



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

FINAL EXAMINATION
OCTOBER 2025 SEMESTER

COURSE CODE : CFD20303
COURSE TITLE : FOOD CHEMISTRY
PROGRAMME NAME : DIPLOMA IN CHEMICAL ENGINEERING TECHNOLOGY (FOOD)
DATE : 31 JANUARY 2026
TIME : 9:00AM - 12:00PM
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. Section A consist 25 MCQ or EMQ questions. Answer ALL questions.
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*

THERE ARE 12 PAGES OF QUESTIONS INCLUDING THIS PAGE

SECTION A (Total: 25 marks)

Answer ALL questions.

Please use the objective answer sheet provided.

1. Identify the correct statement about water.
 - A. Freezing and drying are examples of Food processing techniques that do not involve water.
 - B. Ice is denser than water.
 - C. Water is a Non-Polar Solvent.
 - D. Contains strong covalent bonds that hold 2 hydrogen atoms and 1 oxygen atom together.

2. _____ is a type of bond that is formed between 2 water molecules.
 - A. Ester bond
 - B. Peptide bond
 - C. Glycosidic bond
 - D. Hydrogen bond

3. Identify the type of water that can be extracted easily from foods by squeezing/cutting/pressing.
 - A. Free water
 - B. Vicinal water
 - C. Multilayer water
 - D. Entrapped water

4. Indicate the process that occurs when fruits such as pears, apples, or bananas are cut, exposed to air, and the cut sample begins to brown.
- A. Saponification
 - B. Catabolism
 - C. Glycolysis
 - D. The Maillard reaction
5. All the following are the most correct statements about carbohydrates **EXCEPT**.....
- A. Composed of elements sugar and water
 - B. Classified as simple CHO (the sugars) and the complex CHO (starch, glycogen, cellulose, and fiber)
 - C. Important as the human basic fuel
 - D. Promote growth and repair tissues
6. Choose the **CORRECT** combinations of monosaccharides to form disaccharides.
- i. Glucose + Glucose = Maltose
 - ii. Glucose + Fructose = Lactose
 - iii. Glucose + Fructose = Sucrose
 - iv. Glucose + Galactose = Lactose
- A. i,ii,iii
 - B. ii
 - C. All the above
 - D. i,iii,iv
7. _____ is the type of lipid that contains more than one double bond.
- A. Polyunsaturated fatty acids
 - B. Carbohydrates
 - C. Saturated fatty acids
 - D. Unsaturated fatty acids

8. Butter is a solid at room temperature, most of its fatty acids are_____
- A. Short and saturated
 - B. Long and saturated
 - C. Short and unsaturated
 - D. Long and unsaturated
9. Choose the properties of lipids that are important in foods from the following options.
- i. Melting point - determine whether a lipid is oil or fat at room temperature.
 - ii. Ability to form emulsions.
 - iii. Controlling browning reactions
 - iv. Contributes to flavor.
- A. i, iii,iv
 - B. All the above
 - C. i
 - D. i, ii
10. Identify the reason for the denaturation of protein in food.
- A. Extraction and distillation
 - B. Drying, refrigerating, freezing, rubbing in
 - C. Spray drying and freeze drying
 - D. Heat, acids, mechanical agitation, air bubbles
11. _____ is a type of bond formed between molecules in a protein chain.
- A. Ester bond
 - B. Glycosidic bond
 - C. Peptide bond
 - D. Condensed bond

12. Choose the best statement about amino acids from the following:
- A. A network of elastic protein glands
 - B. Organic acids that are found exclusively in dairy.
 - C. Organic acids that are found in fruits and vegetables.
 - D. Organic acids are found in all proteins.
13. Molecules that are composed of simple proteins combined with a non-proteinous substance are known as _____.
- A. zwitterions
 - B. Secondary protein
 - C. conjugated protein
 - D. amino acid
14. A complex protein molecule that stimulates or speeds up a specific chemical reaction without being used up itself is called an _____.
- A. Enzyme
 - B. Cofactor
 - C. Mycelium
 - D. Substrate
15. Predict the function of an enzyme that breaks down starch.
- A. As a Catalyst
 - B. As a Protein
 - C. As an energy of activation
 - D. As a reactant

16. Z can be classified as citrus fruits such as orange and it helps repair tissue. Predict the type of vitamin that best describes Z.
- A. Vitamin D
 - B. Vitamin A
 - C. Vitamin C
 - D. Vitamin B
17. Select the correct combination of fat-soluble and water-soluble vitamins.
- A. Fat soluble and muscle soluble
 - B. Vitamin B1 and Vitamin B2
 - C. Vitamin A and vitamin B1
 - D. Vitamin D and Vitamin E
18. Choose the best source of vitamins.
- A. Yogurt
 - B. Supplements
 - C. Apple juice
 - D. Fresh fruits and vegetables
19. Predict the origin of leafy green vegetables get most of their colour.
- A. Xanthophyl
 - B. Chlorophyll
 - C. Carotene
 - D. Mitochondria

20. A carrot gets its red colour from _____
- A. Lycopene
 - B. Fructose
 - C. Beta carotene
 - D. limonene
21. All the following are the functions of food additives **EXCEPT**.....
- A. to decrease the rate of oxidation of food
 - B. to improve the texture of food
 - C. to increase the digestion of food
 - D. to enhance the flavor of food
22. BHA, BHT, Ascorbic acid, and sodium citrate are examples of _____ that are usually used as food additives.
- A. Sweeteners
 - B. Food colorings
 - C. Preservatives
 - D. Antioxidants.
23. _____ are used to restore colour lost during processing or storage of food products.
- A. Flavoring
 - B. Colours
 - C. Antimicrobial agent
 - D. Antioxidants

24. State the type of food additive required for mixing water and fat to create mayonnaise and ice cream.
- A. Humectant
 - B. Bulking agent
 - C. Emulsifier
 - D. Anticaking agent
25. _____ are used to maintain desired moisture levels in foods like shredded coconut, marshmallows, and sausage casings.
- A. Antioxidants
 - B. Antimicrobial agent
 - C. Flavoring
 - D. Humectants

SECTION B (Total: 75 marks)

Answer THREE (3) questions only.

Please use the answer booklet provided.

Question 1

Answer the following question

- (a) Describe the structure of water
(5 marks)
- (b) Water activity (a_w) is the amount of free water available for microorganisms to grow in a food product.
- i. Demonstrate how water (a_w) activity can be used in predicting food spoilage.
(4 marks)
- ii. Illustrate the effect of low, medium, and high Water activity (a_w) on the physical properties of food with an example of each.
(6 marks)
- (c) Describe Carbohydrates
(4 marks)
- (d) Explain the browning of food called caramelization.
(6 marks)

Question 2

Answer the following question

- (a) Fatty acid is an important components of lipids (fat-soluble components of living cells) in plants, animals, and microorganisms. Explain **TWO (2)** main types of fats and their sources.

(5 marks)

- (b) The food industry relies on protein as it provides food with structure and texture and enables water retention.

- i. Explain **FIVE (5)** examples of protein functionality usage in food product preparation.

(10 marks)

- ii. Clarify protein denaturation

(4 marks)

- (c) Clarify the effect of acids and bases on protein denaturation with an example of applications.

(6 marks)

Question 3

Answer the following question

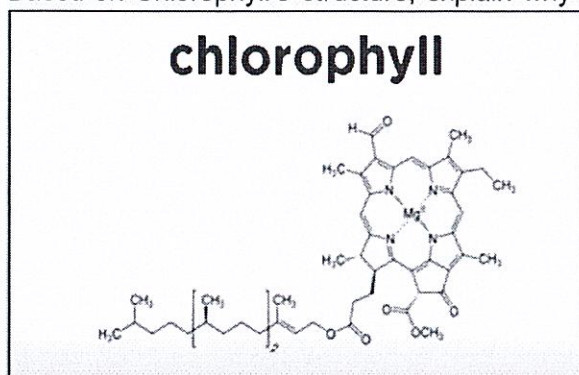
- (a) Enzymes are globular proteins that function as catalysts to increase the rate of chemical reactions without entering into the reaction.
- i. Illustrate **TWO (2)** mechanisms of enzyme catalysis
(6 marks)
- ii. With the aid of diagram, show the reaction progress on how the enzyme plays a role in accelerating the rate of reaction.
(6 marks)
- (b) Vitamin C (ascorbic acid) is a vital water-soluble nutrient and antioxidant that protects cells, aids wound healing, supports immune function, and helps the body absorb iron from plants. Give **FOUR (4)** factors that affect vitamin C destruction during food processing.
(8 marks)
- (c) Minerals are vital components of our food. Compare the functions of Calcium and Sodium in our body.
(5 marks)

Question 4

Answer the following question

- (a) Differentiate between natural and synthetic color with an example of each
(3 marks)

- (b) Based on Chlorophyll's structure, explain why chlorophyll is not soluble in water.



(10 marks)

- (c) Many different food additives have been developed over time to meet the needs of food production.
- i. Discuss **THREE (3)** reasons why color additives are used in food applications.
(6 marks)
- ii. Differentiate between **THREE (3)** types of additives with an example of each:
(6 marks)

END OF EXAMINATION PAPER

