UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

PROGRAMME	:	**FOOD SCIENCE, NUTRITION AND TECHNOLOGY YEAR II**
COURSE CODE	:	**FSNT 206**
TITLE OF PAPER	:	**FOOD CHEMISTRY**
TIME ALLOWED	:	**TWO (2) HOURS**
INSTRUCTIONS	:	**ANSWER QUESTION ONE (1) AND ANY OTHER TWO (2) QUESTIONS.**

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QUESTION 1 (COMPULSORY)

(a) Food can be described as a dispersion. What is a dispersion? Explain **three (3)** types of food dispersions. **(4 Marks)**

(b) List the **four (4)** main constituent of food. **(4 Marks)**

(c) The bond angle between the hydrogen atoms in a water molecule (H_2O) is 104.5°C and in methane (CH_4) the bond angle between two hydrogen atoms is 109.5°C. Explain why the bond angle is smaller in the water molecule than in methane while both molecules consist of sp3 hybridized orbitals. Include drawings in your answer.

(10 Marks)

(d) Draw the structure of oleic acid [C18:1 (9, cis)] **(8 Marks)**

(e) Draw the structure of maltose and name the glycosidic bond. **(5 Marks)**

(f) Explain the following:-

i. Why long chain fatty acids have higher melting points than short chain fatty acids?

ii. Why the melting points of fatty acids decreases with increase in the number of double bonds?

iii. Why "trans" isomers of fatty acids have higher melting points than "cis" isomers?

(9 Marks)

[TOTAL MARKS = 40]

QUESTION 2

(a) Explain the existence of hydrogen bridges (hydrogen bonding) between water molecules and also explain the low viscosity of water. **(6 Marks)**

(b) Show how lipase can cleave all three fatty acids from a triglyceride. Explain **two (2)** advantages and **one (1)** disadvantage of this enzyme in food. **(10 Marks)**

(c) Draw a structure of a dipeptide showing the peptide bond. **(6 Marks)**

(d) Name **four (4)** groups of naturally occurring colour compounds in plant foods. **(8 Marks)**

[TOTAL MARKS = 30]

QUESTION 3

(a) Autooxidation is a peroxidation reaction that proceeds in three steps. Explain the **three (3)** steps, using photoxidation as one of the steps and showing how free radicals are formed and react. **(10 Marks)**

(b) Explain the composition of starch stating the monosaccharide units and type of bonds between the units. **(12 Marks)**

(c) What compounds are formed in the following reactions? :-

a. Oxidation of glucose under mild conditions by Br_2/HO^-
b. Treatment of glucose with a strong oxidizing agent such as HNO_3

(8 Marks)

[TOTAL MARKS = 30]

QUESTION 4

(a) State **three (3)** effects of lipid hydroperoxides on protein. **(9 Marks)**

(b) Explain the Maillard reaction,and under what **two (2)** conditions does it occur in food? **(8 Marks)**

(c) What is interesterification and its importance in food? **(5 Marks)**

(d) What are proteolytic enzymes? Explain **two (2)** uses of these enzymes in food. **(8 Marks)**

[TOTAL MARKS = 30]