110

2ND SEM. 2015/16

UNIVERSITY OF SWAZILAND

SUPPLEMENTARY 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) Explain the composition of the following food dispersions giving an example in each case:-

i. Emulsion **(4 Marks)**
ii. Solution **(3 Marks)**
iii. Colloidal suspension **(3 Marks)**

(b) What is water activity (A_w)? Explain how the water activity of food can be reduced. **(8 Marks)**

(c) Water molecules form a three dimensional network structure. Draw the structure and explain how this structure is formed. **(6 Marks)**

(d) Draw the chemical structure of α-D-glucose using the Haworth projection. **(3 Marks)**

(e) What monosaccharide sugar units are present in lactose? Draw structure and name the bond between the sugar units: **(8 Marks)**

(f) Why is the halogen addition reaction important in fat and oil analysis? Show the chemical reaction **(5 Marks)**

[TOTAL MARKS = 40]

QUESTION 2

(a) Show reaction of glycerol and fatty acid molecules to form monoglyceride, diglyceride and triglyceride. **(9 Marks)**

(b) What is hydrogenation and its purpose in fat and oil processing? Show the reaction mechanism. **(14 Marks)**

(c) Fats can exist in **four (4)** different crystal forms. What is this phenomenon called? Explain the different forms. **(7 Marks)**

[TOTAL MARKS = 30]

QUESTION 3

(a) Show the chemical hydrolysis reaction of triglycerides when treated with potassium hydroxide (KOH). **(8 Marks)**

(b) Unsaturated fatty acids have double bonds. Explain how a double bond is formed between two carbon atoms. **(12 Marks)**

(c) What products of industrial use are produced by the reduction reaction of sugars to alcohol? Show the reaction. What are these products used for? **(6 Marks)**

(d) Show how two amino acids react to form a peptide bond. **(4 Marks)**

[TOTAL MARKS = 30]

QUESTION 4

(a) Explain photoxidation initiation reactions in autoxidation resulting in the formation of hydroperoxides. Show reaction mechanism. **(12 Marks)**

(b) Name the following free radicals formed during lipid peroxidation:- **(10 Marks)**

i. $R^{\bullet}$
ii. $ROO^{\bullet}$
iii. $RO^{\bullet}$
iv. $HO^{\bullet}$
v. $^{1}O_{2}^{-}$

(c) Explain what takes place during lipoxygenase catalyzed lipid peroxidation, without going into details of the reaction mechanism. **(8 Marks)**

[TOTAL MARKS = 30]