank and Imhoff tank. Interpret both.
Terdapat dua jenis unit rawatan air buangan iaitu tangki septik dan tangka imhoff. Tafsirkan kedua-duanya.

[12 marks]
[*12 markah*]

Notes

Assessment items for this course have covered elements of the Dublin Problem: DP1, DP2 and DP3 as mention in FEIST.

SOALAN TAMAT