



PROGRAM : B TECH
FOOD TECHNOLOGY

SUBJECT : **FOOD COMPONENTS 4**

CODE : **FTN1AC4**

DATE : WINTER EXAMINATION
7 JUNE 2018

DURATION : (X-PAPER) 11:30 - 14:30

WEIGHT : 50 : 50

TOTAL MARKS : 183 (180 = 100%)

EXAMINER : DR S DE KOCK Sanso Number

MODERATOR : DR G LOMBARD File Number

NUMBER OF PAGES : 5 PAGES

REQUIREMENTS : 2 ANSWER SHEETS PER STUDENT.

INSTRUCTIONS:**ANSWER ALL QUESTIONS**

QUESTIONS MAY BE ANSWERED IN ANY ORDER, BUT SUB-SECTIONS OF QUESTIONS MUST BE ANSWERED TOGETHER

QUESTION 1

- 1.1 List the three types of water that we find in food. (3)
- 1.2 Waterholding capacity of meat used in sausage manufacturing is of utmost importance. Explain how meat can be treated (before and after slaughtering) to ensure that its waterholding capacity would be superior when it is used in sausage products. (8)
- 1.3 Explain why sterilised evaporated milk would be prone to browning (hint: think of the optimum conditions for browning, and what components are needed for browning). (3)
- [14]**
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QUESTION 2

- 2.1 Explain why cross-bonded waxy starches are such a popular choice in food applications. In your answer, compare this starch with other starches and explain why they might not be suitable. Make use of graphs to illustrate your answer. (14)
- 2.2 (Hypothetically) A new starch with the following properties was discovered:
- Granule size is somewhere between potato and corn
 - Contains no amylose
- From your knowledge of the behavior of other starches, predict the new starch's approximate gelatinisation temperature and swelling power. Then draw a predicted pasting curve (heat, hold, cool). Explain your answer. (7)
- 2.3 Explain how addition of monoglycerides can retard bread staling (make use of an illustration to aid your answer). (7)
- 2.4 Would you choose waxy or normal maize starch to thicken something that has to be poured after cooling? Explain why. (4)
- [32]**
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QUESTION 3

You are employed in the Research and Development Department at a breakfast cereal manufacturer. You are developing a new, healthy breakfast cereal called Nutri-Brek. Information/ specifications of this cereal are as follows:

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- It contains no added cane sugar, but it is sweet.
 - It is low in fat.
 - It is high in protein.
 - It is high in soluble fiber.
 - It is low in kJ.
 - It has a low GI.
 - It contains no gluten.
 - It is suitable for lacto-vegetarians.
 - The main cereal ingredients are whole maize, degermed maize and whole rice.
 - It mixes easily with cold water.
- 3.1 Describe the process the maize meal would be subjected to in order to enhance cold water dispersibility? (3)
- 3.2 What reasons could there be for not wanting to add cane sugar to this product? (4)
- 3.3 Suggest possible ingredients that can be added to achieve a sweetening and bulking effect and describe them. (7)
- 3.4 What stabilizer (hydrocolloid) would you recommend for this cereal? Discuss the structure and properties thereof. (9)
- 3.5 What ingredients could be added to achieve the high protein content? (3)
- [26]**
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QUESTION 4

- 4.1 Complete the following table (only write the number and answer in your answer book):

Type of gel desired	Carrageenan type	Alginate type (M-G ratio)
Strong, firm and brittle	4.1.1	4.1.3
Elastic, resilient and cohesive	4.2.1	4.1.4

(4)

- 4.2.1 Define two types of pectin with regards to degree of esterification, and describe the conditions under which each of them will gel. (7)
- 4.2.2 Show with the aid of a diagram how low methoxyl pectin forms a gel. (3)
- 4.3 Describe how guar gum and locust bean gum differ in chemical structure, and explain how this will influence their properties. (6)

[20]

QUESTION 5

- 5.1 State for each of the following scenarios whether you would use a high or low DE corn sweetener:
- 1.1.1 To improve browning of a baked product
 - 1.1.2 To increase the viscosity in a soup powder
 - 1.1.3 To increase the microbiological shelf-life of a food product
 - 1.1.4 To decrease “stickiness” in hard-boiled candy
 - 1.1.5 To increase foam stability in a baked product (5)
- 5.2 HFCS is a sweetener that gets a lot of media attention.
- 5.2.1 Describe the production and attributes of HFCS. (7)
 - 5.2.2 Do you think HFCS should be used in food production? Motivate your answer. (3)
- [15]**
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QUESTION 6

- 6.1 Explain 4 uses/functions/functional properties of the following proteins in the food industry.
- 6.1.1 Egg proteins
 - 6.1.2 Gluten (8)
- 6.2 Describe the three types of hydrolytic modification of proteins used to modify their functional properties. (10)
- 6.3 What is milk protein concentrate? (4)
- [22]**
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QUESTION 7

- 7.1 Few natural fats and oils meet the stringent requirements of processors and consumers. Discuss the various types and degrees of fat modification that can be used to meet these requirements. (15)
- 7.2.1 What are the functions of fat in bread? (4)
 - 7.2.2 What types of fat can be used to bake bread? (2)
- 7.3 Briefly describe the modification (e.g. treatment, additives) of fats/oils to achieve the following:
- 7.3.1 Improved whipped cream (3)
 - 7.3.2 Pourable solid shortening (3)
- [27]**
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QUESTION 8

Match column B with column A (e.g. 1 F).

[10]

A	B
1. Glycerol	A. Phenolketonuria
2. Aspartame	B. Sugar alcohol
3. Neotame	C. DE > 20
4. Gellan gum	D. 200 times as sweet as sucrose
5. Surimi	E. Protein from fungi
6. Xylitol	F. Browning
7. Maltodextrin	G. 7000-13000 times as sweet as sucrose
8. Stevia	H. Glycosides that are sweet
9. Myofibrillar protein	I. Gum from microorganism
10. Mycoprotein	J. Emulsifier in sausages
	K. Sushi imitation
	L. Humectant
	M. Shellfish analogue
	N. Bacterial protein
	O. DE < 20

QUESTION 9

What food component will you use if you want to achieve the following? Motivate your answer.

- | | | |
|-----|---|-----|
| 9.1 | Flavour encapsulation | (2) |
| 9.2 | Prevention of ice crystal formation in ice-cream | (2) |
| 9.3 | Cold water-dispersable fats | (3) |
| 9.4 | To sweeten chewing gum | (2) |
| 9.5 | To “glue” meat pieces together | (2) |
| 9.6 | Fat substitute in mayonnaise | (2) |
| 9.7 | Nutritive sweetener for a lower kilojoule breakfast cereal | (2) |
| 9.8 | Replacer of egg albumin in meringue (no motivation necessary) | (1) |
| 9.9 | Foam formation in marshmallows (no motivation necessary) | (1) |

[17]**TOTAL 183 (180-100%)**