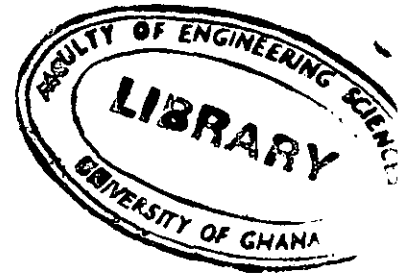




UNIVERSITY OF GHANA

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BSc ENGINEERING SECOND SEMESTER EXAMINATION: 2015/2016

SCHOOL OF ENGINEERING SCIENCES

FPEN 402. ENGINEERING DESIGN OF FOOD PROCESSES IV. ANIMAL FOODS (3 Credits)

INSTRUCTIONS: Answer five questions

TIME ALLOWED: Three (3) Hours.

1. A plant processes 10,000 fresh eggs an hour using the in-line egg processing system. Forty-five percent of the eggs are processed and packaged as fresh eggs with the remaining further processed into other egg products.
 - a. What is in-line processing of eggs? Is this a system that can be applied in Ghana? Give reasons.
 - b. The embossment below (in box) was found on a package of fresh eggs from the plant.

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Explain the embossment and indicate the advantages in food marketing and possible applications in Ghana.

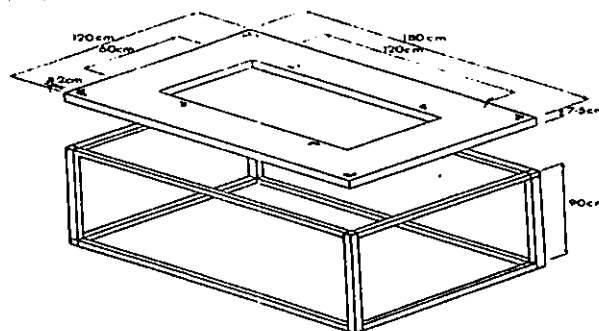
- c. If you are in charge of an in-line egg processing plant, what steps will you take to maintain fresh egg quality?
 - d. Delineate the unit operations for the production of dried whole egg or dried egg white
2. The design and construction of facilities for slaughtering animals follows certain principles. As a Food Process Engineer, if you are tasked to make proposals for the construction of such facilities for cattle, what will you include in the proposals? With the help of a diagram show your proposed floor plan for the plant and justify your decisions.

3. Ice cream production has evolved from a manually manufactured household product to an automated industrial product. Designing a plant to manufacture ice cream will require an understanding of the processes for transformation. Discuss
- the formulation considerations in ice cream manufacture,
 - the critical operations and associated machinery you will recommend for setting up an ice cream plant.

- 4.
- The design and operation of cold store facility requires professional expertise. In a small-scale meat processing facility you have been tasked to determine the size of cold store to keep raw materials such as beef sides and lamb in a walk-in cold store operating at $0^{\circ}\text{C} - 4^{\circ}\text{C}$. If the distance between rails is 0.9 m and 0.46 m respectively for beef and lamb, calculate the size of the cold room based on daily carcass meat demand.

Assume:

- the area per beef side is 0.6 m^2
 - area for lamb side is 0.55 m^2
 - movement factor of 1.5m and
 - average weight of beef side is 49kg
 - average weight of lamb is 45 kg
 - Carcass meat demand of 520 kg/day for beef and 450kg/day for lamb.
- What is ante-mortem inspection in animal slaughter operations? Delineate the judgement categories and discuss their significance.
- 5.
- The figure below represents a filleting table for small scale fish processing. Describe the design features and show what you will do as an Engineer to adapt it to modern fish processing.



- b. You are working with the Ministry of Fisheries to assist artisanal fish processors. What will you advise to prevent the spoilage of fish before processing, during processing and after processing?
- 6.
- a. What are the general steps in the aseptic canning of foods? Discuss the significance of each step and their contribution to product quality.
 - b. Draw and discuss a typical heat penetration curve as applied in fish canning.
 - c. What are the causes of spoilage in canned foods? Discuss the procedures to be followed in examining containers of canned fish products.
7. What are the critical operations in the processing of poultry for the market? Discuss the equipment needed and the contributions of the operations to the delivery of quality products to the consumer.

