



**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER I  
SESSION 2015/2016**

COURSE NAME : OIL AND FATS TECHNOLOGY  
COURSE CODE : BWD 30503  
PROGRAMME : 3 BWD  
EXAMINATION DATE : DECEMBER 2015 / JANUARY 2016  
DURATION : 3 HOURS  
INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

**Q1** Oils and fats consist of a mixture of glycerol esters of fatty acids.

- (a) Write the common name of the abbreviated fatty acid below:
- (i) 18:2
  - (ii) 18:1
  - (iii) 18:3
  - (iv) 18:0
- (4 marks)
- (b) Point out the reasons why elaidic acid has a melting point of 45 °C, while oleic acid has a melting point of 13.4 °C.
- (10 marks)
- (c) Differentiate between essential fatty acid and conditionally essential fatty acid.
- (4 marks)
- (d) With a suitable graphic organizer, categorise the structure of fatty acid (a) to (h) in **Figure Q1** into omega-3/ omega-6/ essential/ conditionally essential fatty acid, by writing their abbreviated common name.
- (10 marks)

**Q2** Fat imparts unique properties in food that is difficult to re-create or copy. Likewise fats and oil function in many ways in food preparation.

- (a) Ice cream is an emulsion. Explain.
- (4 marks)
- (b) By giving an example of food product, relate the functions of oil and fats and the unique properties they impart to meet the demands of consumers.
- (6 marks)

**Q3** After several months, David realized that the olive oil that he bought produced slightly objectional odor. So, David inferred that the oil has been oxidized.

- (a) Draw and name the main structure of triacylglycerol that may oxidize in the oil product.
- (3 marks)
- (b) Hydroperoxidase is one of the major initial oxidative products that decompose to form compounds responsible for off-flavor and odors of oil and fat products, such as olive oil. Write the mechanism of fat oxidation to form hydroperoxidase in olive oil.
- (6 marks)
- (c) Dismutation is a common hydroperoxidase breakdown scheme to produce stable compound during rancidity process of fat products. Draw the structure of dismutation reaction product which may cause ketonic odor in the olive oil.
- (2 marks)
- (d) Plan an experiment to prove David's inference.
- (10 marks)

- Q4** Edible oils and fats have been separated from animal tissues, oilseeds, and oil-bearing fruits, to obtain triglycerides in high yield and purity.
- (a) State **THREE (3)** types of impurities in crude oil. (3 marks)
- (b) **Table Q4** lists the phospholipids and free fatty acid (FFA) in crude vegetable oils. Outline the suitable method of oil refining for the crude oil in **Table Q4**. (16 marks)
- Q5** In the United States and northern Europe, animal fats in the form of butter, lard, and tallow were the major source of edible fats until introduction of the hydrogenation process in 1911.
- (a) Define hydrogenation process in oil and fat industry application by giving a suitable example of triglyceride. (5 marks)
- (b) Relate the operating variables involved in hydrogenation process with the formation of trans fat. (12 marks)
- (c) Sun Oil Pte. Ltd. has produced several margarine products from sunflower oil by using partial hydrogenation process for 42 years. In recent years they realize that the sales of the products have decreased immediately. **Figure Q5** is one of the Sun Oil's margarine products with its nutrition facts. As Oil & Fat Food Technology Consultant, recommend the processing technique/s that can be used by Sun Oil Pte. Ltd. to enhance their sales of the margarine products. (5 marks)

- END OF QUESTIONS -

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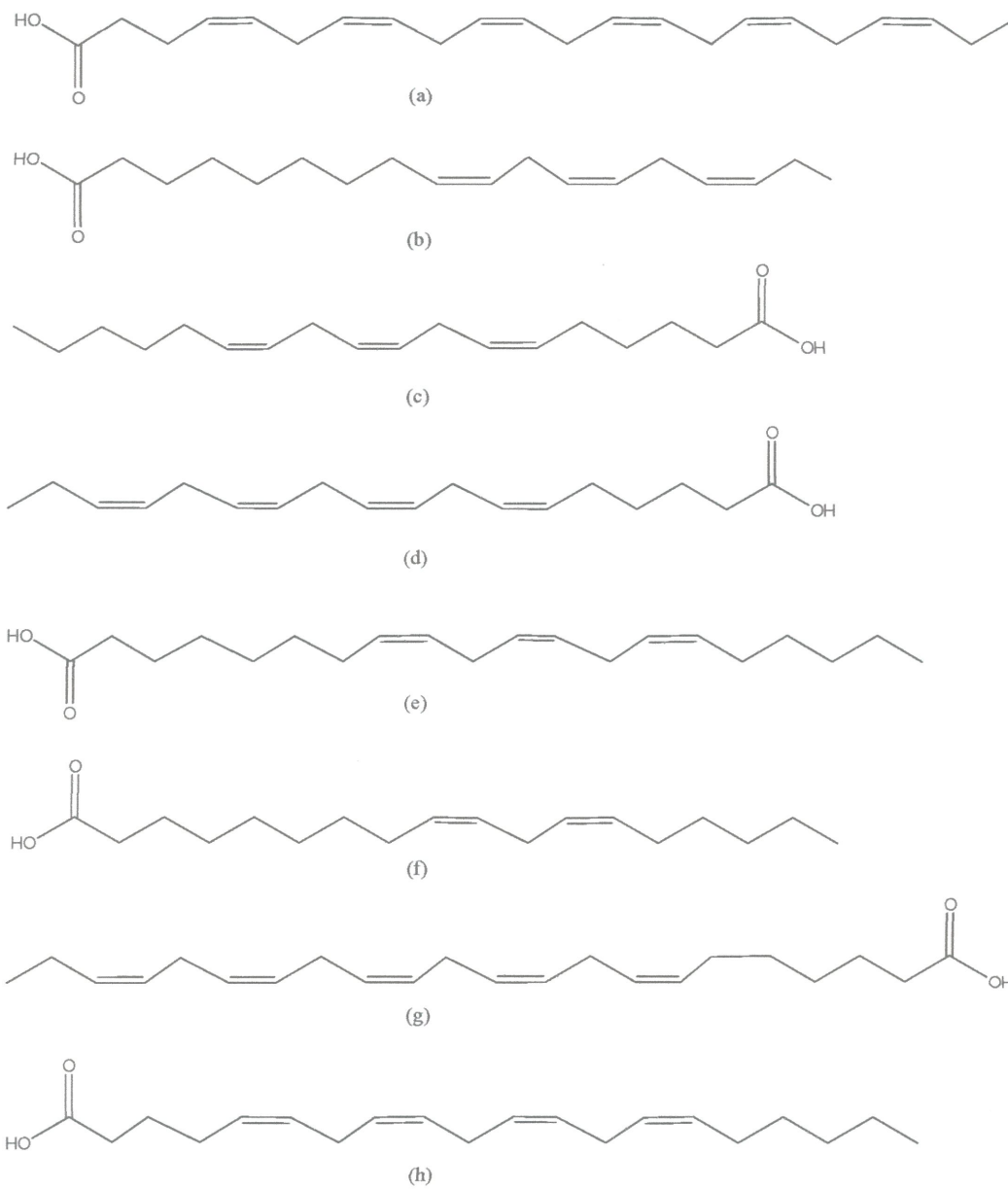


Figure Q1

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Crude oil	Phospholipids content, %	FFA content, %
Canola oil	1.80-3.50	0.50-1.50
Palm oil	0.06-0.95	1.00-4.00
Soybean oil	1.00-3.00	0.30-1.10
Coconut oil	0.07-0.98	1.30-3.80

**Table Q4**



<b>Nutrition Facts</b>	
Serving Size 4 oz. (113g)	
Servings Per Container 4	
Amount Per Serving	
<b>Calories 280</b>	<b>Calories from Fat 130</b>
% Daily Value*	
<b>Total Fat 14g</b>	<b>22%</b>
Saturated Fat 3.5g	<b>18%</b>
Trans Fat 2.5g	
<b>Cholesterol 120mg</b>	<b>40%</b>
<b>Sodium 640mg</b>	<b>27%</b>
<b>Total Carbohydrate 13g</b>	<b>4%</b>
Dietary Fiber 1g	<b>4%</b>
Sugars 0g	
<b>Protein 24g</b>	

**Figure Q5**