UNIVERSITY OF GHANA

BSC. ENGINEERING SECOND SEMESTER EXAMINATIONS: 2015/2016

SCHOOL OF ENGINEERING SCIENCES

FPEN 408: MICROBIOLOGICAL APPLICATIONS IN FOOD PROCESSING
(2 Credits)

INSTRUCTIONS: ANSWER QUESTION 1 AND ANY THREE OTHER QUESTIONS

TIME ALLOWED: TWO (2) HOURS

1. The main objective of a HACCP system is to provide a high degree of assurance that a ready-to-eat food will be free of food safety hazards. Describe how you would implement a HACCP system to achieve this objective. **Use ice-kenkey as your product.**

2.
   a. Discuss the different types of decay that can occur in foods as a result of microbial activities.
   b. Outline the sequence of events necessary for food borne illnesses.
   c. Differentiate between probiotics and prebiotics.

3. The table below is an extract of a microbiological standard for milk products. Use the information provided to answer the following questions.

Product	Test	Class Plan	Sampling unit		Microbiological limit (cfu/g)	
			n	c	m	M
Powdered milk	Salmonella	2	5	0	0	0
	Coliforms	3	5	1	10	10^2
UHT Milk	Aerobic plate count	2	5	0	10	-

a. Explain the following terms: **n, c, m, M** (use values from the table to support your answer).

b. Explain why there are different numbers under the column "**Class Plan**".

c. Five (5) samples **each** from two batches of powdered milk were tested for Coliforms and the following results were obtained

i. Batch A: 10, 1, 10^3, 10^2 and 10 cfu/g

ii. Batch B: 10, 1, 10^2, 10^2 and 10 cfu/g

Would you accept or reject the two batches? Explain your answer.

4.

a. The quality of Ghanaian cocoa beans is acknowledged world-wide. The processing of cocoa seeds into the high quality and valuable cocoa beans involves an essential fermentation process. Explain in detail the fermentation process used in cocoa bean processing specifically including details on the microorganisms involved and the corresponding biochemical changes that occur in the seed.

b. What are the sequence of events needed for microbial spoilage of foods?

5.

a. Discuss the key considerations that influence the severity of a heat treatment selected for processing of a food product.

b. A batch of raw milk was tested and found to contain a bacterial population of $4x10^5$ cfu/ml. It is to be pasteurised at 79°C for 21 seconds. The average D value at 65°C for the mixed population is 7 min. The *z* value is 7°C.

i. Explain the terms "D value" and "*z* value".

ii. Calculate how many organisms will be left after pasteurisation.

iii. How much time will be needed at 65°C to accomplish the same degree of lethality?

iv. How much time will be needed at 72°C to achieve the same degree of lethality?