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University Examinations 2012/2013

THIRD YEAR, FIRST SEMSTER, EXAMINANATIONS FOR DEGREE OF FOOD SCIENCE TECHNOLOGY

AFS 2302: FOOD ENGINEERING II

DATE: AUGUST 2013 **TIME: 2 HOURS**

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

QUESTION ONE – (30 MARKS)

a) Differentiate between sorting and grading (2 Marks)
b) Describe the principle of electrostatic cleaning. (4 Marks)
c) Discuss blanching as is used as a preliminary operation in vegetable processing. (3 Marks)

d) Discuss two equipment employed in moving grains form lower to a upper floor in a processing industry. (6 Marks)

f) Discuss the principle of centrifugation (3 Marks)

g) Briefly discuss the principle of ultrasound in food preservation. (3 Marks)

h. What is the power required to crush 100 tonne/h of elements if 80% of the feed pass 50.8mm screen and 80% of the product a 3.175mm screen. The work index of elements is 12.74. (3 Marks)

i. Milk was allowed to stand for long cream formed at the surface. Discuss why it forms and how to prevent it. (6 Marks)

QUESTION TWO – (20 MARKS)

a) Discuss the mechanism by which microwave oven heats food. (8 Marks)
b) Discuss four applications of emulsification in food industry. (8 Marks)
c) Discuss two equipment used in mixing of solids. (4 Marks)

QUESTION THREE – (20 MARKS)

a) Briefly describe these equipment, how they function and application in food industry;
   i. Crushing rolls
   ii. Plate mill
   iii. Screw conveyor
   iv. Concentric drum screen
   v. Aspiration screens (15 Marks)

b) A solution of ethanol contain 40% ethanol by weight. Calculate the mole fraction of ethanol and water in the solution. (5 Marks)

QUESTION FOUR – (20 MARKS)

a) Differentiate between steady state and unsteady state heat transfer. (4 Marks)
b) Name and describe briefly three equipment used in filtration. (6 Marks)
c) The power required to mill grain at 10,000kg per hour is 67.5 N. 80% of the initial distribution can pass through a sieve of 3360umwhile 80% final distribution can pass through a sieve size of 300um.

i. Determine the work index for the grain using bond's law
ii. Determine the total power requirement using Bond's law, Rethiger's law and Rick's law to mill down to distribution where 80% pass through a 100 um sieve. (10 Marks)