UNIVERSITY OF JOHANNESBURG

FACULTY OF SCIENCE

DEPARTMENT OF FOOD TECHNOLOGY (DFC)

MODULE: FTN2ABC
FOOD BIOCHEMISTRY III
(NATIONAL DIPLOMA FOOD TECHNOLOGY)

JUNE EXAMINATION

DATE: 9 JUNE 2016 **SESSION: 8:30-11:30**

EXAMINER **Dr S de Kock**

MODERATOR **Dr G Botha**

DURATION 3 HOURS **MARKS 183 (180=100%)**

NUMBER OF PAGES: 6 PAGES

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

1.1 McCain produces a variety of frozen oven potato chips.

1.1.1 Briefly describe 4 things they can do to prevent enzymic browning from happening in their chips. (4)

1.1.2 What is the enzyme responsible for enzymic browning called? (1)

1.1.3 Describe (in words only) what happens chemically during enzymic browning: from substrate to end pigment. (7)

1.1.4 In order to lower the oil absorption during par-frying, they can coat the chips with a cellulose derivative. What is it called and how does it work? (3)

1.2 During the Kohman proximate analysis of butter, the solids turn brown when the moisture is evaporated from the butter. Define the type of browning and describe why that happens. Then give a diagrammatical illustration which ONLY shows the pathway SPECIFIC to this type of browning (no structures necessary, only names of compounds).
Hint: Butter is made from cream which is made up of fat, water, salt, lactose, casein, vitamins and minerals. (11)

1.3 Define or describe the following:

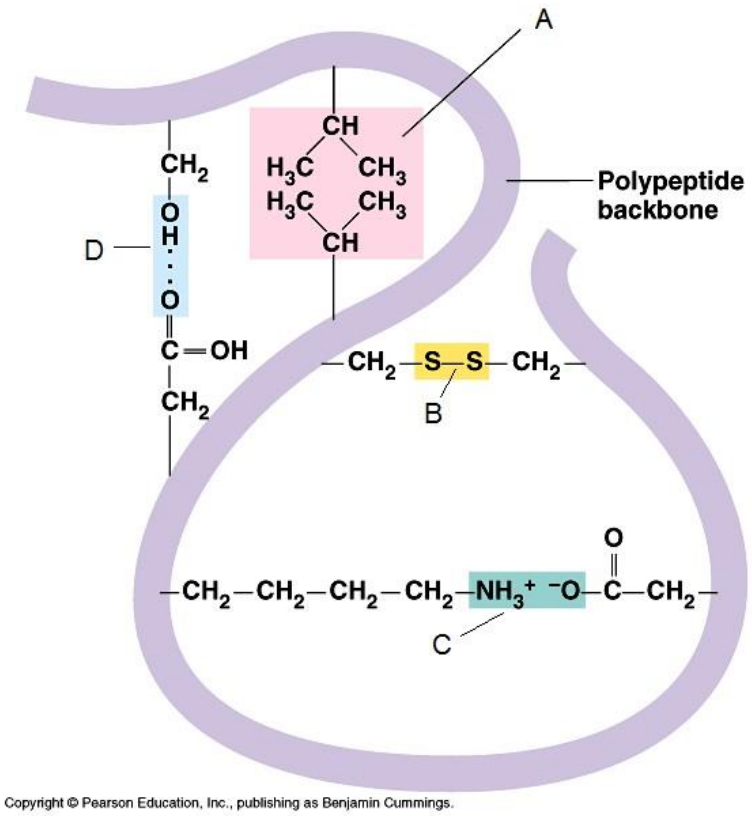
1.3.1 Denaturation (3)

1.3.2 Functional property of wheat protein and description of that protein (5)

1.3.3 Soya protein isolate (2)

1.3.4 Casein micelle (3)

1.4 In the diagram on the next page, name the bonds (A-D) that are stabilizing the tertiary structure of proteins, and for each of the bonds, give an example of which amino acids can be involved in that bond. (8)



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QUESTION 2

2.1 Discuss the manufacturing, properties and uses of cross-bonded starches. (7)

2.2 Describe the structure and properties of xanthan gum. (9)

2.3 Discuss the composition, production and properties of HFCS (high fructose corn syrup). (8)

2.4 Glucose syrups are finding increasing applications in the food industry.

2.4.1 Define the DE value of a glucose syrup. (3)

2.4.2 State whether a high or low DE syrup is needed to accomplish the following:

a) Decreased sweetness
b) Increased viscosity
c) Increased fermentability
d) Increased mouthfeel
e) Increased browning (5)

2.5 CMC is used extensively in the food industry.

2.5.1 What does it stand for? (1)
2.5.2 How is it made? Show chemical reaction. (4)
2.5.3 Explain 5 of its food uses. (5)
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QUESTION 3

3.1 Briefly discuss the factors which will influence lipid oxidation in a food product. (9)

3.2 Explain why it is important to use the *correct* amount of anti-oxidants in food products (make use of chemical reactions to illustrate your answer). (6)

3.3 Show the isomeric hydroperoxides which are expected to form from *linoleic acid* during prolonged exposure to oxygen. (6)

3.4 Define interesterification. Describe how it is performed and give 3 examples of where it is used in the food industry. (10)

3.5 Name the four steps oil is subjected to during the refining process. Describe how the steps are performed and explain the main function of each step. (10)
[41]

QUESTION 4

4.1 Explain the presence of colour in carotenoids. (4)

4.2 Name the four groups that pigments can be divided into and give an example of each. (8)

4.3 Show the dynamic system of three pigments that occur in fresh meat (with their colours). (6)
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QUESTION 5

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

A	B
1. Pectin	A. Mannuronic and guluronic acid
2. Lipoprotein	B. Violet colour
3. Butiric acid	C. 6 carbons, no double bonds
4. Collagen	D. Soluble in 50-80% alcohol
5. Hydroperoxide	E. Non-reducing
6. Carrageenan	F. Oxidation
7. Anthocyanidin	G. 18 carbons, two double bonds
8. Maltose	H. Slowly absorbed
9. Cholesterol	I. Unsaponifiable
10. Amylase	J. Galactose:mannose = 4:1
11. Alginate	K. Contains α (1,4) bond
12. Ovalbumin	L. Causes flatulence
13. Lycopene	M. Sweetest sugar
14. α-lactalbumin	N. Green colour
15. Cellulose	O. Ripe tomatoes
16. Sorbitol	P. Two glucose units
17. Fructose	Q. α-1,4 and α-1,6 glycosidic bonds
18. Raffinose	R. Strong, triple helix
19. Linolenic acid	S. 4 carbons, no double bonds
20. Guar gum	T. Galactose:mannose = 2:1
21. Sucrose	U. Break down starch
22. Prolamins	V. Contains β (1,4) bond
23. Myosin	W. 18 carbons, three double bonds
24. Amylopectin	X. Meat
25. Methionine	Y. Whey protein
	Z. Legumes are deficient in this
	AA. Galacturonic acid
	BB. Lecithin
	CC. Kappa, iota and lambda
	DD. Egg protein
	EE. Cereals are deficient in this

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QUESTION 6

Use one term (word) that would fit the description of the following:

6.1 The name of the pigment that forms when sucrose is heated for 35 min at 200°C.
6.2 Water loss from a starch gel.
6.3 Simple proteins which are soluble in water and coagulated by heat.
6.4 A plant protein type that can be spun to imitate meat fibres.
6.5 The amino acid that cereals lack.

6.6 A system describing how an emulsifier should be used most effectively.
6.7 The fatty acid that has 18 carbons and 2 double bonds.
6.8 Three fatty acids link to a glycerol.
6.9 The red beet pigment.
6.10 The compound causing astringency in tea.

[10]

TOTAL 183 (180=100%)