

UNIVERSITY OF KWAZULU-NATAL
SCHOOL OF AGRICULTURAL, EARTH & ENVIRONMENTAL SCIENCES
DISCIPLINE OF DIETETICS AND HUMAN NUTRITION
MAIN EXAMINATION: JUNE 2016
SUBJECT, COURSE & CODE: FURTHER CONCEPTS IN FOOD SCIENCE
(FSCI 210)

DURATION: 3 HOURS

TOTAL MARKS: 120

Internal Moderator:

Dr A. van Onselen

Internal Examiner:

Dr M. Siwela

NOTE: THIS PAPER CONSISTS OF SEVEN (7) 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 and there is a choice from SECTION B

SECTION A is COMPULSORY

QUESTION 1

- 1.1 State two (2) differences in nutritional value between egg protein and maize protein. (2)
- 1.2 State two (2) methods of preserving fish. (2)
- 1.3 Name the substance largely responsible for the smell of rotten eggs. (1)
- 1.4 What is the effect of pasteurization on microbial spores? (1)
- 1.5 List two (2) types of undesirable substances naturally occurring in legumes, **excluding carbohydrate types**. (2)
- 1.6 Name one pathogenic bacterial genus that can grow in poultry products. (1)

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- 1.7 Name the compound responsible for the greenish-blue colour on the surface of the egg yolk of a hard-boiled egg. State one (1) technique for minimizing the formation of this compound. (3)
- 1.8 Name two (2) carbohydrates responsible for flatulence (gaseous discomfort) of dry beans. State one (1) way you would process dry beans to reduce their flatus effect. (3)
- 1.9 What is the likely colour of anthocyanin-containing fruit juice that has been diluted with acidic water? (1)
- 1.10 Astringency has been detected in cocoa. What substance is likely responsible for the astringency? (1)
- 1.11 What is the likely effect of over-manipulation on the texture of a leafy vegetable salad? (1)
- 1.12 Why is it critical to prevent potatoes sprouting during storage? (1)
- 1.13 What is the main food application of waxy potatoes? (1)

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SECTION B

ANSWER ANY FOUR (4) QUESTIONS FROM THIS SECTION

QUESTION 2

2.1 Write the key points of a lecture you will give on the topic “Reasons for the consumer trend to shift from animal protein to vegetable/plant protein.” (10)

2.2.1 Briefly explain the attractive characteristics of soya bean as a food, and name one soya product on the market. (5)

2.2.2 Give **at least two (2)** ingredients used in the production of each of the following types of food analogues: meat analogues; seafood analogues; egg analogues; and milk analogues. (10)

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QUESTION 3

3.1. Write short notes of a lecture you would give on changes in myoglobin that affect the colour of meat and a sausage preserved with sodium nitrite. (10)

3.2 Write the different ways of classifying fish giving specific examples of fish fitting in the different classes. (11)

3.3 Given that the meat: bone ratio of chicken is 2:1, calculate the weight of chicken (meat and bones) that should be cooked in order to obtain 750 g of meat. Show calculations. (4)

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QUESTION 4

4.1 With reference to chemical composition, justify the recommendation that people should include vegetables in their diet. (10)

4.2. Comment on the changes that may occur in chlorophyll when vegetables are cooked in water (consider water that is either basic or acidic). (4)

4.3.1. What are the primary compounds responsible for the strong flavour of vegetables of the *Brassica/Cruciferae*/Mustard and the *Allium/Lily* families? (2)

4.3.2 What is the effect of heat on the compounds named in 4.3.1? (2)

4.3.3 State how you would cook these vegetables (of the *Brassica/Cruciferae*/Mustard and the *Allium/Lily* families) to reduce the strong flavour. (2)

4.4 Answer the question by writing a-e in your book and giving the corresponding vitamin activity of the carotenoid pigments listed in Table 1 below. (5)

Table 1. Fruit and vegetable carotenoid pigments

Pigment type	example	Colour	Vitamin A activity (%)
Carotenes	β -carotene	Red/orange	(a)
	α -carotene	Red/orange	(b)
	Lycopene	Red	(c)
Xanthophylls	Cryptoxanthin	yellow	(d)
	Lutein	yellow	(e)

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QUESTION 5

5.1 Explain the principles of food preservation by:

5.1.1 Ohmic heating; (3)

5.1.2 Freezing (4)

5.1.3 Pasteurization (4)

5.2 After a celebration party in a rural setting where there is neither electricity nor refrigeration facilities the following food materials are **left overs**:

-Fresh milk

-Small amounts of fermented milk (amasi) and yoghurt

-Fresh meat

-Fresh leafy vegetables

-Spices and vinegar

-Salt

Explain and discuss how you would prevent spoilage of the fresh meat, leafy vegetables and milk using resources that are typically found in a rural setting and if possible, also using some of the leftover food materials. Identify the preservation factor/s in each case. (9)

5.3.1 Explain the concept of “combination processing/hurdle technology” in food preservation. (3)

5.3.2 State two (2) preservation hurdles that can be applied to preserve a fruit juice without heating it. (2)

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QUESTION 6

6.1 Draw Table 2 below and write answers for the questions represented by a question mark (?). Marks allocated for each question (?) are indicated in brackets. (15)

Table 2. Characteristics, chemistry, and composition of types of tea

Process or Characteristic	<u>Type of Tea</u>		
	Green	Oolong	Black
<i>Colour of leaves</i>	Green	? (1)	? (1)
<i>Enzymatic oxidation of phenolic compounds (fermentation)</i>	? (1)	Slightly	Very much
<i>Aroma</i>	? (2)	Moderate	? (2)
<i>Taste</i>	? (2)	In between	? (2)
<i>Caffeine bitterness effect</i>	? (2)	Slightly modified	? (2)

6.2.1 Name the substances that are largely responsible for the flavour and colour of black tea. (3)

6.2.2 Name one (1) nutrient found in cocoa. (1)

6.2.3 What are the substances responsible for the potential health benefits of the herbal tea rooibos? (1)

6.2.4 Explain the difference between green tea, black tea and oolong tea in terms of processing. (3)

6.2.5. What is the effect of lemon juice on the colour of black tea? (2)

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QUESTION 7

7.1 Name one (1) egg protein that has the foaming properties. (1)

7.2 Describe the changes that occur in an egg as it deteriorates during storage in warm conditions in its shell. (15)

7.3 Describe and explain to a commercial egg trader how to store and preserve eggs in their shells to ensure their optimum quality. Explain the scientific basis of the storage and preservation methods described and explained. (9)

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