

**SULIT**



**KEMENTERIAN PENDIDIKAN TINGGI  
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI**

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

**JABATAN TEKNOLOGI KIMIA DAN MAKANAN**

**PEPERIKSAAN AKHIR**

**SESI II : 2024/2025**

**DMK10033 : INTRODUCTION TO OIL AND FAT**

**TARIKH : 14 MEI 2025**

**MASA : 2.30 PETANG - 4.30 PETANG (2 JAM)**

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

Struktur (5 soalan)

Dokumen sokongan yang disertakan : Tiada

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**JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN**

(CLO yang tertera hanya sebagai rujukan)

**SULIT**



**INSTRUCTION:**

This section consists of **FIVE (5)** structured questions. Answer **ALL** questions.

**ARAHAN:**

*Bahagian ini mengandungi LIMA (5) soalan berstruktur. Jawab SEMUA soalan.*

**QUESTION 1****SOALAN 1**

CLO1

- (a) List **FOUR (4)** main groups of complex lipids.

*Senaraikan EMPAT (4) kumpulan utama lipid kompleks.*

[4 marks]

[4 markah]

CLO1

- (b) Lipid plays an important role in the human body. It can be divided into 3 main groups; simple lipid, complex lipid and derived lipid. Monoglyceride (MAG) and Diglyceride (DAG) are the examples of simple lipid.

*Lipid memainkan peranan penting dalam badan manusia. Ia boleh dibahagikan kepada 3 kumpulan utama; lipid mudah, lipid kompleks dan lipid terbitan. Monogliserida (MAG) dan Digliserida (DAG) adalah contoh bagi lipid mudah.*

- i) Define simple lipid.

*Berikan definisi lipid mudah.*

[2 marks]

[2 markah]

- ii) Explain **TWO (2)** differences between MAG and DAG structure.

*Terangkan DUA (2) berbezaan di antara struktur MAG dan DAG.*

[4 marks]

[4 markah]

- iii) Explain **TWO (2)** functions of lipids in the human body.  
*Terangkan DUA (2) fungsi lipid dalam badan manusia.*

[4 marks]

[4 markah]

CLO1

- (c) Figure 1 (c) shows the condensation reaction between three molecules of fatty acid and one molecule of glycerol backbone. Determine the product of this reaction by sketching the structure C and D.

*Rajah 1 (c) menunjukkan tindakbalas kondensasi di antara tiga molekul asid lemak dan satu molekul gliserol. Tentukan produk hasil tindak balas dengan melakarkan struktur C dan D.*

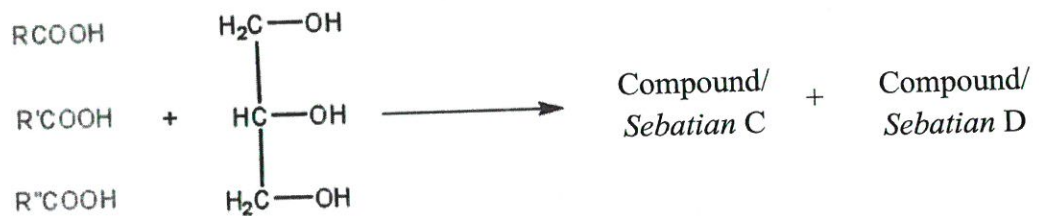


Figure 1 (c) / Rajah 1 (c)

[6 marks]

[6 markah]

**QUESTION 2****SOALAN 2**

CLO1

- (a) List **TWO (2)** examples of saturated and unsaturated fatty acids by giving their common name.

*Senaraikan DUA (2) contoh asid lemak tepu dan tak tepu dengan memberikan nama biasanya.*

[4 marks]

[4 markah]

CLO1

- (b) Fatty acid nomenclature uses a variety of naming system that describe the number of carbons and double bond in fatty acid. It can be recognized by its common name, beside the International Union of Pure and Applied Chemistry (IUPAC) name and the omega naming system.

*Tatanama asid lemak menggunakan pelbagai sistem penamaan yang menggambarkan bilangan karbon dan ikatan berganda dalam asid lemak. Ia boleh dikenali dengan nama biasa, selain nama Kesatuan Kimia Tulen dan Gunaan Antarabangsa (IUPAC) dan sistem penamaan omega.*

- i) List **TWO (2)** classes of unsaturated fatty acid.

*Senaraikan DUA (2) kelas asid lemak tak tepu.*

[2 marks]

[2 markah]

- ii) Explain **TWO (2)** differences between saturated and unsaturated fatty acid.

*Terangkan DUA (2) perbezaan di antara asid lemak tepu dan tak tepu.*

[4 marks]

[4 markah]

- iii) By drawing the line structure of Linoleic acid, name it according to IUPAC nomenclature system.

*Dengan melukis struktur garisan asid Linoleik, namakannya mengikut sistem tatanama IUPAC.*

[4 marks]

[4 markah]

- CLO1 (c) Differentiate between Linolenic acid and Myristic acid in term of carbon number, number of double bond and its omega nomenclature.  
*Bezakan antara asid Linolenik dan asid Myristic dari segi nombor karbon, bilangan ikatan ganda dua dan tatanama omeganya.*

[6 marks]

[6 markah]

**QUESTION 3****SOALAN 3**

- CLO1 (a) List **FOUR (4)** vegetable oils that can be extracted from its fruit.  
*Senaraikan **EMPAT (4)** lemak sayuran yang boleh diestrak daripada buahnya.*

[4 marks]

[4 markah]

- CLO1 (b) Triglyceride (TAG) molecules are made from a combination of chemical elements that are typically found in the organic materials. Sources of oil and fat, such as coconut, sunflower oil, and butter, are examples of natural triglyceride-rich substances which commonly used in food, cooking, and industrial applications.  
*Molekul trigliserida (TAG) diperbuat daripada gabungan unsur kimia yang biasanya terdapat dalam bahan organik. Sumber minyak dan lemak, seperti kelapa, minyak bunga matahari, dan mentega, adalah contoh bahan kaya trigliserida semula jadi yang biasa digunakan dalam makanan, masakan dan aplikasi industri.*

- i) Identify **TWO (2)** chemical elements that can be found in oil and fat.  
*Kenalpasti **DUA (2)** unsur kimia yang boleh diperolehi dari lemak dan minyak.*

[2 marks]

[2 markah]

- ii) Determine **TWO (2)** differences between coconut oil and sunflower oil in term of its major fatty acid and their state at room temperature.

*Tentukan DUA (2) perbezaan antara minyak kelapa dan minyak bunga matahari dari segi asid lemak utamanya dan keadaannya pada suhu bilik.*

[4 marks]

[4 markah]

- iii) Figure 3 (b) (iii) shows the process of butter making. Explain the step in N and O with the function of both processes.

*Rajah 3 (b) (iii) menunjukkan proses pembuatan mentega. Terangkan langkah dalam N dan O dengan fungsi kedua-dua proses.*

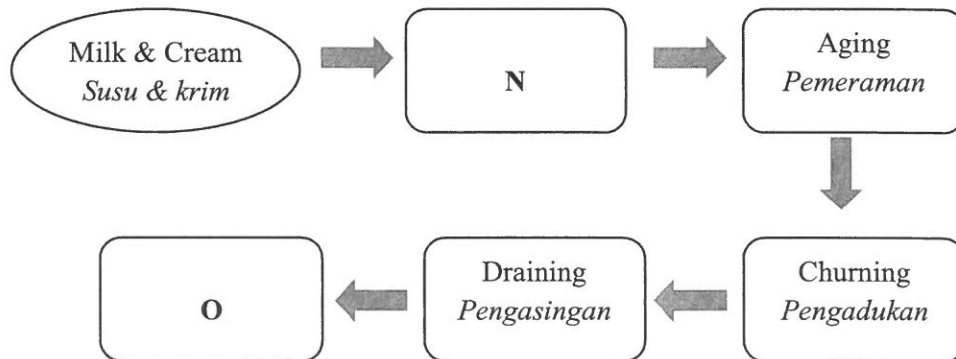


Figure 3 (b) (iii)/ Rajah 3(b) (iii)

[4 marks]

[4 markah]

- CLO1 (c) Compare the major fatty acids in palm oil and olive oil with **TWO (2)** examples of fatty acid for each of it.

*Bandingkan asid lemak utama dalam minyak sawit dan minyak zaitun dengan DUA (2) contoh asid lemak untuk setiap satunya.*

[6 marks]

[6 markah]

**QUESTION 4****SOALAN 4**

CLO1

- (a) List **FOUR (4)** chemical analysis of oil and fat.  
*Senaraikan EMPAT (4) analisis kimia bagi lemak dan minyak.*

[4 marks]

[4 markah]

CLO1

- (b) A comprehensive understanding on the factors influencing the physical and chemical properties of oils and fats is vital, as these properties significantly impact the texture, stability, and functionality of various products.

*Pemahaman menyeluruh tentang faktor yang mempengaruhi sifat fizikal dan kimia minyak dan lemak adalah penting, kerana sifat ini memberi kesan ketara kepada tekstur, kestabilan dan kefungsiian pelbagai produk.*

- i) Define physical properties.

*Definisikan ciri- ciri fizikal.*

[2 marks]

[2 markah]

- ii) Explain **TWO (2)** factors that affecting the physical properties of oil and fat.

*Terangkan DUA (2) faktor yang mempengaruhi sifat fizikal minyak dan lemak.*

[4 marks]

[4 markah]

- iii) Explain concept of iodine value of palm kernel oil and sunflower oil.

*Terangkan konsep nilai iodin minyak isirung sawit dan minyak bunga matahari.*

[4 marks]

[4 markah]

- CLO1 (c) Explain the physical properties of coconut oil in term of solubility in water, physical state in room temperature and its melting point.  
*Terangkan sifat fizik minyak kelapa dari segi keterlarutan dalam air, keadaan fizik dalam suhu bilik dan takat leburnya.*

[6 marks]

[6 markah]

**QUESTION 5****SOALAN 5**

- CLO1 (a) List **TWO (2)** suitable conditions for oil palm planting.  
*Senaraikan DUA (2) keadaan yang sesuai bagi penanaman kelapa sawit.*

[4 marks]

[4 markah]

- CLO1 (b) The traditional supply chain of palm oil involves several stages; harvesting of palm fruit in the plantation, the milling process of fresh fruit bunch followed by the refining process of crude palm oil and the processing of refined palm oil.

*Rantaian bekalan tradisional minyak sawit melibatkan beberapa peringkat; penuaian buah sawit di ladang, proses pengilangan tandan buah segar diikuti proses penapisan minyak sawit mentah dan pemprosesan minyak sawit ditapis.*

- i) Define refining process of palm oil.  
*Berikan definisi proses penapisan minyak sawit.*

[2 marks]

[2 markah]

- ii) Complete the milling process of palm oil in Figure 5 (b) (ii) with the explanation of the functions process in P and Q.

*Lengkapkan proses pengilangan minyak sawit di Rajah 5 (b) (ii) dengan menerangkan fungsi proses yang terlibat di P dan Q.*

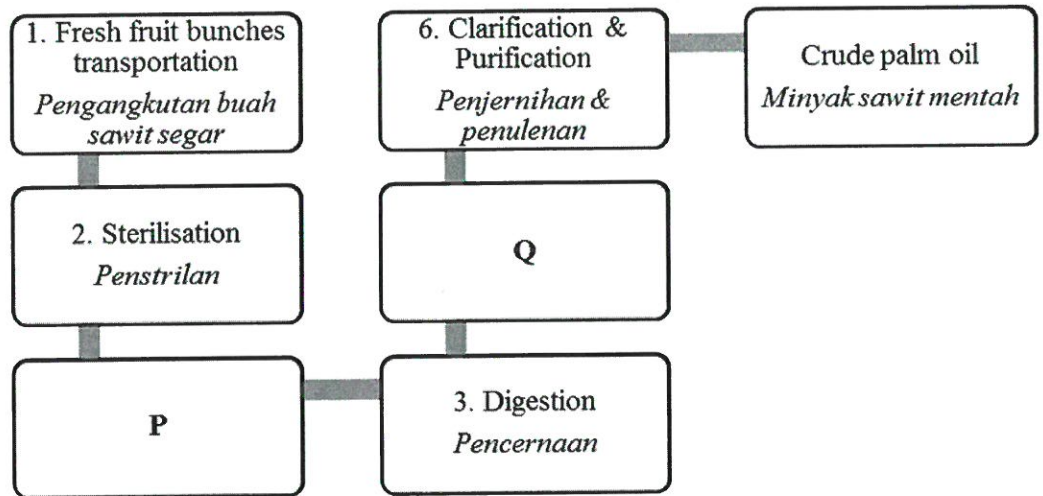


Figure / Rajah 5 (b) (ii)

[4 marks]

[4 markah]

- iii) Explain **TWO (2)** benefits of palm oil compared to the other vegetable oils.

*Terangkan DUA (2) kelebihan minyak kelapa sawit berbanding minyak sayuran lain.*

[4 marks]

[4 markah]

- CLO1 (c) Figure 5 (c) shows the process of chemical refining of crude oil. Explain the process of X and Y with TWO (2) compounds that have been removed during that process.

*Rajah 5 (c) menunjukkan proses penapisan minyak mentah secara kimia. Terangkan proses X dan Y beserta DUA (2) sebatian yang telah disingkirkan semasa proses tersebut.*

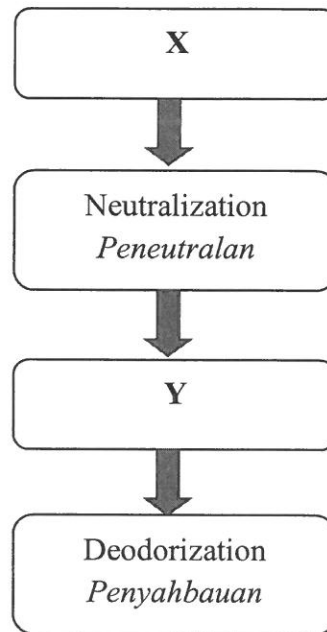


Figure / Rajah 5 (c)

[6 marks]

[6 markah]

**SOALAN TAMAT**

