AE 4109 - System Concepts Applied to Postharvest Applications
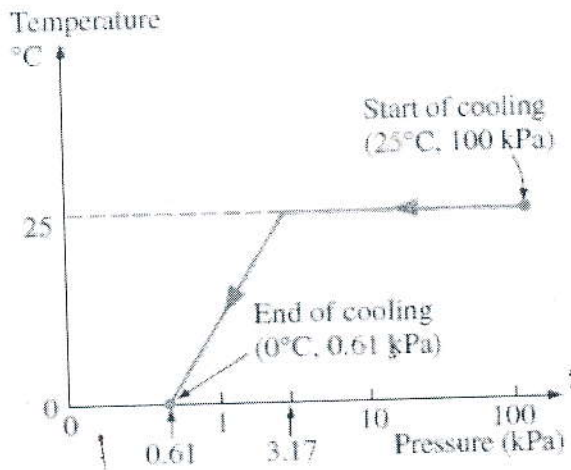
Practical Examination

me: Two hours
nswer all questions

01. Following observation was made by a student during her research on vacuum cooling. Her observation on the variation of temperature of bananas with pressure is given the graph below.

i) Explain the effect of heat of vapourization on product temperature.

ii) Explain the stages of cooling observed by the student.

iii) If the average heat of vaporization can be taken to 2466 kJ/kg and the specific heat of the product is about 4 kJ/kg.^{0}C, determine the temperature at which the vaporization of 0.01 kg of water takes place from 1kg of product.

02. Comment on the changes that you observed in the psychrometric properties of air during grain drying in a solar dryer. Support your answer with a suitable diagram.

03. A group of students attempted to determine the drying constants in the Page's drying model for which about 5 kg of paddy with an initial moisture content of 31% was dried in a solar dryer. The moisture content of the grains was frequently determined at 1 hour intervals for about 7 hours. The data recorded by the students are tabulated below.

Time	Grain moisture content (%)
9.00 am	31
10.00 am	29
11.00 am	24
12.00 noon	20
1.00 pm.	17
2.00 pm	14
3.00 pm	13.5
4.00 pm	13.0

(i) Plot a graph against moisture ratio against drying time.

(ii) Determine k and n in the Page's model.

Page's Model

$$MR = Exp\left(-Kt^n\right)$$

Where

k, n – drying constants

MR – Moisture Ratio

t - Time