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University Examinations 2012/2013

THIR YEAR, FIRST SEMSTER, EXAMINANATIONS FOR DEGREE OF BACHELOR OF SCIENCE IN HORTICULTURE

ABE 2321: HORTICULTURAL STRUCTURE

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

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

QUESTION ONE – (30 MARKS)

a) Using examples describe 3 ways of classifying farm structures. (3 Marks)
b) What role equ(do) farm structure play in realization of food security in Kenya. (4 Marks)
c) Discuss the main climatic elements influencing the quality of the environment in agricultural building and suggest ways of manipulating them. (10 Marks)
d) Explain the difference between isometric and orthographic projection. (4 Marks)
e) Describe how the following psylometric properties of air influence greenhouse plant product. State how they can be modified to optimize plant production.
   (i) Temperature (4 Marks)
   (ii) Humidity ratio (4 Marks)
f) Differentiate between dead load and live load (1 Mark)

QUESTION TWO (20 MARKS)

a) Protected cultivation is gaining popularity in Kenya. Differentiate between a greenhouse, a tunnel and a hot bed. (3 Marks)
b) Calculate the minimum air exchange rate to maintain the temperature within a 100mx50m greenhouse completely covered with a crop at 27^{o} when the outside temperature is 22^{0}c if the maximum solar radiation level is $1000m^{-}2$ heat transmission coefficient of the dadding '*u*'= $8um^{-2o}c^{-1}$ transmission coefficient 't' of 0.7
   Crop factors F-1
   Ratio radiation energy 'E'of 0.5
   Specific heat at dry air 'c' of1010 $jkg^{-1o}c^{-1}$

Specific weight of air -1.14 kgm^{-1}
Wall height of the greenhouse of 3m
Multispan structure roof of 10span each 5m wide with a roof angle of 26^0
Roof angle of 26^o

c) Using examples, describe the three (3) ways of classifying storage structure (9 Marks)
d) List three (3) feature to consider in the design of fruit support structures (3 Marks)

QUESTION THREE (20 MARKS)

a) Briefly describe sex (6) parameters to consider when designing a greehouse (6 Marks)
b) List two advantages and two disadvantages of using insect proof screen to cover the side walls of a greenhouse. (4 Marks)
c) A green ownes in Meru has realized that his plants are not doing well, He observed dirt on the roof (resulting from dust hence varies with season) The farm is located at an altitude 2000m with average wind speed of 2mls, average amblect air temperature of 25oc and atleast 1000mm of rainfall per annum. Calculate the solar radiation inside a greenhouse with the dirt deposits shown below. Assume the average intensity of solar radiation outside the greenhouse is 671.29w/m2 and the value of constants 'a' and 'b' is as shown in the brackets;
   i. Clear (a=0.65, b=0.0004) (3 Marks)
   ii. Dirt deposition $6mg/m^2$ (a=0.45, b= 0.0065) (1 Mark)
   iii. Dirt deposit $110mg/m^2$ (a=0.30, b=0.0068) (1 Mark)
   iv. Suggest a possible solution (2 Marks)

d) Outline 3 advantage of cold storage (3 Marks)

QUESTION FOUR (20 MARKS)

a) Surveying of virgin land is important before establishing a farming enterprise.
   i) Describe the process of surveying (6 Marks)
   ii) Give three errors that may arise when using chain or tape surveying and suggest ways of overcoming the errors. (5 Marks)
b) 40kg of air goes from a dry bulb temperature of 30oc and 60% relative humidity to a dry bulb temperature of 40c and 80% relative humidity.
   i. Give 4 properties of air at the initial condition (2 Marks)
   ii. Give 4 properties of air at the final condition (2 Marks)
   iii. Determine the amount of moisture removed (3 Marks)
c) Suggest ways of mitigating the negative effects of wind (2 Marks)