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University Examinations 2013/2014

THIRD YEAR, FIRST SEMESTER EXAMINATIONS FOR DEGREE OF BACHELOR OF SCIENCE IN FOOD TECHNOLOGY

AFS 2302: FOOD ENGINEERING II

DATE: APRIL 2014   TIME: 2 HOURS

INSTRUCTIONS: *Answer question **one** and any other **two** questions*

QUESTION ONE – (30 MARKS)

(a) Briefly discuss three preliminary operation carried out on milk prior to processing. For each operation suggest equipment used.   (3 Marks)

(b) A farmer allowed the milk to stand after milking and boiling. A layer of cream formed on the surface. Discuss how it formed and how to prevent it at household level.
                                                                                                                           (3 Marks)

(c) Discuss three reasons why size reduction is important in food processing.   (3 Marks)

(d) Maize grains were ground from average diameter of 1000μm to an average diameter of 100μm. the net energy consumption was 0.8 kw/h per tonne. What would be the net energy consumption for grinding maize to 50μm powder?
    (i)   According to Kick's Law.   (3 Marks)
    (ii)   According to Bond's Law   (3 Marks)

(e) Briefly, discuss the principle of pulsed electric fields as a non-thermal food preservation method.   (3 Marks)

(f) Calculate 'g' in a centrifuge that can spin liquid at 2000 rev/min at a maximum radius of 20cm.   (3 Marks)

(g) Discuss the principle of operation of:
    (i) Reverse osmosis   (2 Marks)
    (ii) Pneumatic conveyor   (2 Marks)
    (iii)Rotary vacuum filter   (2 Marks)

(h) You are employed in a juice processing industry that has high pressure system and pasteurization system. Which of the two systems would you choose for processing your juice and why? (3 Marks)

QUESTION TWO – (20 MARKS)

(a) You are employed as a Production Manager in a fruit processing industry. Every week you receive 100 tonnes of fruit. Discuss three equipment that you would recommend for your company for conveying fruit from reception to the processing unit. (6 Marks)
(b) Discuss the principle of operation of the following food processing equipment or processes.
    (i) Reel blancher
    (ii) Bucket elevator
    (iii)Electrostatic cleaner
    (iv)Fruit pulper
    (v) Ultrasound food processors
    (vi)Bowl centrifuge
    (vii) Bowl cutter (14 Marks)

QUESTION THREE – (20 MARKS)

(a) During a practical class, a student heated equal amount of oil and water in a microwave oven. Water heated to a lower temperature compared to oil. Discuss the principle by which microwave heats food and explain why oil heated to a higher temperature than water. (10 Marks)
(b) Giving examples, discuss five application of emulsification in food industry.
(10 Marks)

QUESTION FOUR – (20 MARKS)

(a) Energy required to reduce grain size (1 kg of millet grains) from 3360μm is 23.4 kj calculate the power required to reduce the size from 3360μm to 100μm using Reltinger's, Kick's and Bond law. How do the three methods to calculate size reduction energy determination compare? (8 Marks)
(b) Discus four equipment applied in food centrifugation. In your discussion highlight the principle of centrifugation. (8 Marks)
(c) Discuss two application of size reduction in solids and liquids. (4 Marks)