

The Open University of Sri Lanka
Faculty of Natural Sciences
B.Sc Degree Programme



Department	: Chemistry
Level	: 5
Name of the Examination	: Final Examination
Course Title and - Code	: CYU5307/ CYE5307 (Chemical Aspects of Food Industry)
Academic Year	: 2023/2024
Date	: 08/04/2024
Time	: 1.30 p.m to 3.30 p.m
Duration	: 2 hours

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **four (4)** questions in **four (4)** pages.
3. **All four (4) questions are compulsory.** All questions carry equal marks.
4. Answers to each question should commence from a new page.
5. Draw fully labelled diagrams where necessary
6. Involvement in any activity that is considered an exam offense will lead to punishment
7. Use blue or black ink to answer the questions.
8. Clearly state your index number in your answer script
9. Use of non-programmable calculators will be allowed.
10. Mobile phones and other electronic equipment are not allowed. Switch them off and leave them outside.

(1) Answer all parts (I) to (IV)

(I) (a) Explain the following terms concerning Food Chemistry

- (i) Food Additives
- (ii) Food Contaminants
- (iii) Food Fortificants

(09 Marks)

(b) Name the common **food carbohydrate** and its **constituents** present in the following food source.

- (i) Naturally occurring food carbohydrate/s in honey
- (ii) Sugar beet
- (iii) Cereals

(06 Marks)

(c) One of the uses of oligosaccharides, sugar (sucrose) is crystallization. Name one (1) phenomenon where this crystallization is

- (a) desirable and
- (b) undesirable in the food industry.

(06 Marks)

(d) Explain how crystallization can be prevented during the Jam manufacturing process.

(06 Marks)

(II) (a) Explain the Maillard Browning reaction which occurs in food and write one desirable and one undesirable effect of Maillard Browning.

(08 Marks)

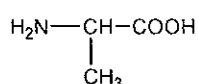
(b) Briefly explain the gelatinization process of starch.

(08 Marks)

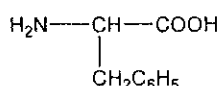
(c) How would you obtain corn syrup from corn? What are its uses in the food Industry?

(07 Marks)

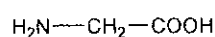
(III) (a) Phenylalanine and glycine are the N-terminal and C-terminal residues respectively of a tripeptide composed of phenylalanine, glycine and alanine. Write the structural formula for the tripeptide using the structures of the above amino acids. Identify any peptide bond/s.



Alanine



Phenylalanine



Glycine

(08 Marks)

(b) Draw the predominant structural forms of Alanine in a strongly acidic medium, strongly basic medium and at the isoelectric point pH of alanine.

(12 Marks)

(c) Explain briefly the limitations of the usage of rice flour over wheat flour in the bread-making industry.

(06 Marks)

- (IV) The structure of Oleic acid can be depicted as C18:1-(Δ^9).
- (a) Draw the structure of Oleic acid. (06 Marks)
 - (b) Draw the basic chemical structure of a lipid which consists of three oleic acids as long-chain fatty acids. (08 Marks)
 - (c) Oleic acid exists in cis-form with the aid of chemical structures, briefly explain the products formed during hydrogenation of Oleic acid. (10 Marks)

(2) Answer all parts (I) to (III)

- (I) Meat curing and tenderization are important technologies used in the meat processing industry.
- (a) What do you mean by meat curing? (06 marks)
 - (b) Write down the main curing agents and explain the function of each agent. (12 marks)
 - (c) (i) Name **four (4)** factors that affect the tenderization of meat. (08 marks)
 - (ii) Briefly describe **two (2)** methods of tenderization used in meat industry. (06 marks)
- (II) Evaporated milk is a type of non-fermented dairy products in milk processing industry.
- (a) Write down five (5) major steps of processing evaporated milk. (10 marks)
 - (b) Define the term solid nonfat (SNF) content in milk. (05 marks)
 - (c) Pasteurization is the most widely used heat treatment process in liquid milk.
 - (i) Write down two purposes of pasteurization of milk. (10 marks)
 - (ii) "Shelf life of pasteurized milk is around 10 days while sterilized milk has a longer shelf life than pasteurized milk." Briefly explain the statement. (15 marks)
- (III)
- (a) Why are eggs important and widely used in the food industry? (14 marks)
 - (b) Name three (3) proteins present in egg yolk (06 marks)
 - (c) Write down four (4) ways of chemical spoilage eggs. (08 marks)

(3) Answer all parts (I) to (III)

- (I) (a) Using a flow diagram summarize the steps involved in the implementation of Food Act No. 26 of 1980 in Sri Lanka until legal proceedings are being taken. (12 Marks)
- (b) Give a brief note on the Food (labeling and advertising) Regulation 2005 published in the Gazette of the Democratic Socialist Republic of Sri Lanka no. 1376/9 of 19th January 2005. (10 Marks)

- (c) Name three categories of persons who can be appointed as Authorized officers and What powers do Authorized officers have? (12 Marks)
- (II) (a) Name three aspects covered by Good Manufacturing Practices (GMP). (09 marks)
- (b) Explain how GMP is implemented. (10 Marks)
- (c) Name 5 "P" s covered by the Good Manufacturing Practices (GMP). (10 Marks)
- (III) (a) What is the Codex Alimentarius commission in relation to the food industry and briefly explain its role. (10 Marks)
- (b) "Normally GHP prevents foodborne diseases" Briefly explain this statement. (12 Marks)
- (c) Briefly explain the following,
- (i) What is HACCP plan validation?
- (ii) What is the validation procedure? (15 Marks)

(4) Answer all parts (I) to (III)

- (I) (a) Name two compounds which show vitamin C activity and give two functions of vitamin C. (12 Marks)
- (b) What is meant by "Recommended Dietary Allowance (RDA)"? (10 Marks)
- (c) Briefly explain the involvement of enzymes in the Tea, Chocolate and Coffee production industry. (10 Marks)
- (II) (a) Give possible structures of Anthocyanins in an Acidic medium with their respective colours. (10 Marks)
- (b) What is the pigment responsible for the yellow colour of freshly milled wheat flour. (08 Marks)
- (c) Explain how freshly milled wheat flour can be converted to white colour wheat flour. (10 Marks)
- (III) (a) Write down five (5) preservation methods of fish. (10 Marks)
- (b) (i) What do you mean by "freeze burn"? (05 Marks)
- (ii) How can it be prevented? (05 Marks)
- (c) (i) What do you mean by fortification of wheat flour? (05 marks)
- (ii) Briefly explain three examples of the fortification of wheat flour. (15 marks)