First Semester Examination
Academic Session 2020/2021

February 2021

KIE 456 – FOOD AND PALM OIL CHEMISTRY
[Kimia Makanan dan Kelapa Sawit]

Duration: 2 hours
[Masa: 2 jam]

Please check that this examination paper consists of **FOUR (4)** pages of printed material before you begin the examination.

Answer **TWO** (2) questions from Part A.

Answer **TWO** (2) questions from Part B.

Answer each question on a new page.

If a candidate answered more than four questions, only the first four questions in order of the arrangement in the received answer scripts will be graded.

PART A: Answer both questions.

1. (a) The primary functions of carbohydrates in the body are to provide and store energy, build macromolecules, as well as spare protein and fat for other uses. According to the Dietary Guidelines for Americans, up 45 to 65 percent of total daily calories are recommended from carbohydrate sources to carry out the functions described above.

(i) By using a glucose molecule as an example, distinguish the terms simple carbohydrate and complex carbohydrate.

(ii) Explain how the glucose molecules perform its function at a calorie surplus.

(8 marks)

(b) Sketch the general structure of a triglyceride to explain the differences between the two classes of lipid.

(7 marks)

(c) Glucose can be modified to be used as a sweetener for people with diabetes. Briefly explain.

(4 marks)

(d) Based on your knowledge of additives, suggest THREE (3) appropriate additives used in preparing the icing on store bought cupcakes. Explain the role of the additives in detail.

(6 marks)

2. (a) Non-enzymatic browning takes place in most foods when exposed to oxygen or heat. It can occur via Maillard reaction or caramelization. Distinguish THREE (3) key points in these two processes.

(6 Marks)

(b) Gelatinization improves the availability of starch for amylase hydrolysis. Therefore, starch can be used constantly in cooking to thicken/bind water in roux, sauce, or soup. Explain.

(7 Marks)

(c) Correlate the relationship between stereospecific locations of fatty acids in triglycerides and its impact on nutrition.

(12 marks)

PART B: Answer any TWO (2) questions.

3. (a) Discuss the hydrolysis versus denaturation of protein.

(6 Marks)

(b) Heat will physically denature protein. This occurs when protein loses its native shape due to the disruption of weak chemical bonds and interactions, thereby becoming biologically inactive. Discuss if the nutrition is still the same after heating.

(7 Marks)

(c) Ice-cream melts slower than sorbet. Interpret the phenomena in relation to the rheological properties of solid fats.

(12 marks)

4. (a) Proteins are large and complex molecules that play many critical roles in the body. They do most of the work in cells and are required for the structure, function, and regulation of body tissues and organs. Discuss the following statement.

(i) Maillard reaction reduces protein nutritional value.

(ii) Protein as health indicator for a renal and liver function.

(10 Marks)

(b) The satisfying crunch from deep-fat fried food often makes it a crowd favorite. Using your knowledge of deep-fat frying, suggest FIVE (5) main reaction products that are formed during deep-frying, their characteristics and formation mechanism.

(15 marks)

5. (a) Flavourings are used to enhance, modify the taste and the aroma in natural food products which lost due to food processing. It is also used to create flavours in foods like candies and snacks that do not have likeable flavours of their own.

(i) Compare natural flavouring, nature identical flavouring and artificial flavouring. Give examples.

(6 Marks)

(ii) Monosodium glutamate (MSG) or E621 is used in cooking as a flavour enhancer with an umami taste that intensifies the meaty, savoury flavour of food. Comment if MSG has nutritional value.

(7 Marks)

(b) Deep sea fishes are usually caught a few days before they are brought back to the shores to be sold. Giving an example of a preservative, briefly discuss the roles and functions of the preservative in keeping the fish fresh.

(5 marks)

(c) Nitrates and nitrites are examples of additives. Explain in detail the uses of nitrates and nitrites and the concerns that arise from using this class of additive.

(7 marks)

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