



2ND SEM. 2018/19

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UNIVERSITY OF ESWATINI

FINAL EXAMINATION PAPER

PROGRAMME : **FOOD SCIENCE, NUTRITION AND TECHNOLOGY LEVEL I**

COURSE CODE : **FNS102**

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 following food dispersions giving a food example in each case.
- i. Solution (4 Marks)
 - ii. Colloidal suspension (3 Marks)
 - iii. Gel (4 Marks)
 - iv. Emulsion (5 Marks)
- (b) Draw the electronic configuration of the oxygen atom in the water molecule and explain how the sp^3 hybrid orbitals are formed, why the bond angle in water is 104.5° and why is the water molecule it is polar. (12 Marks)
- (c) Draw the structures of the following sugar molecules and name the glycosidic bond in the disaccharide sugars:-
- i. α -D-Glucose (2 Marks)
 - ii. α -D-Fructose (2 Marks)
 - iii. Maltose (4 Marks)
 - iv. Sucrose (4 Marks)

[TOTAL MARKS = 40]**QUESTION 2**

- (a) Explain the composition of the following lipids:-
- i. True fats or simple fats (7 Marks)
 - ii. Phospholipids (2 Marks)
 - iii. Glycolipids (3 Marks)
 - iv. Waxes. (2 Marks)
- (b) 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)
- (c) Explain two (2) purposes of hydrogenation:- (4 Marks)
- (d) Explain the role of proteins in dough formation (4 Marks)

[TOTAL MARKS = 30]

QUESTION 3

- (a) Describe the photooxidation reaction mechanism that triggers lipid peroxidation (8 Marks)
- (b) Show a reaction between two amino acids to form a peptide bond. (5 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) Explain the acid-base properties of amino acid. (5 Marks)

[TOTAL MARKS = 30]

QUESTION 4

- (a) Discuss the effect of heat on triglycerides leading to the formation of acrolein. Show the reaction resulting in the conversion of glycerol to acrolein. (9 Marks)
- (b) Briefly discuss the following functional properties of proteins:-
i. Emulsification and foaming (6 Marks)
ii. Gelation (6 Marks)
- (c) What is Maillard browning reaction and list **three (3)** conditions that favour the reaction? (6 Marks)
- (d) Briefly explain the practical application of acylglycerol restructuring (inter- / intraesterification) enzymes. (3 Marks)

[TOTAL MARKS = 30]