

UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF AGRICULTURAL, EARTH AND ENVIRONMENTAL SCIENCES
EXAMINATIONS: DECEMBER 2016
COURSE NAME AND COURSE CODE: INTRODUCTION TO FOOD SCIENCE
(FSCI 120)

DURATION: 3 HOURS

TOTAL MARKS: 120

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Internal Moderator: Dr. A. van Onselen

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

QUESTION 1 (THIS QUESTION IS COMPULSORY)

1.1.1	What is water activity?	(1)
1.1.2	What is the effect of freezing the water in the food on the water activity of the food?	(1)
1.1.3	State one (1) food preparation technique that takes advantage of the high specific heat capacity of water.	(2)
1.2.1	Besides imparting sweetness, what is the function of a sweetener that is added on the top surface of a cake?	(1)
1.2.2	Suggest one (1) of a vegetable gum added to mayonnaise, but not its contribution to the desired viscosity of mayonnaise.	(2)
1.3	State any two (2) possible advantages of commercial plant fats/oils over animal fats/oils when used in food processing.	(2)
1.4	List two (2) types of undesirable substances that can be found in food.	(2)
1.5	After consuming cooked, dried beans, a person feels a stomach discomfort. Name two (2) carbohydrates that might have caused this discomfort.	(2)
1.6	Name one (1) type of nutrient/s found in the aleurone layer of the cereal grain.	(1)

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1.7	Give an example of a shortening and a fat-based fat replacer, but not olestra	(2)
1.8	What are the major differences, in composition and texture, between short crust pastry and flaky pastry?	(2)
1.9.1	State two (2) techniques that can be used to control the Maillard reaction while grilling meat.	(1)
1.9.2	Give one (1) reason for controlling the Maillard reaction.	(1)
	TOTAL MARKS	[20]

SECTION B

ANSWER ANY FOUR (4) QUESTIONS FROM THIS SECTION.

QUESTION 2

- 2.1 Discuss the general properties of a good quality fat replacement. (10)
- 2.2 Give an outline of reaction steps of the deterioration of an oil while stored in a glass bottle placed in a kitchen cupboard. There is **no** water and enzymes in the oil. (15)
- TOTAL MARKS [25]**

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QUESTION 3

- 3.1 Define protein denaturation. (2)
- 3.2 Protein denaturation may contribute positively or negatively to food quality. Give one (1) example for each whereby protein denaturation may contribute **positively** and **negatively** to food quality. (4)
- 3.3 State one (1) technique that can be used to increase the rate of activity of a powered meat tenderizing enzyme, which was stored in a fridge, and has to be applied on a piece of beef steak. (2)
- 3.4 State two (2) techniques for preventing the browning of freshly cut potatoes. (4)
- 3.5 List any four (4) essential amino acids. (4)
- 3.6 State any two (2) differences between gelatine protein and gluten proteins. (2)
- 3.7 How does mixing a legume and a cereal grain improve the protein quality of the food? (2)
- 3.8 State three (3) undesirable and two (2) desirable changes that may occur in proteins when they are heated at a temperature above 100°C. (5)
- TOTAL MARKS [25]

QUESTION 4

- 4.1.1 Give two (2) types of micronutrients found in the germ/embryo. (2)
- 4.1.2 What is the nutritional advantage of brown rice compared to white rice? (1)
- 4.1.3 State any two (2) advantages of marketing maize in the form of maize snacks compared to fresh maize on the cobs. (2)
- 4.2 With reference to the chemical/nutritional composition of cereal grains, justify the statement "Cereal grains are a very important food source". (20)
- TOTAL MARKS [25]

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QUESTION 5

- 5.1 Use notes below and other information to classify carbohydrates commonly found in food. (8)
- Monosaccharides differ in number of carbon atoms they contain;
- carbohydrates differ in number of monosaccharide units they contain;
-polysaccharides are either a main source of energy for humans or they are not a source of energy for humans;
-carbohydrates differ in their solubility in water at room temperature (about 25°C).
- 5.2 Name the reaction and outline the reaction steps (chemical structures are not necessary) which will occur when dry table sugar (granular sucrose) is heated at temperatures above 100°C in acidic or alkaline conditions, in the absence of nitrogen-containing substances (i.e. no proteins, amino acids, peptide, ammonia, etc). Name at least two (2) compounds formed from this reaction. (12)
- 5.3 State the effect of dry heat, moisture heat and weak acid, separately, on starch. (3)
- 5.4 (a) How would you reverse the firmness of bread that has been stored in a refrigerator? (1)
(b) What could have caused the bread to become firm? (1)
- TOTAL MARKS [25]

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QUESTION 6

- 6.1.1 State one (1) advantage and (one) disadvantage of having water in the form of ice in plant foods. (2)
- 6.1.2 State two (2) functions of water in food preparation/processing? (2)
- 6.1.3 How would you lower the melting point of water so that it is more effective in setting a dessert? (1)
- 6.1.4 (a) Which of the two, jam and fresh preservative-free chicken, has a lower water activity, and why? (2)
(b) How would you reduce the water activity of fresh beef steak? (2)
(c) Why is it necessary to reduce the water of the fresh meat? (2)
- 6.2 Explain the composition and properties of the three (3) types of baking powders. Chemical reactions are **not** necessary in the answer. (9)
- 6.3 State one (1) advantage and one (1) disadvantage of using yeast to expand bread. (2)
- 6.4 State the three (3) main bread making operations/steps. (3)

TOTAL MARKS [25]

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QUESTION 7

- 7.1 List three (3) endogenous (naturally found in) chemical components of white bread wheat flour and state the contribution of each of the chemical components to the quality of bread. (6)
- 7.2.1 Explain briefly how you would obtain wet gluten from a known amount (weight) of bread flour. (3)
- 7.2.2 Write an equation for calculating the yield of wet gluten as a percentage of the original weight of the bread flour from which it was obtained. (2)
- 7.2.3 What is the importance of gluten in dough quality and the quality of baked products? (2)
- 7.3.1 State any one (1) difference between short crust pastry and choux pastry. (1)
- 7.3.2 Explain briefly how you would make Choux pastry/paste in the Food Preparation Laboratory. Basic ingredients should be listed, but ingredient quantities are not necessary in the answer. Baking temperature and mixing and baking times are not necessary in the answer. (6)
- 7.4 State two (2) techniques you would use to prevent short crust pastry becoming soggy when high moisture fillings are loaded into it. (4)
- 7.5 Give one product made with choux pastry. (1)
- TOTAL MARKS [25]