

INSTRUCTION:

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

ARAHAN:

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

QUESTION 1**SOALAN 1**

CLO1
C1

(a) Define the following items:

Takrifkan perkara berikut:

i) Dissolved Oxygen, DO

Oksigen Terlarut, DO

[2 marks]

[2 markah]

ii) Eutrophication Process

Proses Eutrofikasi

[2 marks]

[2 markah]

CLO1
C2

(b) Waste water treatment is the process of purifying sewage or waste water before it is released into water reservoirs such as rivers, lakes, and oceans. Compare the terminology of Biochemical Oxygen Demand and Chemical Oxygen Demand in waste water constituent.

Rawatan air sisa ialah proses pembersihan air kumbahan atau air sisa sebelum dilepaskan ke dalam air takungan seperti sungai, tasik, dan lautan. Bandingkan terminologi Permintaan Oksigen Biokimia dan Permintaan Oksigen Kimia dalam konstituen air sisa.

[4 marks]

[4 markah]

- CLO1 (c) The water surface investigation at Tasik Pustaka in Kuching, Sarawak, is
C3 displayed in Table 1(c). As an appointed water quality firm,
Penyiasatan permukaan air di Tasik Pustaka di Kuching Sarawak dipaparkan dalam Jadual 1(c). Sebagai firma kualiti air yang dilantik,

Table 1(c): Water Surface Observation Concern at Tasik Pustaka, Kuching
Jadual 1(c): Penekanan pemerhatian permukaan air, Tasik Pustaka, Kuching

Water Surface Observation Concern

Penekanan Pemerhatian Permukaan Air

Algae bloom

Pertumbuhan alga

Death of aquatic life

Kematian hidupan akuatik

Depletion of dissolved oxygen

Pengurangan oksigen terlarut

- i) Provide **THREE (3)** potential pollution constituents that might be involved in this issue as tabulated in Table 1(c).

Sediakan TIGA (3) potensi konstituen pencemaran yang mungkin terlibat dalam isu ini seperti yang dinyatakan dalam Jadual 1(c).

[3 marks]

[3 markah]

- ii) Provide an explanation of each constituent of pollution provided in **c(i)** that led to water surface observation concern at Tasik Pustaka.

Sediakan penjelasan setiap konstituen pencemaran yang disediakan dalam c(i) yang membawa kepada penekanan pemerhatian permukaan air di Tasik Pustaka.

[14 marks]

[14 markah]

QUESTION 2

SOALAN 2

CLO1
C1

- (a) Domestic waste water sources are also known as sanitary sewage. Define the domestic waste water.

Sumber air kumbahan domestik juga dikenali sebagai kumbahan kebersihan. Takrifkan air sisa kumbahan.

[2 marks]

[2 markah]

CLO1
C2

- (b) Domestic waste water is classified into four types: yellow, brown, black, and greywater. Elaborate **TWO (2)** types of domestic waste water that has been mentioned.

Air sisa kumbahan dikelaskan kepada empat jenis iaitu kuning, coklat, hitam dan air kelabu. Huraikan DUA (2) jenis air sisa kumbahan yang dinyatakan.

[4 marks]

[4 markah]

CLO1
C3

- (c) As illustrated in Figure 2(c), the fluidized bed reactor is usually used in waste water treatment plant.

Seperti yang digambarkan dalam Rajah 2(c), reaktor lapisan terbendalir biasanya digunakan di loji rawatan air sisa.

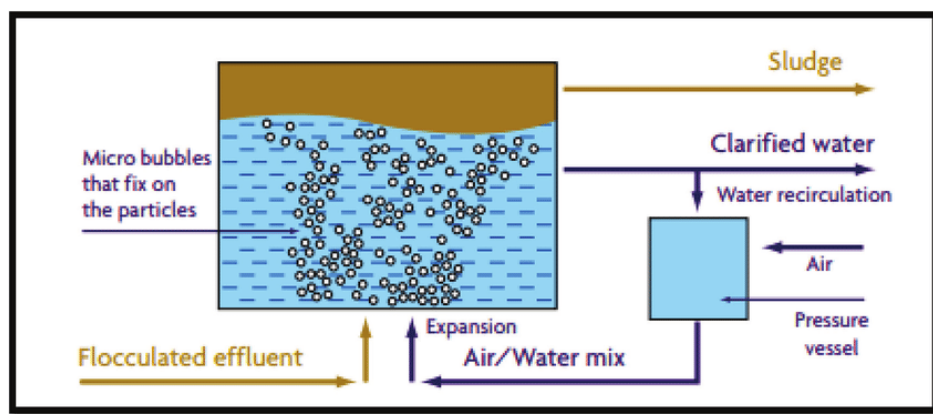


Figure 2(c) Fluidized Bed Reactor

Rajah 2(c) Reaktor Lapisan Terbendalir

CLO1 C3	i)	Provide TWO (2) treatment processes that can be used in a waste water treatment facility with this type of reactor. <i>Sediakan DUA (2) proses rawatan yang boleh digunakan di kemudahan rawatan air sisa dengan reaktor jenis ini.</i> [4 marks] [4 markah]
CLO1 C3	ii)	Provide TWO (2) purposes for design flowrate to be considered in the waste water treatment plant. <i>Sediakan DUA (2) tujuan reka bentuk aliran dipertimbangkan di loji rawatan air sisa.</i> [5 marks] [5 markah]
CLO1 C3	iii)	Waste water characteristics, environmental and regulatory requirements, system reliability, site and facility limitations, and design life and cost all play a significant role in waste water treatment plant planning. Provide FIVE (5) reasons for each of these criteria is considered when designing a waste water treatment facility. <i>Ciri – ciri air sisa, keperluan persekitaran dan kawal selia, kebolehpercayaan sistem, had tapak dan kemudahan, serta hayat reka bentuk dan kos semuanya memainkan peranan penting dalam perancangan loji rawatan air sisa. Sediakan LIMA (5) sebab untuk setiap kriteria ini dipertimbangkan semasa mereka bentuk kemudahan rawatan air sisa.</i> [10 marks] [10 markah]

QUESTION 3**SOALAN 3**

- CLO2
C1 (a) State **TWO (2)** physical unit operations that may be appropriate for storm waste water.
*Nyatakan **DUA (2)** operasi unit fizikal yang mungkin boleh digunakan untuk rawatan air sisa banjir.*
- [2 marks]
[2 markah]
- CLO2
C2 (b) Preliminary waste water treatment systems include the measurement and regulation of incoming flow as well as the removal of big floating solids, grit, and possibly grease. Explain the following process:
Sistem rawatan air sisa awal melibatkan pengukuran dan pengawalan aliran masuk serta penyingkiran pepejal terapung besar, grit, dan mungkin gris. Terangkan proses berikut:
- i) Aeration System
Sistem Pengudaraan
- [4 marks]
[4 markah]
- ii) Primary Sedimentation
Pemendapan Utama
- [4 marks]
[4 markah]
- CLO2
C3 (c) Chemical constituents in waste water will straightaway undergo the chemical processes such as coagulation, precipitation, and oxidation process.
Konstituen kimia dalam air sisa akan terus menjalani proses kimia seperti proses pembekuan, pemendakan, dan pengoksida.

- CLO2
C3
- i) With an example of precipitation agent, provide the explanation of precipitation process in waste water treatment.
- Dengan contoh agen pemendakan, sediakan penjelasan mengenai proses pemendakan dalam rawatan air sisa.*

[7 marks]

[7 markah]

- CLO2
C3
- ii) Provide the types of precipitating agents that are often used in waste water treatment with their functions.
- Sediakan jenis – jenis agen pemendakan yang selalu digunakan dalam rawatan air sisa serta fungsinya.*

[8 marks]

[8 markah]

QUESTION 4**SOALAN 4**

- CLO2
C1
- (a) The biological treatment process is categorized as secondary treatment in waste water treatment. State the objective for the introduction of biological treatment.
- Proses rawatan biologi dikategorikan sebagai rawatan sekunder dalam rawatan air sisa. Nyatakan objektif rawatan biologi diperkenalkan.*

[2 marks]

[2 markah]

- CLO2
C2
- (b) In biological treatment, the anaerobic and aerobic processes are widely applied. Compare the aerobic and anaerobic processes in the biological treatment.
- Dalam rawatan biologi, proses anaerobik dan aerobik digunakan secara meluas. Bandingkan proses aerobik dan anaerobik dalam rawatan biologi.*

[8 marks]

[8 markah]

- CLO2
C3
- (c) Microorganisms require energy, carbon source, and inorganic compound to reproduce and be active in biological treatment.
Microorganisma memerlukan tenaga, sumber carbon dan sebatian bukan organik untuk membiak dan kekal aktif dalam rawatan biologi
- i) Provide **TWO (2)** roles of microorganisms in waste water treatment.
Sediakan DUA (2) peranan mikroorganisma dalam rawatan air sisa.
[5 marks]
[5 markah]
- ii) With the aid of a diagram, provide **FOUR (4)** phases of microorganism growth.
Dengan bantuan gambarajah, sediakan EMPAT (4) fasa pertumbuhan mikroorganisma
[10 marks]
[10 markah]

SOALAN TAMAT