UNIVERSITY OF SWAZILAND

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

i. Emulsion
ii. Form
iii. Colloid

(9 Marks)

(b) What is water activity (A_w)? Give **three (3)** reasons why it is an important parameter in food? **(8 Marks)**

(c) Water molecules form a three dimensional network structure. Draw the structure and explain how this structure is formed. **(8 Marks)**

(d) Draw the chemical structure of α-D-glucose using the Haworth projection. **(5 Marks)**

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

(f) Distinguish between pentose and hexose sugars. **(5 Marks)**

[TOTAL MARKS = 40]

QUESTION 2

(a) Draw a structure showing how two fatty acids come together to form a dimer molecule.

(6 Marks)

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

(c) Fatty acids in triacylglycerol are cleaved by lipase. What is the significance of this reaction in food? Show the reaction on how the three fatty acids can be cleaved by lipase. **(10 Marks)**

(d) Explain three (3) ways to lower the water activity of food. **(6 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. **(6 Marks)**

(c) What products of industrial use are produced by the reduction reaction of sugars to alcohol? What are these products used for? **(8 Marks)**

(d) What are antioxidants? Show how antioxidants can scavenge peroxy and alkoxy free radicals. **(8 Marks)**

[TOTAL MARKS = 30]

QUESTION 4

(a) Explain **four (4)** initiation reactions in autoxidation without going into details of the reaction mechanism. **(12 Marks)**

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

i. $R^{\bullet}$
ii. $ROO^{\bullet}$
iii. $RO^{\bullet}$
iv. $HO^{\bullet}$

(8 Marks)

(c) Explain what takes place during lipoxygenase catalyzed lipid peroxidation, without going into details of the reaction mechanism. **(10 Marks)**

[TOTAL MARKS = 30]