



UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF CHEMICAL AND BIO-ENGINEERING TECHNOLOGY

FINAL EXAMINATION
OCTOBER 2025 SEMESTER

COURSE CODE : CQB 20603
COURSE TITLE : FOOD SAFETY TOXICOLOGY
PROGRAMME NAME : BACHELOR OF FOOD SAFETY AND QUALITY TECHNOLOGY WITH HONOURS
DATE : 28 JANUARY 2026
TIME : 2:00PM - 5:00PM
DURATION : 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. This question paper consist of TWO sections.
4. Answer ALL questions for Section A.
5. Section B consist of four questions. Answer THREE (3) questions only.
6. Please write your answer on the answer booklet provided.
7. Please answer all questions in English only.
8. Please answer MCQ/EMQ questions using OMR sheet. ☐ *Tick if applicable*
9. Refer to the attached Formula/ Appendies. ☐ *Tick if applicable*

SECTION A (Total: 40 marks)

Answer ALL questions.

Please use the answer booklet provided.

Question 1

Food toxicology is the study of nature, properties, effects and detection of toxic substances in food and their disease manifestation in humans.

- (a) State **FOUR (4)** possible exposure pathways of toxic substances into the human body.

(4 marks)

- (b) Identify the phases of toxicity that occur after exposure to a toxic substance.

(3 marks)

- (c) A laboratory toxicity study reported that the LD_{50} of a food contaminant is 0.08 mg/kg body weight in rats. If the average rat weighs 250 g, calculate the amount of chemical (in mg) corresponding to the LD_{50} dose.

(3 marks)

Question 2

Natural toxins are toxic compounds that are naturally produced by living organisms. These toxins are not harmful to the organisms themselves, but they may be toxic to other creatures including humans when eaten.

- (a) Describe the source and health effect of the following plant-derived natural toxins:

- i) Tannins
- ii) Biogenic Amines

(4 marks)

- (b) A consumer develops tingling, numbness, and respiratory difficulty shortly after eating shellfish. Identify the type of poisoning involved.

(2 marks)

- (c) Describe how shellfish poisoning food can affect humans differently in the short term and over a long period.

(4 marks)

Question 3

Veterinary drugs play an important role in modern animal farming and food production because they help keep animals healthy and prevent diseases. However, when these drugs leave residues in products like meat, or milk, they can remain in the food we eat and may cause health risks for humans over time.

- (a) List **TWO (2)** antibiotics most likely to be detected in meat.
(3 marks)
- (b) Determine **TWO (2)** classes of drugs that can be used to treat rumen foaming and bloat in cattle.
(2 marks)
- (c) Improper use of veterinary drugs can result in residue presence in meat or milk. Determine **TWO (2)** practices that contribute to this problem.
(2 marks)
- (d) Describe **THREE (3)** control measures that can be implemented at farm level to minimize veterinary drug residues in food.
(3 marks)

Question 4

A packaged snack product is created using several common ingredients, including wheat flour, soy lecithin, and monosodium glutamate (MSG). The manufacturing process involves high-temperature conditions, which are necessary to cook the ingredients properly and extend the product's shelf life.

- (a) Identify **TWO (2)** potential food allergens and **ONE (1)** process toxicant present in the product.

(3 marks)

- (b) State the possible health effects for:
- i. an allergic individual
 - ii. an individual with food intolerance

(2 marks)

- (c) Explain the mechanisms that lead to the formation of toxicants during the processing of the snack product mentioned above.

(3 marks)

- (d) Determine **TWO (2)** control measures that can be implemented to reduce health risks of food allergens and process toxicant to consumers.

(2 marks)

SECTION B (Total: 60 marks)

Answer THREE (3) questions only.

Please use the answer booklet provided.

Question 1

Jake Sully, a 45-year-old man from a small village enjoys eating traditional foods that he prepares himself. One afternoon, he harvested cassava from his garden to cook a quick meal. As he was in a hurry, he skipped the usual steps and cooked the cassava straight away. A short time after eating, Jake started feeling unwell and experienced several symptoms. Concerned about his symptoms, Jake started to wonder whether the cassava he ate contained something harmful.

- (a) Based on Jake's symptoms, identify the type of plant toxin involved. Briefly describe its properties.

(2 marks)

- (b) Explain why cooking alone may not fully remove natural toxins in cassava.

(2 marks)

- (c) Compare the acute and chronic effects of plant toxins on people using using Jake's cassava poisoning as an example.

(8 marks)

- (d) Discuss preventive measures to avoid plant toxin poisoning from cassava.

(8 marks)

Question 2

Phthalate are a group of chemical compounds primarily used in numerous consumer products. The widespread use of Phthalate has raised concerns about their potential impact on human health. In Malaysia, regulatory agencies are increasingly monitoring Phthalate levels in food products to ensure consumer safety. Understanding how Phthalate enter food and the risks associated with long-term exposure is crucial to minimize contamination.

- (a) Describe **TWO (2)** purposes of phthalate used in consumer products.
(2 marks)
- (b) Analyzing phthalate contamination in food products is crucial for protecting public health. Identify **TWO (2)** suitable analytical equipment used for this analysis.
(2 marks)
- (c) Discuss the potential toxic effects of phthalate exposure, particularly in vulnerable populations.
(8 marks)
- (d) Based on the given study, identify and explain **FOUR (4)** routes through which phthalate can enter the food supply.
(8 marks)

Question 3

In 2024, the Ministry of Health (MOH) Malaysia conducted routine surveillance on several locally produced soft drinks and found that some products contained benzoic acid levels close to the maximum permitted limit, particularly in acidic beverages containing vitamin C. The samples were analyzed using analytical equipment to accurately quantify the benzoic acid content and ensure compliance with the Malaysian Food Regulations.

- (a) Identify **TWO (2)** reasons why benzoic acid is commonly used in soft drinks.
(2 marks)
- (b) Describe **TWO (2)** potential health concerns associated with excessive intake of benzoic acid.
(2 marks)
- (c) Construct a step-by-step laboratory procedure for the analysis of benzoic acid in a soft drink using analytical equipment.
(8 marks)
- (d) The maximum permitted level of benzoic acid in soft drinks under the Malaysian Food Regulations is 150 mg/L. Explain how result of analysis in (c) was used to determine the concentration of benzoic acid in the soft drink and to verify whether it is within the permitted limit.
Hint: In your answer, describe how the spectrum or chromatogram help support your conclusion.
(8 marks)

Question 4

For several years, a waste incineration facility has been operating close to a rural area where local farmers depend on cattle rearing and vegetable farming for their livelihood. Recent soil tests in the area showed high levels of dioxins. Since the meat and vegetables produced in this area are consumed by the public, authorities are worried about possible contamination of food and its impact on consumer health.

- (a) Identify which food products from this area would pose the highest risk to consumers. Justify your answer.
(2 marks)
- (b) Discuss role of bioaccumulation and biomagnification in increasing dioxin levels.
(2 marks)
- (c) Determine the control measures that can be taken to reduce consumer exposure to dioxins from foods produced in this area.
(8 marks)
- (d) Explain how waste incineration facility in that rural area could indirectly contribute to the formation and environmental presence of dioxins.
(8 marks)

END OF EXAMINATION PAPER