

INSTRUCTION:

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

ARAHAN:

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

QUESTION 1**SOALAN 1**

CLO1

- (a) State **FOUR (4)** sources of waste water.
Nyatakan EMPAT (4) sumber air sisa.

[4 marks]

[4 markah]

CLO1

- (b) Match the following material based on their respective categories.
Padankan bahan berikut berdasarkan kategori masing-masing.

Material /Bahan	Category/Kategori
Hydrocarbon <i>Hidrokarbon</i>	Biological substance <i>Sebatian biologi</i>
Microorganism <i>Mikroorganisma</i>	Physical substance <i>Sebatian fizikal</i>
Decaying plant <i>Tumbuhan mati</i>	Chemical substance <i>Sebatian kimia</i>
Cyanide <i>Cyanida</i>	

Figure 1(b): Categories of Material

Rajah 1(b): Kategori Bahan

[4 marks]

[4 markah]

- (c) Nutrients are essential elements for the growth of plants, which can be found from industrial effluent such as from agricultural activities.

Nutrien adalah unsur-unsur penting untuk pertumbuhan tumbuhan yang boleh dijumpai daripada sisa industri seperti aktiviti pertanian.

CLO1

- (i) Write **TWO (2)** examples of nutrient can be found in waste water.

*Tuliskan **DUA (2)** contoh nutrien yang boleh dijumpai dalam air sisa.*

[3 marks]

[3 markah]



Figure 1(c): Eutrophication

Rajah 1(c): Eutrofikasi

CLO1

- (ii) Figure 1(c) depicts the eutrophication process occurring in a lake. Share the causes to the process occurrence.

Rajah 1(c) menunjukkan proses eutrofikasi yang berlaku di sebuah tasik.

Kongsikan penyebab kepada berlakunya proses tersebut.

[14 marks]

[14 markah]

QUESTION 2

SOALAN 2

CLO1

- (a) Describe infiltration process of waste water.

Jelaskan proses penyusupan air sisa.

[2 marks]

[2 markah]

CLO1

- (b) Express
- FOUR (4)**
- contaminants found in domestic waste water.

*Tentukan **EMPAT (4)** bahan pencemar yang terdapat dalam air sisa domestik.*

[4 marks]

[4 markah]

- (c) Suspended solids are the impurities in waste water.

Pepejal terampai merupakan bahan asing di dalam air sisa.

CLO1

- (i) Assign
- FOUR (4)**
- types of treatment process for suspended solid.

*Berikan **EMPAT (4)** jenis proses rawatan untuk pepejal terampai.*

[4 marks]

[4 markah]

CLO1

- (ii) Complete the following table with the correct answer.

Lengkapkan jadual berikut dengan jawapan yang betul.

Table 2(c): Purpose for design and operation for waste water treatment.

Jadual 2(c): Tujuan untuk reka bentuk dan operasi bagi rawatan sisa domestik.

Mass Loading Factor <i>Faktor Pemuatan Jisim</i>	Purpose for design and operation <i>Tujuan untuk reka bentuk dan operasi</i>
Minimum month <i>Bulan minima</i>	
Minimum day <i>Hari minima</i>	

[5 marks]

[5 markah]

- CLO1 (iii) Waste water treatment involving physical, chemical and biological unit processes is carried out in vessels or tanks commonly known as reactors. Provide **FIVE (5)** types of reactor with appropriate explanation.
- Rawatan air sisa yang melibatkan operasi unit fizikal, unit kimia dan unit biologi dijalankan di dalam vesel atau tangki yang biasa dikenali sebagai reaktor. Berikan **LIMA (5)** jenis reaktor dengan penjelasan yang sesuai.*

[10 marks]

[10 markah]

QUESTION 3**SOALAN 3**

- CLO2 (a) Identify **TWO (2)** types of preliminary treatment operations of waste water.
- Kenal pasti **DUA (2)** jenis operasi rawatan awal air sisa.*
- CLO2 (b) Screening and solid reduction are the preliminary unit operation of domestic waste water
- Penyaringan dan proses pengecilan pepejal adalah operasi rawatan awal domestik air sisa*
- (i) Discuss the differences between screening unit operation and solid reduction process.
- Bincangkan perbezaan antara operasi unit penyaringan dan proses pengecilan pepejal.*

[2 marks]

[2 markah]

[4 marks]

[4 markah]

CLO2

- (ii) Screens are generally classified based on the size of their openings in the screening element and mechanism of removal. Elaborate **TWO (2)** types of screen involved in screening unit operation.

*Skrin biasanya dikelaskan berdasarkan saiz bukaan dalam elemen penyaringan dan mekanisme penyingkiran. Huraikan **DUA (2)** jenis skrin yang terlibat dalam operasi unit penyaringan.*

[4 marks]

[4 markah]

(c)

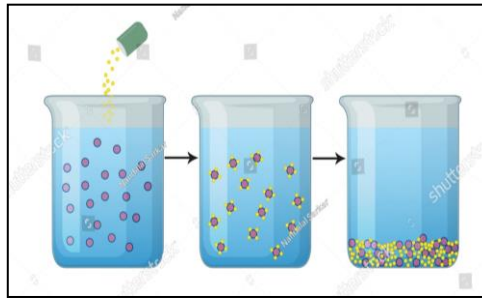


Figure 3(c): Coagulation of colloid particle

Rajah 3(c): Pembekuan zarah koloid

Figure 2(c) depicts the process of coagulation for colloid particle.

Rajah 2(c) menggambarkan proses penggumpalan bagi zarah koloid.

CLO2

- (i) Write briefly the working principle for process shown in Figure 3(c) including **TWO (2)** examples of coagulant used.

*Tulis secara ringkas prinsip kerja bagi proses yang ditunjukkan dalam rajah 3(c) termasuklah **DUA (2)** contoh penggumpal yang digunakan.*

[7 marks]

[7 markah]

CLO2

- (ii) Provide **FOUR (4)** factors that contribute to the characteristics of colloidal particles in waste water.

*Berikan **EMPAT (4)** faktor yang menyumbang kepada ciri-ciri zarah koloid dalam air sisa.*

[8 marks]

[8 markah]

QUESTION 4**SOALAN 4**

CLO2

- (a) State the aim of biological treatment process.

Nyatakan matlamat proses rawatan biologi.

[2 marks]

[2 markah]

CLO2

- (b) Discuss **FOUR (4)** roles of microorganisms in waste water treatment.

Bincangkan EMPAT (4) peranan mikroorganisma dalam rawatan air sisa.

[8 marks]

[8 markah]

- (c) Moisture, carbon dioxide, temperature, pH, and mechanical sonic stress are common factor affecting microbial growth in the biological treatment process.

Kelembapan, carbon dioksida, suhu, pH dan tekanan sonik mekanikal adalah faktor persekitaran biasa yang mempengaruhi pertumbuhan mikrob dalam proses rawatan biologi

CLO2

- (i) Sketch a graph that illustrate the phases of microbial growth patterns, accompany by suitable explanations.

Lakarkan graf yang menggambarkan fasa pola pertumbuhan mikroorganisma beserta dengan penjelasan yang sesuai.

[5 marks]

[5 markah]

CLO2

- (ii) Provide an explanation of **FIVE (5)** environmental factors that influence the growth of microorganisms.

Berikan penjelasan tentang LIMA (5) faktor persekitaran yang mempengaruhi pertumbuhan mikroorganisma.

[10 marks]

[10 markah]

SOALAN TAMAT