

CONFIDENTIAL



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2014/2015**

COURSE NAME : OIL AND FATS TECHNOLOGY
COURSE CODE : BWD 30503
PROGRAMME : 3BWD
EXAMINATION DATE : DECEMBER 2014/JANUARY 2015
DURATION : 3 HOURS
INSTRUCTION : ANSWER ALL **FIVE (5)** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

CONFIDENTIAL

- Q1** (a) Based on **FIGURE Q1**, answer the following questions. Write only the number that corresponds to your answer.
- i Which molecule has both hydrophilic and hydrophobic properties and would be found in plasma membranes?
(1 mark)
 - ii A fat (or triacylglycerol) would be formed as a result of a dehydration reaction between which molecules?
(1 mark)
 - iii Which molecule is glycerol?
(1 mark)
 - iv Which molecule is a saturated fatty acid?
(1 mark)
 - v Which of the following molecules consists of a hydrophilic "head" region and a hydrophobic "tail" region?
(1 mark)
- (b) Enumerate **five (5)** reactions which oil and fats undergo due to their chemical nature.
(5 marks)
- (c) Describe the **two (2)** different methods involved in animal fat recovery giving emphasis on the industrial importance of the recovered fat from **each** process.
(10 marks)

- Q2** (a) i. In oil processing, hydrogenation aims to convert liquid oil to semi-solid. Elaborate four (4) parameters that may affect hydrogenation process.
- (5 marks)
- ii. Deodorization is one general step in oil post-extraction process. Design deodorization process flow of a chosen oil. (Label every component in the design)
- (5 marks)
- (b) Nowadays, oil and fats are characterized mainly by their fatty acid composition determined by gas chromatography, replacing the titrimetric and gravimetric assays used previously. However, the saponification value (SV) and iodine value (IV) are still used in specifications and to monitor processes. Differentiate between these **two (2)** methods.
- (5 marks)
- (c) Choose any type of butter and establish the discrete steps in manufacturing it from milk.
- (5 marks)
- Q3** (a) List and discuss the objective of sterilization in every process flow that produces oil from seed.
- (5 marks)
- (b) Reactions converting acids to esters or vice versa and the exchange of ester groups are among the most widely used in fatty acid and lipid chemistry. They find applications from micro scale preparation of methyl esters for GC analysis to the industrial production of oleochemicals and biodiesel. Explain briefly **three (3)** of these important reactions that are applied in industrial scale.
- (15 marks)

- Q4** (a) Ketonic rancidity is a type of deterioration that is rather less known. However, this type of deterioration can arise in foods such as desiccated coconut and butter which are normal ingredients of Malaysian cooking. Describe the mechanism of Ketonic rancidity.

(5 marks)

- (b) Fats and oil are important ingredients in a variety of foods. They provide specific functional properties such as softness, texture, mouth feel, structural integrity, air incorporation, heat transfer, and shelf life increase to food products. Relate the functional properties of fats and oil that plays important structural role in the following products: (1) chocolate, (2) ice cream, (3) biscuits, (4) breads and (5) cakes.

(15 marks)

- Q5** (a) Evaluate any **one (1)** type of soybean extraction listed below in terms of process flow and production.

Screw-pressing; extrusion expelling; solvent extraction

(5 marks)

- (b) Autoxidation is a free-radical chain reaction, involving a complex series of reactions that initiate, propagate, and terminate the chain. Explain the mechanism involve in these reactions (initiation, propagation and termination).

(15 marks)

END OF QUESTION

