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Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2023/2024**

- COURSE NAME** : FOOD TECHNOLOGY
- COURSE CODE** : BNN40803
- PROGRAMME CODE** : BNN
- EXAMINATION DATE** : JULY 2024
- DURATION** : 3 HOURS
- INSTRUCTIONS** :
1. ANSWER ALL QUESTIONS
 2. THIS FINAL EXAMINATION IS CONDUCTED VIA
 - Open book
 - Closed book
 3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

THIS QUESTION PAPER CONSISTS OF FOUR (4) PAGES

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TERBUKA

- Q1** Approximately one-third of all food manufactured in the world is lost due to spoilage by microorganisms, chemical deteriorations or high water activity (a_w).
- (a) List **SIX (6)** main factors affecting the growth of microorganisms.
(6 marks)
 - (b) Describe **THREE (3)** different types of microorganism that cause food spoilage.
(6 marks)
 - (c) Apply your knowledge in water activity (a_w) to explain food spoilage due to **THREE (3)** different types of chemical deterioration reaction.
(6 marks)
 - (d) A food company is drying baking powder at a constant temperature of 50 °C. The saturation water activity (a_w^*) of the powder at this temperature is 0.85. The rate constant (K) for the drying process is 0.03 per hour and the empirical constant (n) is 1.6. Estimate using the 'Page' formula in **Figure Q1.1**, the water activity (a_w) of the dried powder after 12 hours of drying.

$$a_w = a_w^* \cdot \exp\left(-K \cdot t^{\frac{1}{n}}\right)$$

Figure Q1.1 Formula for the 'Page' model.

(7 marks)

- Q2** Concerns regarding food processing include potential contamination risks and challenges in regulatory compliance such as cGMP and HACCP.
- (a) Show **TWO (2)** health benefits and **TWO (2)** limitations of consuming unprocessed or minimally-processed foods.
(4 marks)
 - (b) Ultra-processed foods such as soft drinks and sugary snacks are often high in calories, sugar, and unhealthy fats, which can contribute to negative health and environmental impacts. Defend this statement by providing **THREE (3)** detailed concerns of consuming highly-processed food.
(9 marks)
 - (c) Explain the concept of cGMP (current Good Manufacturing Practices) in context of food production.
(4 marks)

- (d) Recently, a local food company has received several reports of customers falling ill after consuming the company's salads, leading to concerns about food safety. Upon investigation, it was discovered that one of the salad ingredients, lettuce, was contaminated with pathogenic strain of *E. coli*. The contamination likely occurred during the washing and processing of the lettuce at the company's facility. As a result, the company is facing a significant legal issue. Recommend Hazard Analysis and Critical Control Points (HACCP) plan for the company to prevent similar incidents happening in the future.

(8 marks)

Q3 There are several preservation techniques used by food industries.

- (a) Differentiate between 'thermal' and 'non-thermal' food preservation technologies.

(6 marks)

- (b) Compare and contrast the principles behind 'high pressure processing' and 'pulsed electric field technology'.

(6 marks)

- (c) Evaluate the applications of **Q3(b)** in preserving different types of food products, emphasizing their impact on microbial safety and food quality.

(6 marks)

- (d) Critically analyze the challenges associated with the industrial-scale implementation of non-thermal technologies in food preservation.

(7 marks)

Q4 As part of a food product development team in your company, you are tasked to propose a new healthier ready-to-eat (RTE) meal product.

- (a) Outline the key steps involved in the new food product development process. Discuss how each step, from idea generation to commercialization, contributes to the successful identification and launch of your new food product. Decide **ONE (1)** example of RTE product at the end of your steps.

(8 marks)

- (b) List **THREE (3)** roles of right packaging in preserving the quality of your food products in **Q4 (a)**.

(3 marks)

- (c) Discuss how innovations, such as active and intelligent packaging, contribute to extending the shelf life of your new products. Provide examples of specific applications of these technologies and their impact on food safety and sustainability.

(6 marks)

- (d) Recommend a marketing plan for your new RTE product. Outline the key components of the marketing plan and discuss the importance of aligning the marketing strategy with the overall goals of the company's brand image.

(8 marks)

- END OF QUESTIONS -