UNIVERSITY OF GHANA

B.SC. SECOND SEMESTER EXAMINATIONS, 2014-2015.

FPEN 204. PHYSICAL AND CHEMICAL PROPERTIES OF FOODS (3 CREDITS)

INSTRUCTIONS: ANSWER FIVE QUESTIONS, AT LEAST TWO FROM EACH SECTION.

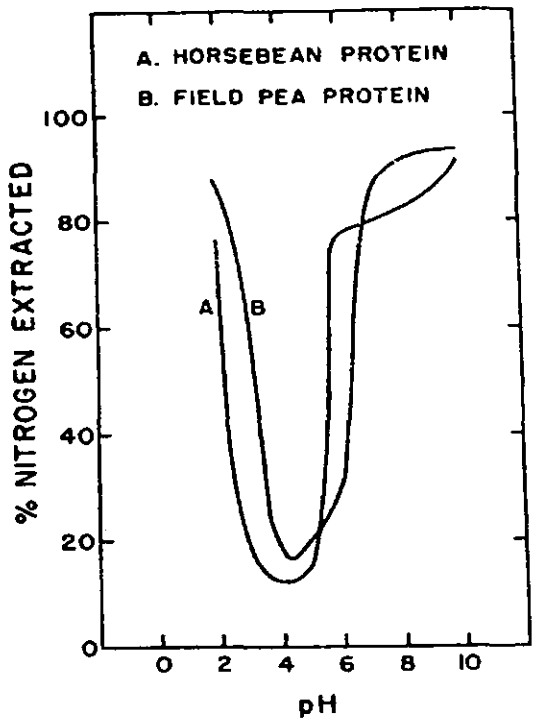
QUESTION ONE (1) IS COMPULSORY

TIME ALLOWED THREE HOURS.

SECTION A

1. In 2014-2015, the Level 200 Food Process Engineering students studied the transformation of maize (*Zea mays*) to maize malt. Describe the processes your group applied, the associated physical and chemical changes and other outcomes.

2. The diagram below refers to the nitrogen solubility of flours derived from two legume flour sources. In what ways can you apply this in designing a high-protein food processing plant?



3.

a. The physical, chemical and microstructural characteristics of a food will influence how well it performs in the national food system. Identify one root crop known to have inherent problems that affect their utilization, discuss the nature of the problem and what you will do as a process Engineer to solve it.

b. Browning reactions can occur during food production, food handling, processing and storage and show desirable and undesirable effects. As a process engineer what types of browning mechanisms will be of interest to you? Give examples of desirable and undesirable effects.

4.

a. Delineate critical points on the Brabender Viscoamylograph graph and comment on their significance and application in the processing of food starch systems.

b. Enzymes have various effects in food processing. Using brewing of pito as example, identify the various process operations associated with the presence of enzymes.

SECTION B

5.

a. Discuss the main characteristics of pectins and their specific application in food processing.

b. With the aid of appropriate diagrams, explain the flow behaviour of non-Newtonian fluids.

5.

a. "Most foods exist in the form of dispersions." Discuss this statement using three (3) specific examples.

b. List three applications of moisture sorption isotherms in food product development.

7. Proximate analyses were conducted on fresh tomatoes and the following data were obtained. Using the appropriate calculations and conversion factors determine the amount of each corresponding nutrient and complete the Table below.

Nutritional composition (per 100g sample)

Moisture (g)	Protein (g)	Fat (g)	Carbohydrate (g)	Fibre (g)	Ash (g)
				1.4	0.6

a. Moisture:
   i. Weight of fresh tomatoes for air drying = 10.0403g
   ii. Weight of air dried tomatoes = 1.4378g
   iii. Weight of air dried tomato used for oven drying = 2.2104g
   iv. Weight of oven dried tomatoes = 1.0034g

b. Fat
   i. Weight of sample – 2.0034g
   ii. Weight of extracted fat – 0.041g

c. Protein
   i. % Nitrogen – 0.1752

8.

a. Explain why the knowledge of the moisture content of a food ingredient is of significance to a food process engineer?

b. What options are available for addition of essential nutrients to foods during processing?

c. What are functional properties of foods? Give two examples.