



**FACULTY OF SCIENCE**

**DEPARTMENT OF FOOD TECHNOLOGY (DFC)**

**MODULE:** FTN1BF1  
FOOD TECHNOLOGY I  
(NATIONAL DIPLOMA FOOD TECHNOLOGY)

**NOVEMBER EXAMINATION**

**DATE:** 1 NOVEMBER 2014

**SESSION:** 8:30-10:30

**EXAMINER**

**Dr S de Kock**

**MODERATOR**

**Mr B Draddy**

**DURATION 2 HOURS**

**MARKS 121 (120=100%)**

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**NUMBER OF PAGES: 4 PAGES (PLUS 2 ANNEXURES)**

**INSTRUCTIONS: ANSWER ALL QUESTIONS**

**QUESTIONS MAY BE ANSWERED IN ANY ORDER, BUT SUB-  
SECTIONS OF QUESTIONS MUST BE ANSWERED TOGETHER  
CALCULATORS ARE PERMITTED (ONLY ONE PER STUDENT)**

**REQUIREMENTS: 2 ANSWER SCRIPTS PER STUDENT**

/2...

**QUESTION 1**

Woolworths recently launched a new product: **Caramel coffee low fat flavoured milk.**



The following information can be found on the label:

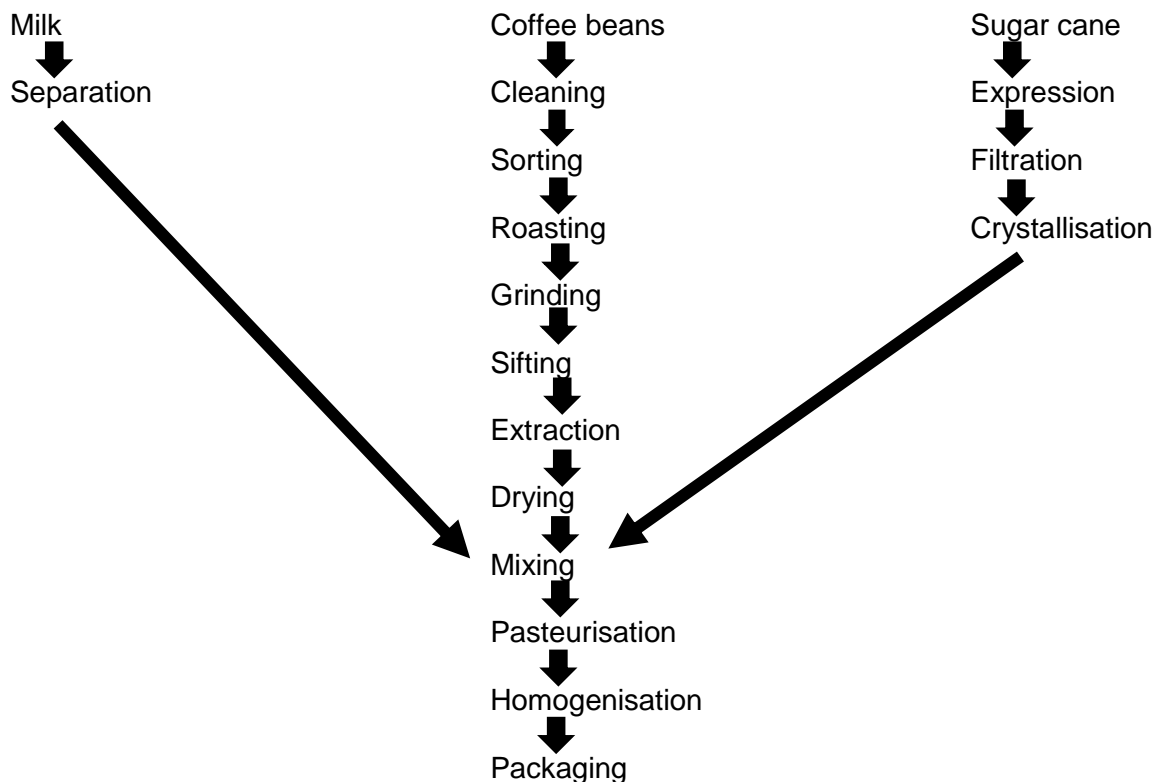
**Ingredients:** Low-fat milk, sugar, coffee, coffee extract, flavouring, stabiliser (plant based)

300ml

Nutritional information

	Per 100ml
Protein	2.5g
Carbohydrate	10g
Fat	1.5g

The process flow diagram indicating the unit operations during its manufacturing is as follows:



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- 1.1 A tubular bowl centrifuge can be used to separate the cream from the milk to produce low fat milk. Make an illustrated drawing to show the working of this piece of equipment. (7)
- 1.2.1 Describe the contaminants that are removed during the cleaning process. (5)
- 1.2.2 Briefly explain four factors that will increase the efficiency of spray washing. (4)
- 1.3 Explain how the damaged coffee beans can be separated from the good coffee beans during sorting (hint: damaged coffee beans have a higher density in water). (3)
- 1.4 During roasting, the Maillard reaction produces the brown colour of the coffee beans and a roasted flavour. Explain the chemistry of the Maillard reaction. (3)
- 1.5.1 Grinding is a size reduction unit operation. Why do the coffee beans need to be grinded before extraction? (1)
- 1.5.2 Suggest an impact mill that can be used to reduce the size of the coffee beans. Describe its working and make use of a diagram to illustrate your answer. (5)
- 1.5.3 What is the definition of the Reduction Ratio of a grinder? If you want to produce coffee with a very small particle size, do you need a grinder with a high or low Reduction Ratio and why? (3)
- 1.6. A single stage extractor is used to extract the ground coffee beans. Explain its working and illustrate your answer with a diagram. (8)
- 1.7 Describe the design and operation of a piece of equipment that can be used to express sugar from sugar cane. Make a drawing to illustrate your answer. (9)
- 1.8.1 Define filtration as a unit operation. (3)
- 1.8.2 Do a schematic drawing to show the flow of slurry to filtrate in a vertical shell and leaf pressure filter. (6)
- 1.9.1 A propeller mixer can be used to mix the final product together. Briefly describe this mixer. (2)
- 1.9.2 What problems could arise with the use of this mixer? Suggest ways to overcome this and make use of drawings to illustrate your answer. (7)
- 1.10 A pressure homogeniser is used to create a uniform emulsion in the end product. Explain how this machine operates. (4)
- 1.11 Suggest a stabiliser (gum) that can be used for this product. (1)
- 1.12 The manufacturers found a cheaper caramel flavour than the one that they are currently using. They don't want the flavour of the product to change. They ran a triangle test with 7 panellists 3 times. Nine of the responses correctly identified the odd one out. What conclusion can you make from this? (5% confidence level). (4)
- 1.13.1 How much kJ would you consume if you drank two of these bottles? (5)
- 1.13.2 One's basal metabolic rate (BMR) determines (amongst other things) how many kJ you are supposed to consume per day. Discuss the factors affecting the BMR. (6)

- 1.14 Similar products are sold by Pick 'n Pay, Checkers and OK. Woolworths wanted to compare their product with the other three. The results of the ranking test they ran are as follows:

Panellist	Woolworths product	Pick 'n Pay product	Checkers product	OK product
1	1	2	3	4
2	1	3	2	4
3	2	1	4	3
4	1	3	2	4
5	1	2	3	4
6	2	1	3	4

1 – most liked

4 – least liked

What statistical conclusions can you draw from this? (5)

- 1.15 Sugar is one of the ingredients in this product. Name some functional properties of sugar in food in general. (3)

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## **QUESTION 2**

- 2.1 Explain what reverse osmosis is and make use of a diagram to illustrate your answer. (7)
- 2.2 Give the advantages of using reverse osmosis instead of evaporation (4)
- 2.3 Mayonnaise is an example of an emulsion. Suggest an appropriate emulsifying agent that can be used in this product and explain how it works. (6)

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## **QUESTION 3**

Give one word/term for the following:

- 3.1 The method used to select and train panellists
- 3.2 The vitamin that prevents night blindness
- 3.3 The branched component in starch
- 3.4 Two sugar units which are linked together
- 3.5 An orange pigment in foods
- 3.6 Acid in oranges
- 3.7 A milk protein
- 3.8 The scale used in scoring during sensory evaluation
- 3.9 The enzyme that breaks down lipids
- 3.10 Glycerol with three fatty acids

[10]

**ANNEXURE A****TRIANGULAR COMPARISON - NUMBER CORRECTLY IDENTIFYING ODD  
SAMPLE REQUIRED TO INDICATE SIGNIFICANT DIFFERENCE**

Total Number of Triangular Comparisons	Number of Correct Selections for Odds:		
	19 : 1 (5 Per Cent Level)	99 : 1 (1 Per Cent Level)	999 : 1 (.1 Per Cent Level)
4			
6	5	6	0
8	6	7	8
10	7	8	9
12	9	9	10
15	10	11	12
18	11	12	13
21	12	14	15
24	14	15	16
27	15	16	18
30	16	18	19
35	18	20	22
40	20	22	24
45	22	24	26
50	25	26	28
60	29	30	32
70	33	35	37
80	37	39	41
90	41	43	45
100	45	47	49

**ANNEXURE B**

**TABLE 91**

**RANK TOTALS REQUIRED FOR SIGNIFICANCE AT THE 5 PER CENT LEVEL (P < 0,05)**

The four-figure blocks represent: Lowest insignificant rank sum, any treatment - Highest insignificant rank sum any treatment. lowest insignificant rank sum, predetermined treatment - Highest insignificant rank sum, predetermined treatment.

Number of Reps.	Number of Treatments, or Samples Ranked										
	3	3	4	5	6	7	8	9	10	11	12
2	... ...	... ...	... ...	... 3-9	... 3-11	... 3-13	... 4-14	... 4-16	... 4-18	... 5-19	5-21
3	... ...	... 4-8	... 4-11	4-14 5-13	4-17 6-15	4-20 6-18	4-23 7-20	5-25 8-22	5-28 8-25	5-31 9-27	5-34 10-29
4	... ...	5-11 5-11	5-15 6-14	6-18 7-17	6-22 8-20	7-25 9-23	7-29 10-26	8-32 11-29	8-36 13-31	8-39 14-34	9-43 15-37
5	... 6-9	6-14 7-13	7-18 8-17	8-22 10-20	9-26 11-24	9-31 13-27	10-35 14-31	11-39 15-35	12-43 17-38	12-48 18-42	13-52 20-45
6	7-11 7-11	8-16 9-15	9-21 11-19	10-26 12-24	11-31 14-28	12-36 16-32	13-41 18-36	14-46 20-40	15-51 21-45	17-55 23-49	18-60 25-53
7	8-13 8-13	10-18 10-18	11-24 13-22	12-30 15-27	14-35 17-32	15-41 19-37	17-46 22-41	18-52 24-41	19-58 26-51	21-63 28-56	22-69 30-61
8	9-15 10-14	11-21 12-20	13-27 15-25	15-33 17-31	17-39 20-36	18-46 23-41	20-52 25-47	22-58 28-52	24-64 31-57	25-71 33-63	27-77 36-68
9	11-16 11-16	13-23 14-22	15-30 17-28	17-37 20-34	19-44 23-40	22-50 26-46	24-57 29-52	26-64 32-58	28-71 35-64	30-78 38-70	32-86 41-76
10	12-18 12-18	15-25 16-24	17-33 19-31	20-40 23-37	22-48 26-44	25-25 30-50	27-63 34-56	30-70 37-63	32-78 40-70	35-85 44-76	37-93 47-83
11	13-20 14-19	16-28 18-26	19-36 21-34	22-44 25-41	25-52 29-48	28-60 33-55	31-68 37-62	34-76 41-69	36-85 45-76	39-93 49-83	42-101 53-90
12	15-21 15-21	18-30 19-29	21-39 24-36	25-47 28-44	28-56 32-52	31-65 37-59	34-74 41-67	38-82 45-75	41-91 50-82	44-100 54-90	47-109 58-98
13	16-23 17-22	20-32 21-31	24-41 26-39	27-51 31-47	31-60 35-66	35-69 40-64	38-79 45-72	42-88 50-80	45-98 54-89	49-107 59-97	52-117 64-105
14	17-25 18-24	22-34 23-35	26-44 28-42	30-54 33-51	34-64 38-60	38-74 44-68	42-84 49-77	46-94 54-86	50-104 59-95	54-114 65-103	57-125 70-112

