052

The Open University of Sri Lanka
Faculty of Natural Sciences
Diploma in Food Science Programme

Department	: Chemistry
Name of the Examination	: Final Examination
Course Code and Title	**: CYD3612 Introduction to food science and constituents of food**
Academic Year	: 2020/2021
Date	: 18/09/2022
Time	: 09.30a.m.-12.30p.m.
Duration	: 3 hours
Index number	:

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **Four** questions in **six** pages.
3. **Answer All FOUR (04) questions. All questions carry equal marks.**
4. Answer for each question should commence from a new page.
5. Draw fully labelled diagrams where necessary
6. Having any unauthorized documents/ mobile phones in your possession is a punishable offense
7. Use blue or black ink to answer the questions.
8. Circle the number of the questions you answered in the front cover of your answer script.
9. Clearly state your index number in your answer script.

1. A) Food components can be classified into two groups, essential and non-essential, depending on whether they could be biosynthesized in the body.

   i) Define the terms essential and non-essential food components.

   ii) Give two examples each for essential and non-essential food components.

   iii) Nutrients composition of food govern by several factors. Give three (03) factors of them. .

(35 marks)

B) Food Technology is the science that deals with all the technological and engineering aspects related to Food processing to marketing.

i) What is meant by food processing?

ii) Why is food preservation necessary for food technology?

iii) State three preservation techniques used in the early days.

(30 marks)

C) Water is an essential component in any food item.

i) Draw the structure of water and give the H-O-H bond angle.

ii) Name the hybridization found in water molecule.

iii) name two major sources of water found in our body.

(35 marks)

2. A) Carbohydrates are essential components of food.

i) Classify the following sugars as monosaccharides, disaccharides, and polysaccharides.

a) Glucose

b) Starch

c) Maltose

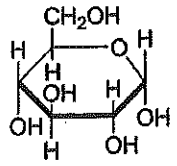
d) Sucrose

e) Lactose

ii) Give three (03) uses of carbohydrates in our body.

(30 marks)

B) Maltose is a disaccharide of α-D-Glucose. The structure of α-D-Glucose is given below.



α -D-glucose

i) Show the monomeric carbon of α-D-Glucose.

ii) Explain why the above structure is named as α – Glucose.

iii) Draw the structure of maltose and indicate the glycosidic bond.

(20 marks)

C) Carbohydrates undergo different chemical reactions.

i) Explain the classification of sugars as reducing and non-reducing, giving one (01) example for each.

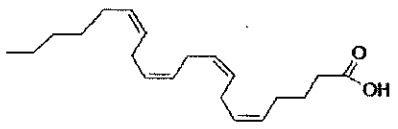
ii) A laboratory technician in a Food laboratory receives an unknown sugar sample X, which is galactose or starch. He did the following tests, and the observations are given below. Identify the sugar sample with a suitable explanation for each sugar sample .
X gave a violet colouration at the interface obtained by adding concentrated sulphuric acid down the sides of the tube to a solution heated with α-naphthol. X gives a silver mirror on heating with Tollen's reagent in a water bath. It did not provide blue colouration with iodine.

iii) Briefly explain the chemical reaction taking place during the Tollen's test.

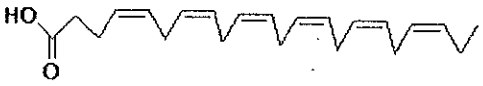
(50 marks)

3. (A)

i) Giving reasons, name the shorthand notation according to the ω_x nomenclature of the following fatty acids.



a)



b)

ii) The smoke point of butter is 150°C, whereas the smoke point of coconut oil is 204 °C. Which is the most suitable for deep frying of meat? Explain your answer.

iii) Draw the structure of the following fatty acid molecules.

a) Lauric acid (12:0)

b) Palmitoleic acid 16:1 (n-7) (44 marks)

(B) i) Name three factors responsible for the solubility of fatty acids.

ii) Write down three (03) main sources of vitamin D.

iii) Give two (02) diseases that cause a deficiency in vitamin D.

iv) Name two (02) functions of vitamin A.

(36 marks)

(C) The trans isomer of oleic acid (18:1 (n-9)) is called Elaidic acid. Elaidic acid is formed during the partial hydrogenation of vegetable oils.

i) Explain why oleic acid melts at 4 °C, but Elaidic acid melts at 45°C.

ii) Compare how the consumption of oleic acid and Elaidic acid affects the level of HDL and LDL cholesterol.

(20 marks)

4. A) i) What do you mean by dietary minerals?

ii) Write down two (02) enhancing factors and inhibition factors of calcium absorption in the human body.

iii) What do you mean by goitrogenic food? Give two examples.

iii) Write down three (03) ways of fortification with minerals?

(31 marks)

B) i) Briefly explain the reason for colour changes of fresh meat from bright red to pink colour during processing.

ii) Write down two (02) possible texture changes that occur when cooking plant-based food material.

iii) Name three compounds that impart a bitter taste in food.

(45 marks)

(C) Briefly explain the reasons for the followings.

i) Consuming large amounts of raw eggs will cause biotin deficiency

ii) Vitamin C is an unstable vitamin that is readily lost during food processing and storage.

iii) Iron in plant food is not readily available, while iron in animal sources is readily available.

(24 marks)