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QUALIFICATION : **BACHELOR OF HUMAN NUTRITION**	
QUALIFICATION CODE: **08BOHN**	LEVEL: **6**
COURSE: **FOOD CHEMISTRY**	COURSE CODE: **FCH621S**
DATE: **JANUARY 2025**	SESSION: **1**
DURATION: **3 HOURS**	MARKS: **100**

SECOND OPPORTUNITY/SUPPLEMENTARY EXAMINATION: QUESTION PAPER

EXAMINER: **MR. ERICK NATANGWE UUKULE**

MODERATOR: **MS. FIINA K. NAMUKWAMBI**

INSTRUCTIONS:

1. Answer all questions on the separate answer sheet.
2. Please write neatly and legibly.
3. Do not use the left side margin of the exam paper. This must be allowed for the examiner.
4. No books, notes and other additional aids are allowed.
5. Mark all answers clearly with their respective question numbers.

PERMISSIBLE MATERIALS:

1. None

ATTACHMENTS

1. None

This question paper consists of 5 pages including this front page

SECTION A: MULTIPLE CHOICE AND TRUE / FALSE [20 MARKS]

QUESTION 1: MULTIPLE CHOICE QUESTIONS [10 MARKS]

Evaluate the statements in each numbered section and select the most appropriate answer or phrase from the given possibilities. Fill in the appropriate letter next to the number of the correct statement/phrase on your ANSWER SHEET. [10]

1.1 One of the main goals of food processing is to:

A. To maximise profits for the food processor.
B. To make it more appealing to the elderly.
C. To modify sensory characteristics.
D. To prevent food losses.

1.2 Which of the following vitamins may be lost when processing oil into margarine:

A. Vitamin E.
B. Vitamin C.
C. Vitamin B.
D. Vitamin D.

1.3 The chemical bond formed between two monosaccharides is called:

A. Glycosidic bond.
B. Glycolipid bond.
C. Peptide bond.
D. Glycophospholipid bond.

1.4 Which of the following classes of enzymes are popular in the food industry:

A. Transferases and Lyases.
B. Hydrolases and Oxidoreductases.
C. Isomerases and Ligases.
D. All of the above.

1.5 Which of the following enzymes is used in the meat industry:

A. Protease.
B. Lactase.
C. Amylase.
D. Pectinase.

1.6 Which of the following types of starch contributes to gel formation:

A. Amylopectin.
B. Amylose.
C. Pectin and amylose.
D. None of the above.

1.7 Which of the following food additives is an anti-oxidant:

A. Ascorbic acid.
B. Lecithin.
C. Benzoic acid.
D. Sulphur dioxide.

1.8 A lipid is said to be saponifiable if:

A. It can be converted into an emulsion.

B. It can be converted into a soap.

C. It can be converted into a gum.

D. All of the above.

1.9 Which of the following fatty acids will be more susceptible to lipid oxidation?

A. Octadecanoic acid.
B. 11-Octadecenoic acid.
C. Tetracosanoic acid.
D. 5, 8, 11, 14-Eicosatetraenoic Acid.

1.10 Which of the following enhances minerals bioavailability?

A. Phytic acid.
B. Organic acids.
C. Polyphenolic compounds.
D. All of the above.

QUESTION 2: TRUE/FALSE QUESTIONS **[10 MARKS]**

Evaluate the statements and select whether the statement is true or false. Write the word 'True' or 'False' next to the corresponding number on your ANSWER SHEET. [10]

2.1 Saturated fats are more prone to lipid oxidation.

2.2 Hydrolytic rancidity is the breakdown of a triacylglycerol by the addition of an acid.

2.3 Food additives are not considered nutritional even if they have some nutritive value.

2.4 Compared to iron, sodium is highly bioavailable.

2.5 Chlorophyll is more stable to heat in basic media compared to an acidic media.

2.6 Anthocyanins are highly stable.

2.7 The hydrogenation of oleic acid changes it to stearic acid.

2.8 A mixture of two substances that are capable of completely dissolving into one another is called a dispersion.

2.9 The enzyme Polyphenol Oxidase plays an important role in the enzymatic browing of fruits and vegetables.

2.10 Maltose is produced through the hydrolysis of starch by the enzyme β-Amylase.

SECTION B: SHORT/LONG ANSWER QUESTIONS [80 MARKS]

Please answer ALL of the questions in this section.

QUESTION 3 (30 MARKS)

3.1 Define the following terms:

a) Protein denaturation. (3)

b) Decarboxylation. (2)

c) Isoelectric point. (1)

d) Protein solubility. (1)

3.2 Outline any three (3) essential amino acids (3)

3.3 Identify three (3) key elements that make up an amino acid. (3)

3.4 Caramels play an important role in the food industry. Please answer the following questions:

a) Describe the process of caramelisation. (4)

b) What are caramels used for in the food industry? (2)

3.5 Justify the use of proteins as emulsifiers in the food industry. (4)

3.6 In which three states of water will we find water molecules in their monomolecular form? (1)

3.7 You are presented with a diagram of the structure of an unsaturated fatty acid. Explain how you would identify whether the double bonds present are in a *cis* or *trans* configuration. (2)

3.8 Fatty acids may be named according to the Delta and Omega nomenclatures respectively. Study the diagram of the fatty acid below and name it according to:

a) Delta nomenclature. (2)

b) Omega nomenclature. (2)

QUESTION 4 (30 MARKS)

4.1 In their order of occurrence, discuss the main stages of lipid oxidation. (8)

4.2 Apart from lipid oxidation, highlight any three (3) other chemical reactions that may lead to the deterioration of lipids. (3)

4.3 Identify the primary determinants of a fatty acid's melting point. (3)

4.4 What is *Lipid hydrogenation* and why is it employed in the food industry? (4)

4.5 Mention two non-enzymatic browning reactions involving carbohydrates. (2)

4.6 Differentiate between food fortification and food enrichment? (3)

4.7 People are cautioned against consuming a lot of processed foods. However, food processing companies remain in existence. Why is it necessary for these companies to continue operating? (4)

4.8 Suggest any three (3) methods that can be employed to reduce water activity. (3)

QUESTION 5 (20 MARKS)

5.1 Describe the physical and chemical properties of carotenoids. (7)

5.2 Discuss the impact of the *salting in* and *salting out* phenomena on protein solubility. (4)

5.3 State any three (3) major forces that stabilise protein structures. (3)

5.4 Identify the primary factors that contribute to food spoilage. (3)

5.5 A local entrepreneur who is into food processing approaches you for help on the use of food additives in his product. Using the Codex Alimentarius stipulations, how will you guide this individual? (3)

END OF QUESTION PAPER