

UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF AGRICULTURAL, EARTH & ENVIRONMENTAL SCIENCES
DISCIPLINE OF DIETETICS & HUMAN NUTRITION
EXAMINATIONS: NOVEMBER 2012
SUBJECT, COURSE & CODE: FOOD SCIENCE 120, INTRODUCTION TO FOOD
SCIENCE, P2

DURATION: 3 HOURS

TOTAL MARKS: 120

External Examiner: Prof F. J. Veldman
Internal Examiner: Dr M. Siwela

NOTE: This paper consists of six (6) pages, Please see that you have them all.

INSTRUCTIONS

1. Section A is **compulsory**. This section carries 20 marks.
2. There are six (6) questions in Section B; each question carries 25 marks. Answer any **four (4)** questions in Section B.
3. Use clearly labeled diagrams where necessary.

SECTION A is COMPULSORY

QUESTION 1

- 1.1 State the difference between precision and accuracy. (2)
- 1.2.1 (a) Name the overall reaction that occurs between a carbohydrate and a protein resulting in development of aroma and browning in a beef sausage when it is being fried. (1)
- (b) State one (1) disadvantage of the occurrence of the reaction named in (a). (1)
- 1.2.2 What is the effect of the following on the rate of reaction named in 1.2.1:
- (a) frying the sausage in a copper pan;
- (b) Sodium metabisulphite;
- (c) Low (acidic) pH; (3x1= 3)
- 1.4.1 Name the overall reaction that occurs when a low moisture content table sugar (sucrose) is heated at a temperature above 100°C. (1)
- 1.4.2 Name one (1) substance that is a common product of the reactions named in 1.2.1 and 1.4.1. (1)

UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF AGRICULTURAL, EARTH & ENVIRONMENTAL SCIENCES
DISCIPLINE OF DIETETICS & HUMAN NUTRITION
EXAMINATIONS: NOVEMBER 2012
SUBJECT, COURSE & CODE: FOOD SCIENCE 120, INTRODUCTION TO FOOD
SCIENCE, P2

- 1.4.3 List two (2) flavor substances found in roasted coffee, which are products of the reaction named in 1.4.1, but exclude the substance named in 1.4.2. (1)
- 1.5 Name one (1) monosaccharide found in fruits and one (1) oligosaccharide found in legumes. (2)
- 1.6 Give one (1) example of each: a protein-based and a fat-based fat replacement. (2)
- 1.7 Why is it necessary to reduce the amount of leavening in a cake recipe when baking at a very high altitude (height above sea level)? (2)
- 1.8 You are given gelatine, which is in granular form, to use to set a hot fruit extract into a fruit jelly. Explain briefly the preparation steps you would follow to set the fruit extract into a jelly. (3)
- 1.9 In terms of shortening content, what is the difference between short crust pastry and flaky pastry? (1)

[20]

UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF AGRICULTURAL, EARTH & ENVIRONMENTAL SCIENCES
DISCIPLINE OF DIETETICS & HUMAN NUTRITION
EXAMINATIONS: NOVEMBER 2012
SUBJECT, COURSE & CODE: FOOD SCIENCE 120, INTRODUCTION TO FOOD
SCIENCE, P2

SECTION B

ANSWER FOUR (4) QUESTIONS FROM THIS SECTION

QUESTION 2

- 2.1 Draw the basic chemical structure of a saturated fatty acid. (2)
- 2.2 Describe the chemical structure of a fat/oil molecule. (2)
- 2.3 State one (1) specific sources of commercial fats and oils. (1)
- 2.4 Give an outline of reaction steps that may occur when anhydrous (does not contain water) cooking oil is heated to a temperature above 100°C in a pan with the lid off. (15)
- 2.5 List five (5) types of substances (excluding water) present in oil that has undergone hydrolytic deterioration. (5)

[25]

QUESTION 3

- 3.1 Define a foam as a food system, and give two (2) examples of food Foams, **excluding** milk foams. (4)
- 3.2 State four (4) ways by which you would increase the stability of milk foams. (4)
- 3.3 Explain how you would **experimentally** demonstrate that there are two types of emulsions: oil-in-water (O/W) emulsion or water-in-oil emulsion (W/O). (6)
- 3.4 Cake batter is a complex food system. Justify the statement by identifying four (4) food systems present in the cake batter. (4)
- 3.5 Identify two (2) food systems in *inkomasi*, a South African commercial soured milk product. (2)
- 3.6 List three (3) materials or substances that stabilise mayonnaise. (3)
- 3.7 Give the name of one (1) animal-fat shortening available in the South African food market and state its fat composition. (2)

[25]

UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF AGRICULTURAL, EARTH & ENVIRONMENTAL SCIENCES
DISCIPLINE OF DIETETICS & HUMAN NUTRITION
EXAMINATIONS: NOVEMBER 2012
SUBJECT, COURSE & CODE: FOOD SCIENCE 120, INTRODUCTION TO FOOD
SCIENCE, P2

QUESTION 4

4.1 Draw the basic chemical structure of an amino acid, which is not in the ionic form. (4)

4.2.1 Name three (3) types of forces that hold the protein molecules together in egg white. (3)

4.2.2 One of the types of forces named in 4.2.1 is likely to be broken and reformed between the protein molecules when egg white is beaten into a foam. Name this type of force. (1)

4.3.1 State any two (2) benefits of processing **protein-containing** foods at moderate temperatures (<100°C). (2)

4.3.2 State three (3) undesirable changes that may occur to meat proteins when the meat is grilled. (3)

4.4.1 List four (4) functions of water in food processing. (4)

4.4.2 List four (4) negative effects of water on food quality. (4)

4.4. Without reducing the water content and without heating the food, explain how you would reduce the spoilage of freshly cut cabbages and fresh meat due to the activity of enzymes found in these foods when they are stored at room temperature (about 25°C). (2)

4.5 State one (1) way by which you would soften “temporary hard water”. (2)

[25]

UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF AGRICULTURAL, EARTH & ENVIRONMENTAL SCIENCES
DISCIPLINE OF DIETETICS & HUMAN NUTRITION
EXAMINATIONS: NOVEMBER 2012
SUBJECT, COURSE & CODE: FOOD SCIENCE 120, INTRODUCTION TO FOOD
SCIENCE, P2

QUESTION 5

- 5.1.1 Give an outline of the biochemical reactions that lead to the browning of cut apples. (8)
- 5.1.2 State two (2) ways to reduce or prevent the occurrence of reactions outlined in 5.1.1 (2)
- 5.1.3 State two (2) cases whereby the browning of plant food due to biochemical reactions is desirable. (2)
- 5.2.1 You are provided with a large piece of a tough, fresh meat and a meat tenderizing enzyme, which is in powder form. Give an outline of an experiment you would perform in a Food Preparation laboratory to show that the meat tenderizing enzyme is negatively affected by heat. State the expected results. (6)
- 5.2.2 State two (2) conditions that would promote the activity of the meat tenderising enzyme. (2)
- 5.3 State two (2) reasons why it would be better to obtain an enzyme for processing cheese from microorganisms than from the stomach wall of a pig. (2)
- 5.4 List at least three (3) functional properties of food proteins. (3)
- [25]

QUESTION 6

- 6.1.1 List two (2) uncooked, milled maize products available in the South African food market. (2)
- 6.1.2 What is the nutritional advantage of parboiled rice? (1)
- 6.1.3 State any two (2) advantages of marketing maize in the form of corn flakes. (2)
- 6.2 With reference to the chemical/nutritional composition of cereal grains, justify the statement "Cereal grains are a very important food source". (20)
- [25]

UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF AGRICULTURAL, EARTH & ENVIRONMENTAL SCIENCES
DISCIPLINE OF DIETETICS & HUMAN NUTRITION
EXAMINATIONS: NOVEMBER 2012
SUBJECT, COURSE & CODE: FOOD SCIENCE 120, INTRODUCTION TO FOOD
SCIENCE, P2

QUESTION 7

Write short notes on plant food polysaccharides. The notes should contain **only**:
classification of the polysaccharides and their functional properties (their contribution to
food quality, **excluding** nutritional quality and safety). [25]