

**UNIVERSITY OF KWAZULU-NATAL**  
**SCHOOL OF AGRICULTURAL, EARTH & ENVIRONMENTAL SCIENCES**  
**DISCIPLINE OF DIETETICS AND HUMAN NUTRITION**  
**MAIN EXAMINATION: JUNE 2014**  
**SUBJECT, COURSE & CODE: FURTHER CONCEPTS IN FOOD SCIENCE**  
**(FSCI 210)**

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**DURATION: 3 HOURS**

**TOTAL MARKS: 120**

**External Examiner:**

Mrs A. van Onselen

**Internal Examiner:**

Dr M. Siwela

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**NOTE: THIS PAPER CONSISTS OF SEVEN (7) PAGES, PLEASE SEE THAT YOU HAVE THEM ALL.**

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**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**

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**SECTION A is COMPULSORY**

**QUESTION 1**

- 1.1 List two (2) nutrients found in egg yolk. (2)
- 1.2 State two (2) processes by which fish oil spoils. (2)
- 1.3 Give a reason for the recommendation that spices be added when preparing fish (1)
- 1.4 State one (1) possible difference in the microbiological content of pasteurized milk and sterilized milk. (1)
- 1.5 State one (1) reason for using a substitute of each of the following: milk; egg; meat. (3)
- 1.6 Name the common microbial pathogen that grows in poultry products. (1)
- 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 you would use to minimize the formation of this compound when preparing a hard-boiled egg. (3)
- 1.8 Name one (1) carbohydrate responsible for the flatus effect (gaseous discomfort) of dry beans. State one (1) way you would process dry beans to reduce their flatus effect. (2)
- 1.9 What is the likely colour of anthocyanin-containing fruit juice that has been diluted with alkaline water? (1)
- 1.10 Astringency has been detected in cocoa. What substance may be responsible for the astringency? (1)
- 1.11 Give one (1) reason why salads should be handled minimum during their preparation. (1)
- 1.12 What is the health risk associated with sprouting of potatoes? (1)
- 1.13 What is the main difference in chemical composition between floury and waxy potatoes? (1)

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**SECTION B**

**ANSWER ANY FOUR (4) QUESTIONS FROM THIS SECTION**

**QUESTION 2**

2.1 State at least five (5) properties you would consider when choosing a plant material as alternative protein source to animals. (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 Briefly discuss plant and microbial unconventional sources of protein you have studied. (10)

**[25]**

**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 4.4 below. (5)

**Table 4.4.** Fruit and vegetable carotenoid pigments

<b>Pigment type</b>	<b>example</b>	<b>Colour</b>	<b>Vitamin activity(%)</b>	<b>A</b>
Carotenes	$\beta$ -carotene	Red/orange	(a)	
	$\alpha$ -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 fermentation; (4)

5.1.2 drying (dehydration); (4)

5.1.3 sterilisation. (3)

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 save the fresh meat, leafy vegetables and milk from spoilage 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. (2)

5.3.2 State any three (3) preservation hurdles that can be applied to preserve a sausage. (3)

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**QUESTION 6**

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

6.1.2 Name one (1) flavour substance that is absent in herbal teas but is found in traditional (usual) teas. (1)

6.1.3 What substances with potential health benefits are found in herbal teas? (1)

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

6.1.5 (a) What are the substances largely responsible for the brown (copper-red) colour of black tea? (1)

(b) How you would lighten the colour of the black tea during brewing. (1)

6.2 You have three coffee types, Ethiopian coffee, Kenyan coffee and South African coffee. Design an experiment you would perform to rate the overall acceptability of these coffee types to medical doctors working in KwaZulu-Natal hospitals. Explain the experimental design under the following headings:

Experimental design

(i) Sensory evaluation method/test (2)

(ii) Number of panellist/subject medical doctors (2)

(iii) Maximum age (in whole number years) of the panellists (1)

(iv) Reduction of bias related to sample labeling and sample serving order, and prevention of sample carry-over effect (6)

(v) Sample temperature and type of light in the test room (2)

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**QUESTION 7**

- 7.1 Name two (2) egg proteins that contribute to the foaming of an egg. (2)
- 7.2 State the effects of sugar, acid, salt and water on the volume and stability of an egg white foam. (8)
- 7.3 Describe how you would assess the stability of an egg white foam made from egg whites to which one of the substances in 7.2 has been added. Include a control. Explain how the results will be interpreted. (8)
- 7.4 State one (1) way by which CO<sub>2</sub> may contribute to the preservation of eggs. (1)
- 7.5 Explain the terms “weeping” and “beading” with reference to soft meringues and state one (1) technique you would use to minimize each of them, respectively. (6)

**[25]**