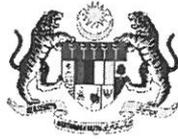


**SULIT**



**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 : 2022/2023**

**DMT40123: FATS AND OILS TECHNOLOGY**

**TARIKH : 12 JUN 2023**

**MASA : 2.30 PTG – 4.30 PTG (2 JAM)**

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Kertas ini mengandungi **SEBELAS (11)** halaman bercetak.

Struktur (4 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 **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 terms:

*Definisikan istilah berikut:*

- i) Diglyceride  
*digliserida*
- ii) Free fatty acid  
*asid lemak bebas*
- iii) Triglycerides  
*Trigliserida*

[3 marks]

[3 markah]

CLO1

- (b) Explain the difference of the structure between:

*Terangkan perbezaan dari segi struktur di antara:*

- i) Monounsaturated and polyunsaturated fatty acids.  
*Asid lemak mono tidak tepu dan asid lemak poli tidak tepu*

[2 marks]

[2markah]

- ii) Cis and trans fatty acid  
*Asid lemak cis dan asid lemak trans*

[2 marks]

[2 markah]

- iii) Simple triglycerides and mixed triglycerides  
*Trigliserida ringkas dan trigliserida campuran*

[2 marks]

[2 markah]

(c) Based on Table 1(c), answer the following questions:

*Jawab soalan berikut berpandukan Jadual 1(c):*

Table 1(c): Chemical and physical properties of fatty acids

*Jadual 1(c): Sifat- sifat fizikal dan kimia bagi asid lemak*

Fatty acid/ <i>Asid Lemak</i>	Number of double bond/ <i>Jumlah ikatan ganda dua</i>	Number of carbon atom/ <i>Jumlah atom karbon</i>	Melting point/ <i>Takat lebur (°C)</i>
Lauric acid/ <i>Asid Laurik</i>	0	12	43.2
Stearic acid/ <i>Asid Stearik</i>	0	18	69.6
Elaidic acid/ <i>Asid Elaidik</i>	1	18	43.7
Oleic acid/ <i>Asid Oleik</i>	1	18	16.3
Linoleic acid/ <i>Asid Linoleik</i>	2	18	-6.5

CLO1

- i) State the physical properties of stearic acid and oleic acid at room temperature.  
*Nyatakan sifat fizikal bagi asid stearik dan asid oleik pada suhu bilik.*

[1 mark]

[1 markah]

CLO1

- ii) Show why stearic acid has higher melting point than oleic acid.  
*Tunjukkan mengapa asid stearik mempunyai takat lebur yang lebih tinggi berbanding asid oleik.*

[3 marks]

[3 markah]

CLO1

- iii) Justify why elaidic acid has higher melting point than oleic acid.  
*Justifikasikan mengapa asid elaidik mempunyai takat lebur yang lebih tinggi berbanding asid oleik.*

[3 marks]

[3 markah]

(d) Based on Table 1(d), answer the questions below:

*Jawab soalan-soalan di bawah berdasarkan Jadual 1(d):*

Table 1(d): Iodine value of several types of oils

*Jadual 1(d): Nilai iodin beberapa jenis minyak*

Types of oil/ <i>Jenis minyak</i>	Iodine value / <i>Nilai Iodin (IV)</i>
Palm oil/ <i>Minyak kelapa sawit</i>	51
Peanut oil/ <i>Minyak kacang</i>	101
Coconut oil/ <i>Minyak kacang</i>	9
Corn oil/ <i>Minyak jagung</i>	127

CLO1

i) Justify why corn oil shows the highest value of iodine value.

*Justifikasikan mengapa minyak jagung menunjukkan nilai iodin yang paling tinggi.*

[4 marks]

[4 markah]

CLO1

ii) Based on the iodine values, find out which oil is the most susceptible to oxidation process.

*Berdasarkan nilai iodin, kenalpasti minyak mana yang paling mudah terdedah kepada proses pengoksidaan.*

[5 marks]

[5 markah]

## QUESTION 2

## SOALAN 2

CLO1

(a) Define the following terms:

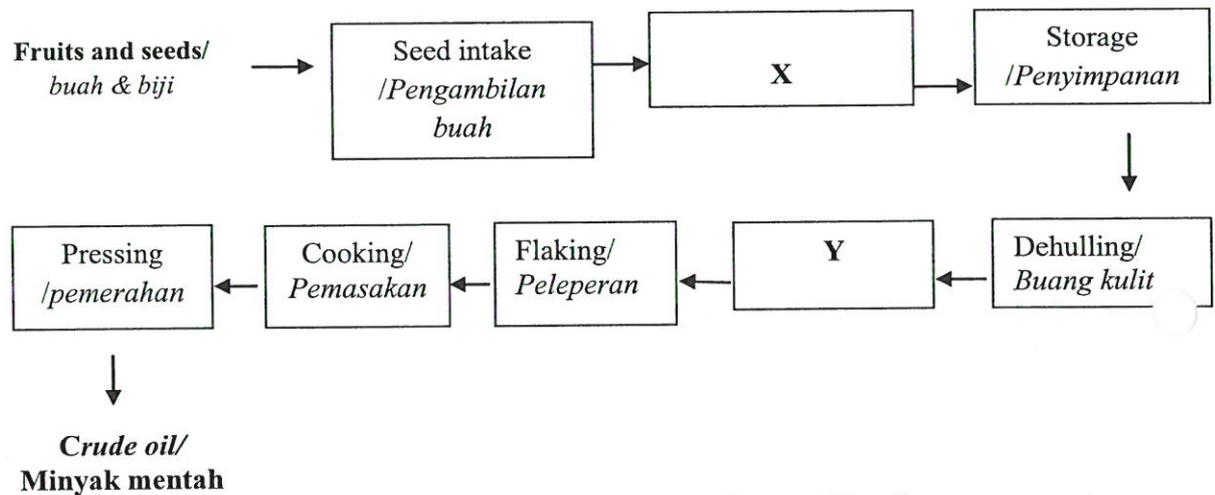
*Definisikan istilah berikut:*

- i) Rendering  
"rendering"
- ii) crude oil  
*minyak mentah*
- iii) decortication  
*dekortikasi*

[3 marks]

[3 markah]

(b) Based on Diagram 2(b), answer the following questions:

*Jawab soalan-soalan berikut berdasarkan Rajah 2(b):*

Flowchart 2b Extraction process of vegetable oil

*Carta alir 2b: Proses pengekstrakan minyak*

CLO1

i) Explain the main purpose of step X and Y.

*Terangkan tujuan utama langkah X dan Y.*

[2 marks]

[2 markah]

CLO1

- ii) Explain the importance of dehulling in extraction process.

*Terangkan kepentingan pembuangan kulit luar di dalam proses pengekstrakan.*

[3 marks]

[3 markah]

- (c) Based on Diagram 2(c), answer the following questions:

*Berdasarkan Rajah 2(c) jawab soalan-soalan berikut:*

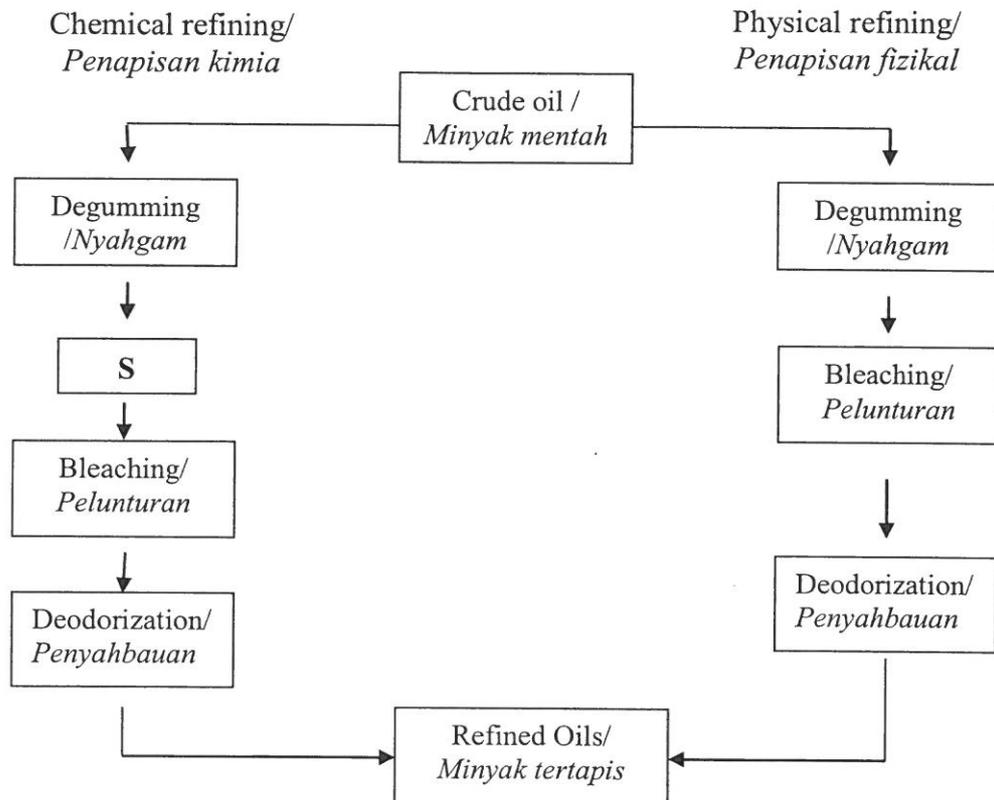


Diagram 2(c): Flowchart of oil refining process

*Rajah 2 (c): Carta alir proses penapisan minyak*

CLO1

- i) Show **THREE (3)** quality effects if phosphatides are not removed during degumming process.

*Tunjukkan **TIGA (3)** kesan terhadap kualiti minyak jika fosfatida tidak disingkirkan semasa proses penyahgaman.*

[6 marks]

[6 markah]

CLO1

- ii) Show how process S is performed.  
*Tunjukkan bagaimana proses S dilakukan.*

[6 marks]

[6 markah]

- (d) A palm oil refinery obtains crude oil with high content of free fatty acids. Find out an appropriate process for the removal of free fatty acids with taking into consideration to low cost and environmental impacts.

CLO1

*Kilang minyak sawit A mendapat minyak mentah yang mengandungi kandungan asid lemak bebas yang tinggi. Kenalpasti proses yang sesuai bagi menyingkirkan asid lemak bebas tersebut dengan mengambil kira kos yang rendah dan kesan terhadap alam sekitar.*

[5 marks]

[5 markah]

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

CLO1

- (a) Define the following terms:

*Definisikan istilah berikut:*

- i) Fractionation  
*Pemeringkatan*
- ii) Plasticizing  
*Pemplastikan*

[2 marks]

[2 markah]

- (b)

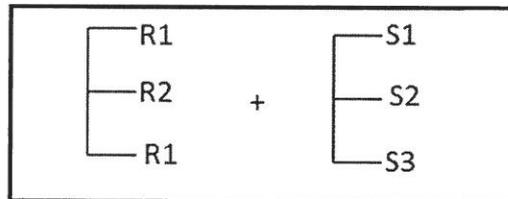


Diagram 3(b): The inter-esterification process of triglycerides

*Rajah 3 (b): Proses saling-pengesteran bagi trigliserida*

Based on Diagram 3(b),

*Berpandukan Rajah 3(b),*

CLO1

- i) Sketch
- THREE (3)**
- new triglycerides that could be produced from inter-esterification process.

*Lakarkan **TIGA (3)** trigliserida baru yang terhasil daripada proses tersebut.*

[3 marks]

[3 markah]

CLO1

- ii) Explain
- THREE (3)**
- advantages of inter esterification process compared to hydrogenation process.

*Terangkan **TIGA (3)** kelebihan proses saling pengesteran berbanding proses penghidrogenan.*

[3 marks]

[3 markah]

CLO1

- (c) i) Explain the differences between dry fractionation and detergent fractionation process.

*Terangkan perbezaan proses pemeringkatan kering dan pemeringkatan pelarut.*

[4 marks]

[4 markah]

CLO1

- ii) Explain **TWO (2)** main principles of fractionation.

*Terangkan DUA (2) prinsip asas bagi pemeringkatan.*

[4 marks]

[4 markah]

- (d) Based on Diagram 3(d), answer the following questions:

*Berpandukan Rajah 3(d), jawab soalan-soalan berikut:*

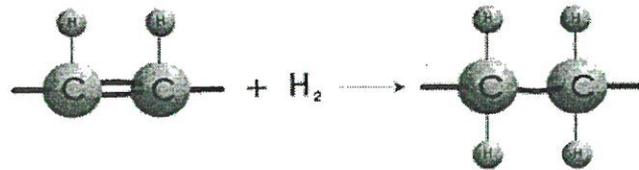


Diagram 3(d): Mechanism of Process X

*Rajah 3(d): Mekanisma Proses X*

CLO1

- i) Explain what is process X.

*Terangkan apa itu proses X.*

[3 marks]

[3 markah]

CLO1

- ii) Show why process X could increase thermal stability of fatty acid.

*Tunjukkan kenapa proses X dapat meningkatkan kestabilan termal asid lemak.*

[3 marks]

[3 markah]

CLO1

- iii) Show how process X would produce trans fatty acids.

*Tunjukkan bagaimana proses X boleh menghasilkan asid lemak trans.*

[3 marks]

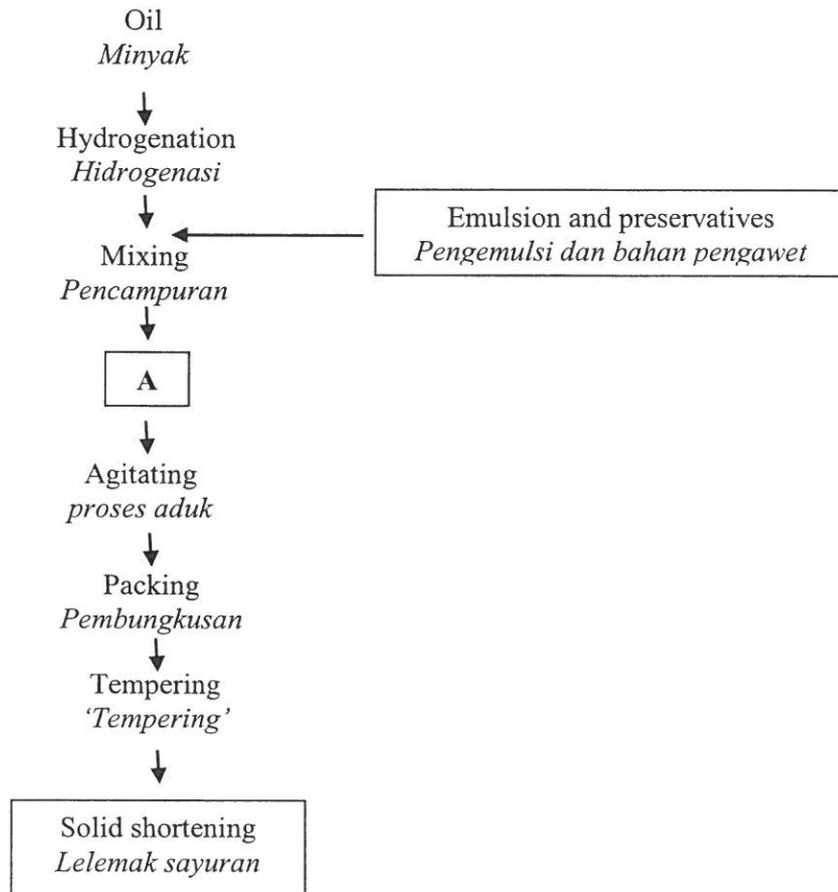
[3 markah]

## QUESTION 4

## SOALAN 4

(a) Based on Figure 4(a), answer the following questions:

*Jawab soalan-soalan berikut berdasarkan Rajah 4(a):*



Flow chart 4(a): Solid shortening processing.

*Carta alir 4(a): Pemprosesan lelemak sayuran.*

CLO1

- i) Name process A.  
*Namakan proses A.*

[1 mark]

[1 markah]

CLO1

- ii) State the purpose of process A.  
*Nyatakan tujuan proses A.*

[1 mark]

[1 markah]

- CLO1      iii)      Figure out the characteristics of the product if tempering process is not done.  
*Jangkakan sifat-sifat produk tersebut sekiranya proses 'tempering' tidak dilakukan.*  
[3 marks]  
[3 markah]
- CLO1      iv)      Show how plastic range affects the consistency of solid shortening.  
*Tunjukkan bagaimana julat plastik mempengaruhi konsistensi bagi lelemak sayuran pepejal.*  
[4 marks]  
[4 markah]
- CLO1      (b)      Show the function of **THREE (3)** main ingredients in mayonnaise production.  
*Tunjukkan fungsi **TIGA (3)** bahan utama dalam penghasilan mayonis.*  
[6 marks]  
[6 markah]
- CLO1      (c)      Explain the formation of emulsion in the production of margarine.  
*Terangkan pembentukan emulsi di dalam penghasilan marjerin*  
[2 marks]  
[2 markah]
- CLO1      (d) i)      Explain **TWO (2)** properties of glycerine in food industry.  
*Terangkan **DUA (2)** sifat gliserin dalam industri makanan.*  
[2 marks]  
[2 markah]
- CLO1      ii)      Discuss **THREE (3)** applications of glycerol in food industry.  
*Bincangkan **TIGA (3)** aplikasi gliserol dalam industri makanan.*  
[6 marks]  
[6 markah]

**SOALAN TAMAT**