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) Discuss the composition of any **four (4)** food dispersions giving a food example in each case.

(8 Marks)

(b) Draw the electronic configuration of oxygen in a water molecule during hybridization, also draw the water molecule showing the sp3 hybridized orbitals and explain why the bond angle between the hydrogen atoms in the water molecule (H_2O) is 104.5°.

(6 Marks)

(c) Draw the structure of linolenic acid (9, 12, 15-Octadecatrienoic acid). What is the omega name of this fatty acid?

(8 Marks)

(d) Draw the structures of the following sugar molecules and name the glycosidic bond in the disaccharide sugars:-

i. α-D-Glucose (2 marks)
ii. α-D-Fructose (2 marks)
iii. Maltose (4 marks)
iv. Sucrose (4 marks)

(12 Marks)

(e) Explain how and why the chain length, degree of saturation and isomerization affect the melting point of fats.

(6 Marks)

[TOTAL MARKS = 40]

QUESTION 2

(a) Explain the composition of the following lipids:-
   i. Phospholipids
   ii. Glycolipids
   iii. Waxes

(6 Marks)

(b) Show the hydrolytic rancidity reaction catalyzed by lipase. Explain its effect on milk and during the production of cheese.

(11 Marks)

(c) Describe the photoxidation reaction mechanism that triggers lipid peroxidation.

(8 Marks)

(d) Show a reaction between two amino acid to form a peptide bond.

(5 Marks)

[TOTAL MARKS = 30]

QUESTION 3

(a) What is hydrogenation? Explain **two (2)** purposes of hydrogenation.

(6 Marks)

(b) Discuss the effect of heat on triglycerides leading to the formation of acrolein. Show the reaction resulting in the conversion of glycerol to acrolein.

(9 Marks)

(c) With the aid of a diagram, explain the composition of starch stating the monosaccharide units and type of bonds between the units.

(10 Marks)

(d) Explain the tertiary structure of proteins and name any **two (2)** forces involved in this structure.

(5 Marks)

[TOTAL MARKS = 30]

QUESTION 4

(a) Briefly discuss the following functional properties of proteins:-

i. Emulsification and foaming
ii. Gelation
iii. Dough formation

(12 Marks)

(b) What is Maillard browning reaction? List **three (3)** conditions that favour the reaction.

(6 Marks)

(c) Briefly explain the practical application of any **one (1)** enzyme under each of the following categories:-

i. Sugar transformation
ii. Acylglycerol restructuring (inter- / intraesterification)
iii. Milk clotting

(6 Marks)

(d) Explain the acid-base properties of amino acids.

(6 Marks)

[TOTAL MARKS = 30]