2ND SEM. 2016/17

UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

PROGRAMME	:	FOOD SCIENCE, NUTRITION AND TECHNOLOGY YEAR II
COURSE CODE	:	FNS 102
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) Describe the following food dispersions and give **one (1)** food example in each case.

i. A solution

ii. Gel

iii. Colloidal suspension

(6 Marks)

(b) Draw the electronic configuration of the oxygen atom and show how the Sp3 hybrid orbitals are formed and also draw the water molecules and explain why the bond angle between the hydrogen atoms is 104.5°.

(9 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 structure of the following sugars and name the glycosidic bond in the disaccharide sugars.

i. α-D-Glucose
ii. β-D-Galactose
iii. Maltose
iv. Cellobiose

(14 Marks)

(e) Explain the following:-

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

ii. Why do the melting points of fatty acids decrease 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 sugar 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) What is an emulsion? Explain the two (2) types of emulsions giving an example in each case.

(8 Marks)

(b) What is the Maillard browning reaction and list **three (3)** conditions that favours 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.

(4 Marks)

[TOTAL MARKS = 30]