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FACULTY OF ENGINEERING SCIENCES

DEPARTMENT OF FOOD PROCESS ENGINEERING

FPEN 204. PHYSICAL AND CHEMICAL PROPERTIES OF FOODS

SECOND SEMESTER EXAMINATIONS, 2013-2014.

TOTAL TIME THREE HOURS. ANSWER FIVE QUESTIONS, AT LEAST TWO FROM EACH SECTION

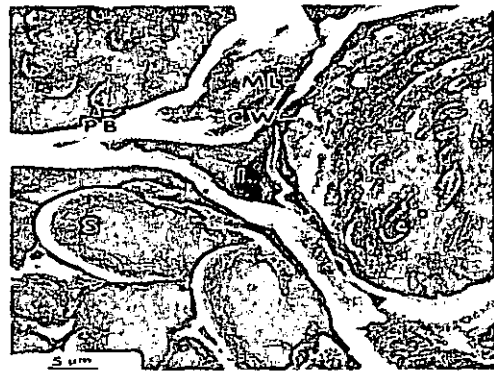
SECTION A

1. In designing effective food processing equipment and processes for the transformation of food commodities into materials of economic value the Engineer needs to understand the nature of the food including its microstructure. The micrographs below represent cowpeas (*Vigna unguiculata*). Identify the components in the slides and comment on their significance in the design of grain legume processing systems.

SLIDE 1



SLIDE 2



2. Browning reactions can occur during food handling, processing and storage. As a process engineer what types of browning mechanisms will be of interest to you? Give reasons.
3. In the study of starch systems in food processing the Brabender Viscoamylograph is very important.
  - a. What is this equipment and what does it do?
  - b. Describe and sketch a typical amylograph delineating critical points on the graph and comment on their significance and application in the processing of food starch systems.
4. The study of enzymes in food systems must be of interest to all involved in food processing, especially the process engineer. Discuss this statement with examples.

## SECTION B

- 5.
- Explain the basis of moisture content determination using
    - air-oven method
    - Vacuum oven method.
  - A food process engineer was given a food material weighing 1,254kg and informed that it contained 20% protein and 25% moisture. The engineer decided to check the moisture content to ensure that the process parameters to be set will be accurate. The raw data for the moisture analysis was as follows:

INDEX	VALUE
Weight of moisture dish	1.4352 g
Weight of moisture dish and wet sample	2.8542 g
Weight of moisture dish and sample after drying at 110°C for 15 hours	2.5042 g

- Calculate the moisture content derived from the engineer's analysis.
  - Comment on the results.
- 6.
- Explain the term "functional properties" of a food ingredient.
  - List and describe any three (3) functional properties of food ingredients and give examples of their application in food systems.
7. Food emulsions and foams play significant roles in the processing of some foods. Write brief comments on the formation and stability of food emulsions and foams.
- 8.
- Discuss any two classes of food colorants and for each of them provide one example.
  - Briefly comment on the role of the electromagnetic spectrum on colour perception and discuss the key components of a colour measuring system.
  - Describe any two tristimulus colour measuring scales.