UNIVERSITY OF GHANA

BSC. FIRST SEMESTER EXAMINATIONS: 2015/2016

DEPARTMENT OF FOOD PROCESS ENGINEERING

FPEN 405: ENGINEERING AND DESIGN OF FOOD PROCESS III – PLANT PRODUCTS (3 Credits)

INSTRUCTIONS: ANSWER ANY FIVE (5) QUESTIONS – AT LEAST ONE (1) QUESTION MUST BE FROM SECTION A. USE SEPARATE ANSWER BOOKLETS FOR EACH SECTION.

TIME ALLOWED: THREE (3) HOURS

SECTION A

1. Discuss engineering design systems for the application of solvent extraction and supercritical fluid processing to oilseed processing. What are the merits and demerits with respect to their application in Ghana?

2. As an Engineer designing systems to extract oil from oilseeds, what will be your approach to improve processing of palm oil, palm kernel oil and coconut oil?

SECTION B

3. Processed foods are generally associated with various concerns related to health, economic, environmental, etc. As a Food Process Engineer, suggest some innovative solutions that you can implement to minimise these concerns. As much as possible, include specific examples of processed plant products to support your proposal.

4.
   a. Draw detailed flow diagrams for the traditional processing of Ga and Fante Kenkey. Use dried corn as your starting raw material.
   b. Select any three of the unit operations in 4(a) above and suggest improvements related to process efficiency and hygiene. At least one of the selected unit operations should be unique to each product.

5.

a. Milling and sieving are critical unit operations in the processing of wheat flour. Describe the key features of equipment used, objectives of these operations and how they can be successfully achieved in a processing facility.

b. Cleaning of raw materials is an important unit operation in the processing of fruits and vegetables. Using specific examples, explain clearly how this is done in a typical processing facility.

6. Each year in Ghana, several tonnes of tomatoes are wasted due to inadequate post-harvest management practices. The Government of Ghana is requesting for proposals for a national project to improve the situation. Using tomato paste as the selected product, write a reference document for the complete process of producing tomato paste including product description, list of associated equipment, detailed flow diagram and description of key unit operations.

7. You have been hired as a consultant Process Engineer to validate the processing steps for a new chocolate processing plant. Assume that the factory receives the following raw materials: sugar, milk powder, cocoa butter and cocoa liquor.

a. Outline the typical process that you would expect the factory to follow to produce milk chocolate.
b. Identify and describe two key equipment to be used in the process.