



2ND SEM. 2013/14

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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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GRANTED BY THE CHIEF INVIGILATOR**

QUESTION 1 (COMPULSORY)

- (a) Describe the following food dispersions and give **one (1)** food example in each case:-
- Water-in-oil emulsion
 - Gel
 - A solution
- (6 Marks)**
- (b) Draw a water molecule showing the sp^3 hybridized orbitals and explain why the bond angle between the hydrogen atoms in the water molecule (H_2O) is 104.5° .
- (5 Marks)**
- (c) Draw the structure of linolenic acid (6, 9, 12-Octadecatrienoic acid). What is the omega name of this fatty acid?
- (7 Marks)**
- (d) Draw the structures of the following sugar molecules and name the glycosidic bond in the disaccharide sugars:-
- α -D-Glucose (3 marks)
 - β -D-Galactose (3 marks)
 - Maltose (4 marks)
 - Cellobiose (4 marks)
 - Sucrose (4 marks)
- (18 Marks)**
- (e) Explain the following:-
- Why long chain fatty acids have higher melting points than short chain fatty acids?
 - Why the melting points of fatty acids decreases with increase in the number of double bonds?

(4 Marks)

[TOTAL MARKS = 40]

QUESTION 2

- (a) Draw the 3 dimensional network structure of water and explain why water has low viscosity.
(6 Marks)
- (b) Show how lipase can cleave all three fatty acids from a triglyceride. Explain two (2) disadvantages and one (1) advantage of this enzyme in food.
(9 Marks)
- (c) Describe the role of fat in the following baked products:-
i. Pastry
ii. Cake
iii. Bread
(9 Marks)
- (d) Name three (3) groups of naturally occurring colour compounds in plant foods.
(6 Marks)

[TOTAL MARKS =30]

QUESTION 3

- (a) Explain the following protein structures:-
i. Primary structure
ii. Secondary structure
(4 Marks)
- (b) Describe the effect of the following agents on protein denaturation:-
i. Change in temperature
ii. Hydrostatic pressure
iii. pH
(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.
(12 Marks)
- (d) What are the effects of the presence of the following minerals in food?
i. Copper and iron in fatty foods
ii. Calcium in cheese
(5 Marks)

[TOTAL MARKS = 30]

QUESTION 4

- (a) Describe the structure, properties and uses of cyclodextrins.
(7 Marks)
- (b) What is Maillard browning reaction and list **three (3)** conditions that favour the reaction?
(9 Marks)
- (c) Explain the action of the following enzymes:-
i. α -Amylase on starch
ii. β -Amylase on starch
iii. Glucose isomerase on glucose
(9 Marks)
- (d) Oxidation of D-glucose results in the production of D-glucono- δ -lactone. What is the food application of D-glucono- δ -lactone?
(5 Marks)

[TOTAL MARKS = 30]