INSTRUCTION:

This section consists of **FOUR (4)** structured questions. Answer **ALL** questions.

ARAHAN:

*Bahagian ini mengandungi **EMPAT (4)** soalan berstruktur. Jawab **SEMUA** soalan.*

QUESTION 1

SOALAN 1

CLO1 (a) Define the following items:

Takrifkan perkara berikut:

i) Industrial effluent

Kumbahan Industri

[2 marks]

[*2 markah*]

ii) Mixed effluent

Kumbahan campuran

[2 marks]

[*2 markah*]

CLO1 (b) Match the following constituent and their sources.

Padankan juzuk berikut dengan sumbernya.

Constituent / *Konstituen*
Pesticides / *Racun perosak*
Animals / *Haiwan*
Phenols / *Fenols*
Viruses / *Virus*
Color / *Warna*

Sources / *Sumber*
Industrial waste / *Sisa industri*
Domestic wastes / *Sisa domestik*
Open watercourse / *Laluan air terbuka*
Agricultural waste / *Sisa pertanian*
Organic decay / *Pereputan organik*

[5 marks]

[*5 markah*]

CLO1 (c)

i) Write the constituent that promotes algae bloom in lakes.
Tuliskan juzuk yang mengalakkan pertumbuhan alga di tasik.

[2 marks]
[*2 markah*]

ii) Write the possible processes that happen in c (i).
Tuliskan proses yang mungkin berlaku dalam c (i).

[6 marks]
[*6 markah*]

iii) Tabulate the suspended solids, heavy metals, dissolved inorganic, and surfactants for water quality effect.
Jadualkan pepejal terampai, logam berat, bukan organik terlarut dan surfaktan untuk kesan kualiti air.

[8 marks]
[*8 markah*]

QUESTION 2

SOALAN 2

CLO1 (a) State **TWO (2)** sources of domestic waste water.

*Nyatakan **DUA (2)** sumber domestik air sisa.*

[3 marks]

[*3 markah*]

CLO1 (b)

i) Discuss **TWO (2)** factors of domestic waste water flowrate.

*Bincangkan **DUA (2)** faktor kadar aliran air sisa domestik.*

[4 marks]

[*4 markah*]

CLO1 ii) Compare the type of domestic waste water between yellow water and black water.

Bandingkan jenis domestik air sisa antara air kuning dan air hitam.

[4 marks]

[*4 markah*]

CLO1 (c) The fluidized bed reactor is usually applied in the floatation process in waste water that involves the presence of suspended organic solids, water, and gases.

Reaktor lapisan terbendalir biasanya digunakan dalam proses pengapungan dalam air sisa yang melibat kehadiran organik pepejal terampai, air, dan gas.

i) Draw the fluidized bed reactor with labelling.

Lukiskan reaktor lapisan terbendalir dengan pelabelan.

[6 marks]

[*6 markah*]

Table 1 Mass loading factor and its purposes.
Jadual 1 Faktor pemuatan jisim dan tujuannya.

Mass loading factor ***Faktor pemuatan jisim***	**Purposes** ***Tujuan***
A	Process turndown requirements *Proses penurunan diperlukan*
Minimum day *Hari minimum*	B
C	Sizing of process units *Saiz unit proses*
Maximum month *Bulan maksimum*	D

CLO1

ii) In Table 1, the mass loading factor and its purposes are considered for designing a waste water treatment plant. Complete Table 1 for A, B, C, and D.
Dalam Jadual 1, faktor pemuatan jisim dan tujuannya dipertimbangkan untuk rekabentuk loji rawatan air sisa. Lengkapkan Jadual 1 untuk A, B, C, dan D.

[8 marks]
[*8 markah*]

QUESTION 3
SOALAN 3

CLO2

(a) Give **TWO (2)** types of equipment for solid reduction process.
*Berikan **DUA (2)** jenis alat bagi proses pengurangan pepejal.*

[4 marks]
[*4 markah*]

CLO2

(b)

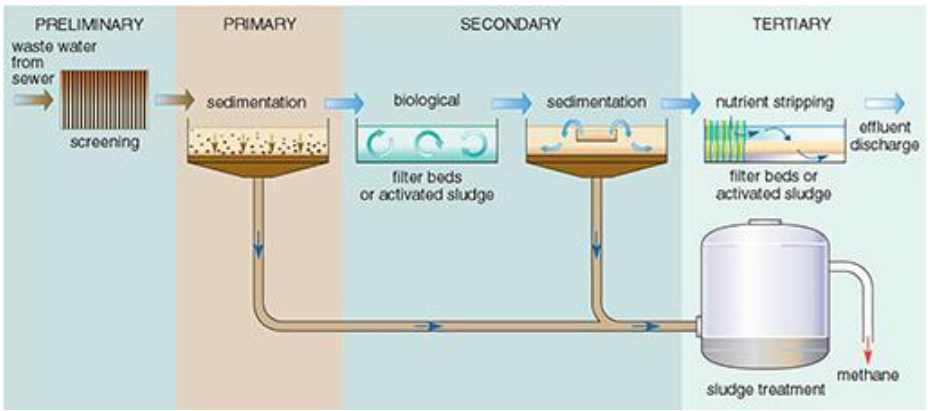

Figure 1 : Waste water treatment plant /
Rajah 1 : Loji rawatan air sisa.

Discuss the purposes of the preliminary, primary, secondary, and tertiary processes in Figure 1.
Bincangkan tujuan proses awal, primer, sekunder dan tertiary dalam Rajah 1.

[8 marks]
[*8 markah*]

CLO2

(c) i) Write factors that contribute to the characteristics of colloidal particles in waste water.
Tuliskan faktor yang menyumbang kepada ciri – ciri zarah koloid dalam air sisa.

[4 marks]
[4 *markah*]

CLO2

ii) Sodium hydroxide is a common precipitating agent that is often used in the precipitation process. Write the mechanism precipitation process.

Natrium hidroksida ialah agen pemendakan sering digunakan dalam proses pemendakan. Tuliskan mekanisme proses pemendakan.

[9 marks]
[9 *markah*]

QUESTION 4

SOALAN 4

CLO2

(a) State **TWO (2)** environmental factors affecting microbial growth.

*Nyatakan **DUA (2)** faktor persekitaran yang mempengaruhi pertumbuhan mikrob.*

[4 marks]
[*4 markah*]

CLO2

(b) Elaborate **FOUR (4)** roles of microorganisms in the biological treatment of waste water.

*Huraikan **EMPAT (4)** peranan mikroorganisma dalam rawatan biologi air sisa.*

[8 marks]
[*8 markah*]

CLO2

(c) i) Write **ONE (1)** example of an attached-growth system in the waste water treatment process.

*Tuliskan **SATU (1)** contoh sistem pertumbuhan-terlampir dalam proses rawatan air sisa.*

[3 marks]
[*3 markah*]

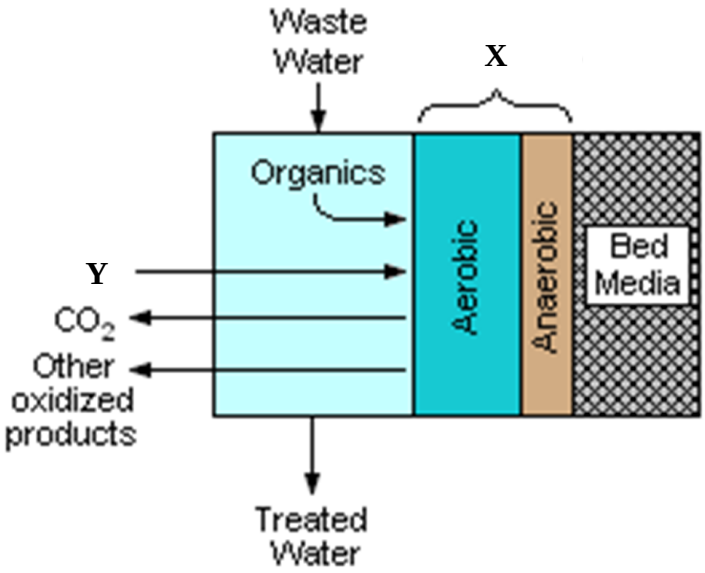

Figure 2 : Schematic cross-section of the contact face of the bed media in the attached-growth system.

Rajah 2 : Keratan-rentas skematik muka sentuhan media katil dalam sistem pertumbuhan-terlampir.

CLO2

i) Complete the X and Y labels in Figure 2.

Lengkapkan label X dan Y dalam Rajah 2.

[4 marks]

[*4 markah*]

CLO2

ii) Provide **TWO (2)** comparisons of aerobic and anaerobic processes in the biological treatment of waste water.

*Sediakan **DUA (2)** perbandingan proses aerobik dan anaerobik dalam rawatan biologi air sisa.*

[6 marks]

[*6 markah*]

SOALAN TAMAT