MERU UNIVERSITY COLLEGE OF SCIENCE & TECHNOLOGY

P.O. Box 972-60200 Meru - Kenya. Tel: 020-2092048, 020 2069349
Fax: 020-8027449

University Examinations 2012/2013

SECOND YEAR, SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR
OF SCIENCE IN FOOD SCIENCE AND TECHNOLOGY

AFS 2207: FOOD ENGINEERING 1

DATE: DECEMBER 2012   **TIME: 2 HOURS**

INSTRUCTIONS: *Answer question ONE and any other TWO questions*

QUESTION ONE –   30 MARKS

(a) Define the following terms as used in Food Engineering.
  (i)   Z-Value   (2Marks)
  (ii)   Thermal death time   (2Marks)
  (iii)   Doubling time in microorganism   (2Marks)

(b) How does a centrifuge work?   (5Marks)
(c) What is heat flux?   (2Marks)
(d) Why do small Vats heat faster than big Vats?   (5Marks)
(e) In thermal process design, which 3 factors are of high importance? Explain   (10Marks)
(f) What is specific weight of a matter?   (2Marks)

QUESTION TWO – 20 MARKS

You are supposed to make l000kg of sausage with 24% fat from two meats A 15% fat and B 30% fat.

(i)   Calculate how much of each meat is required (use mass balance and Pearson square) (10Marks)
(ii)   If the meat A above cost Ksh. 250/kg, what is the proportion of cash of A to total cost of
         producing 1000kg of sausage if 1Kg of sausage is 500/Kg?   (10 Marks)

QUESTION THREE – 20 MARKS

The D-value of B-Cereus at 121°C is 0.3 minutes, while that of C-botulinum is 4.5 minutes in the same medium at the same temperature. The initial spore count is 50,000 spores/ml for B-cereus spores, while C-botulinum is 120,000/ml. If the process at 121°C is meant to reduce B-Cereus count to 10spores/ml.

Calculate the C-botulinum expected after holding at 121°C   (20Marks)

QUESTION FOUR -20 MARKS

A cold room is 12m x 12m x 12m is to be constituted using a 2.5cm inner wood layer, xcm of polythene and outer wood 5cm. The thermal conductivity of inner wood is 0.125, polythene 0.025 and outer wood is $0.11W/ M^2$ °C. The refrigeration capacity available is 2.5kw and works at an efficiency of 80%.

Calculate the required polythene layer assuming temperatures from inside is 0° and outside 3°C

QUESTION FIVE – 20 MARKS

Calculate the volume and height h_1 of the liquid oil in the column.   (20Marks)

D=1.6

Oil

S.g = 0.86

V

h_1

Px

h_2 12cm

h_3 18cm   Hg S.G = 13.6

Hg