

UNIVERSITY OF SWAZILAND
FINAL EXAMINATION PAPER - MAY 2006

BSc.

TITLE : AGRICULTURAL SYSTEMS

COURSE NUMBER: GEP 326

TIME ALLOWED : THREE (3) HOURS

INSTRUCTIONS : 1. THIS PAPER CONTAINS TWO (2) SECTIONS, A AND B.
2. ANSWER FOUR (4) QUESTIONS.
3. CHOOSE TWO (2) QUESTIONS FROM EACH SECTION.
4. WHERE APPROPRIATE ILLUSTRATE YOUR ANSWER
WITH EXAMPLES AND DIAGRAMS.

MARKS ALLOCATION: EACH QUESTION CARRIES TWENTY FIVE (25)
MARKS.

THIS PAPER IS NOT TO BE OPENED UNTIL PERMISSION HAS BEEN GRANTED
BY THE INVIGILATOR.

SECTION A: ANSWER ANY TWO (2) QUESTIONS

QUESTION 1

Considering von Thunen's theory of agricultural location and his concentric rings, explain what is likely to happen when the following modifications are introduced:

- (a) The spatial margin of production is extended. (5 marks)
 - (b) The spatial margin of production is reduced. (5 marks)
 - (c) Variations in the productivity of land. (5 marks)
 - (d) Variations in transport costs resulting from the introduction of an alternative transport system. (5 marks)
 - (e) Alternative markets. (5 marks)
- [25 marks]

QUESTION 2

Discuss the impact of agricultural chemicals on land and water resources in Swaziland, and suggest measures which can reduce the severity of the problem.

[25 marks]

QUESTION 3

Table 1 shows production possibilities under different probable weather conditions. Carry out the necessary calculations and indicate the crops the farmer is likely to grow under the following strategies:

- (a) Minimum regret (12 marks)
 - (b) Obtaining highest possible income (13 marks)
- [25 marks]

Table 1: Production possibilities under different weather conditions. (returns per ha in US \$).

Crop Types	Very Dry (.20)	Dry (.30)	Average (.40)	Wet (.30)	Very Wet (.30)
Oats	13	14	18	30	22
Rice	11	14	19	21	23
Wheat	26	22	18	13	9
Sorghum	13	18	24	18	12

Source: Hypothetical

SECTION B: ANSWER ANY TWO (2) QUESTIONS

QUESTION 4

- (a) With suitable illustrations, define the principles of operation of each of the four different methods that could be employed to estimate average areal precipitation over a given extended cropping area. (15 marks)
- (b) "Different soil properties and rainfall regimes can either favourably or adversely affect crop performance" Discuss. (10 marks)
- [25 marks]**

QUESTION 5

- (i) Explain how photosynthesis occurs. (10 marks)
- (ii) Discuss the different methods that may be employed to measure or determine field soil moisture content. (15 marks)
- [25 marks]**

QUESTION 6

- (a) Discuss Swaziland's agro-climatology and how the country may further enhance agricultural productivity by fully utilising knowledge of this discipline in its practices. (10 marks)
- (b) Explain how to determine a typical crop's water requirement for its growth cycle with varying water supply. (5 marks)
- (c) Discuss the principles of climate management for purposes of optimising crop yield and ensuring crop protection. (10 marks)
- [25 marks]**