2ND SEM. 2017/18

UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

PROGRAMME	:	FOOD SCIENCE, NUTRITION AND TECHNOLOGY LEVEL I
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 giving **one (1)** example in each case.

i. Water-in-oil emulsion **(3 Marks)**
ii. Oil-in-water emulsion **(3 Marks)**

(b) Draw the electronic configuration of the carbon atom and show how the sp2 hybrid orbitals are formed and also using a diagram explain how a double bond is formed through sp2 hybridization between two carbon atoms in unsaturated fatty acids. **(14 Marks)**

(c) Draw the structure of linolenic acid (9, 12, 15-Octadecatrienoic acid). What is the omega name of this fatty acid? **(6 Marks)**

(d) Draw the structure of the following sugars and name the glycosidic bond in the disaccharide sugars.

i. β-D-Glucose **(3 Marks)**
ii. β-D-Galactose **(3 Marks)**
iii. Maltose **(4 Marks)**
iv. Lactose **(4 Marks)**

[TOTAL MARKS = 40]

QUESTION 2

(a) Discuss the following classes of lipids:-

i. Simple or true fats **(7 Marks)**
ii. Waxes **(5 Marks)**

(b) Draw the 3 dimensional network structure of water and explain why water has low viscosity. **(6 Marks)**

(c) Explain the following:-

i. Why do long chain fatty acids have higher melting points than short chain fatty acids? **(4 Marks)**
ii. Why do the melting points of fatty acids decreases with increase in the number of double bonds? **(4 Marks)**

(d) Describe the role of fat in pastry baked products. **(4 Marks)**

[TOTAL MARKS = 30]

QUESTION 3

(a) Explain the following protein structures:-

i. Primary structure **(3 Marks)**
ii. Secondary structure **(3 Marks)**

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

i. Emulsification and foaming **(4 Marks)**
ii. Gelation **(4 Marks)**
iii. Dough formation **(4 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)**

[TOTAL MARKS = 30]

QUESTION 4

(a) 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)**

(b) What is the Maillard browning reaction? List **three (3)** conditions that favours the reaction **(9 Marks)**

(c) Explain the action of the following enzymes:-

i. α-Amylase on starch **(3 Marks)**
ii. β-Amylase on starch **(3 Marks)**
iii. Glucose isomerase on glucose **(3 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? **(3 Marks)**

[TOTAL MARKS = 30]