



## TECHNICAL UNIVERSITY OF MOMBASA

BACHELOR OF SCIENCE IN FOOD TECHNOLOGY & QUALITY ASSURANCE

### AFS 4208: FOOD ENGINEERING I

#### EXAMINATION INSTRUCTIONS:

This paper contains **TWO** sections, A and B. Answer **ALL Questions in Section A**, and **ANY TWO** from Section B.

You should have the following during this examination:

- Scientific Calculator

#### Section A:

#### Question One

- (a) Name **Five** criteria that one would consider when selecting a material handling equipment **(5 Marks)**
- (b) Write short notes on “*Belt Conveyor Take-Ups*” in relation to conveyors **(5 Marks)**
- (c) With an aid of a labeled diagram explain how “*electrostatic cleaning*” can be achieved in a tea factory **(5 Marks)**
- (d) State **FIVE** characteristics of propellers which are used in a mixing equipment **(5 Marks)**
- (e) (i) A laboratory exercise revealed that it required 20kj/kg to reduce particles from a mean diameter of 2.5 cm to 0.4 cm. Using the Rittinger’s law calculate the energy required to reduce the same particles from a diameter of 0.4 cm to 0.02 cm **(2.5 Marks)**
- (ii) A flour mill is known to have a reduction ratio of 15 and energy requirement of 2800 kW/tonne. Given that the product average size is  $2.7 \times 10^{-4}$  m. Calculate the Bond’s Energy for this mill, assuming that the mill is operating at 25% efficiency **(2.5 Marks)**
- (iii) Explain the emulsification theory according to the Bancroft theory **(5 Marks)**

## **SECTION B (Answer ANY TWO questions from this Section)**

### **Question Two**

With an aid of a clear labeled diagram(s) discuss the mode of operation of a hammer mill **(20 Marks)**

### **Question Three**

Below is a diagram showing a set of screens arranged in a multiple deck.

- (a) State the meaning of the symbols used **(3 Marks)**
- (b) Derive the equation used to calculate the overall effectiveness (efficiency) of the screen **(17 Marks)**

### **Question Four**

Discuss how bulk storage of grains can be attained under the following physical and biological variables

- (a) Temperature **(6 Marks)**
- (b) Moisture **(4 Marks)**
- (c) Respiration **(4 Marks)**
- (d) Control of insects and mites **(6 Marks)**

### **Question Five**

With an aid of a clear labeled diagram(s) discuss the operation of Ultrasonic Homogenizer **(20 Marks)**