NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCES

BACHELOR OF SCIENCE HONOURS DEGREE EXAMINATIONS

DEPARTMENT OF APPLIED BIOLOGY AND BIOCHEMISTRY

THEORY: FOOD TECHNOLOGY I SBB 4106

DECEMBER 2004

3 HOURS (100 marks)

INSTRUCTIONS

Answer Four (4) Questions. Each question carries 25 marks. Where a question contains subdivisions, the mark value for each subdivision is given in brackets. Illustrate your answer where appropriate with large, clearly labelled diagrams.

1.(a) Give a brief outline of the canning process, and explain how each of the stages in production contribute to shelf-stability in the final product. (15 marks)

(b) If $D_{121°c}$ for *Clostridium botulinum* is 0.30 minutes, calculate the time required at 121°C to ensure 12 decimal reductions for *C. botulinum* spores. (2 marks)

(c) If the $D_{121°c}$ value for a spore population was 0.20 minutes, how long would it take to reduce an initial population of 1×10^8 to 1×10^2 at 111°C.
Note: the Z value = 10°C (4 marks)

(d) A heat resistant spore has a $D_{121°c}$ value of 2.5 minutes and a Z value of 10°C. Estimate the final population when a sample containing 1000 spores is heated at 111°C for 50 minutes. (4 marks)

2.(a) Describe, with the aid of a fully labeled diagram, the structure of striated muscle, and explain its role in determining meat quality. (10 marks)

(b) Discuss the roles of pre-slaughter handling and post-slaughter conditioning in determining the final quality of meat products. (15 marks)

3.(a) Give a detailed account of the stages in the cheddar cheese production process. (17 marks)

(b) Outline and explain the role of the biochemical changes that occur during the maturation stage. (8 marks)

4. Describe and explain

(i) the principles of the refining procedures that are employed in the production of edible oils. (15 marks)

(ii) the technology involved and the chemical changes that take place in the manufacture of margarines and cooking fats from oil. (10 marks)

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5.(a) Describe the production of wheat flour of different extraction rates, where roller mills are employed. (16 marks)

(b) During the milling of wheat, a factory produces 9 500 kg of flour and 500 kg of non-flour material per day. Calculate the extraction rate of the flour produced, and comment on the value obtained. (4 marks)

(c) Briefly compare and contrast the nutritional profiles of low and high extraction rate flours. (5 marks)

6. Explain briefly, the principles of the following food processing techniques.
   (i) curing (8 marks)
   (ii) irradiation (8 marks)
   (iii) proving (4 marks)
   (iv) blast-freezing (5 marks)

END OF EXAMINATION QUESTION PAPER

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