60

UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

PROGRAMME: BACHELOR OF SCIENCE IN AGRONOMY YEAR 3

COURSE CODE: CP 307

TITLE OF PAPER: FIELD EXPERIMENTATION

TIME ALLOWED: TWO (2) HOURS

INSTRUCTION: ANSWER QUESTIONS 1 AND 2, WHICH ARE COMPULSORY AND ANY OTHER TWO QUESTIONS OF YOUR CHOICE.

NOTE: STUDENTS TO BE PROVIDED WITH RANDOM NUMBER TABLE OF 10

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QUESTION 1

(THIS IS A COMPULSORY QUESTION)

Write on the following terms. Each answer carries seven marks.

[a]. Experimental designs and basis for their use.
[b]. National and international research organisations conducting research in Swaziland and the areas of mandate.
[c]. Correlation and regression and their interpretations.
[d]. Statistical tools for mean separation and how they are used.

[28 marks]

QUESTION 2

(THIS IS A COMPULSORY QUESTION)

Table 1 shows maize yields [g/plot] from a two-factor experiment conducted at Luyengo on the effects of three sources of nitrogen [factor A] and four rates of each [factor B].
Number of replications: 4
Net plot: One row each 4.5 m log
Answer the following questions:
[a] Calculate seed yield [kg/ha] for Table 1 [6 marks].
[b] Draw graphs [seed yield (kg/ha)] for the main effects and for the interaction effects and draw conclusions [12 marks]
[c] Complete Table 2 below [10 marks].

Table 1. Maize seed yield [g/plot] of three nitrogen sources at four rates of each.

Source of nitrogen	Rates of nitrogen [kg/ha]	Seed yield [g/plot]
Limestone ammonium nitrate	0	762.7
Limestone ammonium nitrate	20	2,049.5
Limestone ammonium nitrate	40	3630.9
Limestone ammonium nitrate	80	565.0
Urea	0	2,266.8
Urea	20	3,393.2
Urea	40	854.0
Urea	80	2,549.5
Sodium nitrate	0	4,075.9
Sodium nitrate	20	590.0
Sodium nitrate	40	2095.0
Sodium nitrate	80	3,170.9

Table 2. ANOVA table [uncompleted] for a two-factor experiment

Source of variation	Degrees of freedom	Sum of squares	Mean square	F value
Replication		121809.3		
Factor A		132659.8		
Factor B		42851.2		
Interaction		23998.3		
Error		741234.3		Not applicable
Total		Not applicable	Not applicable	Not applicable

[28 Marks]

QUESTION 3

Using a tabular format, give a brief meaning/explanation/description, two advantages and two disadvantages of the terms below. Reproduce the table in your answer booklet. Each answer carries 5 marks except [d] which carries 4 marks

List	Term	Brief meaning/ explanation	Advantages	Disadvantages
a	Applied research			
b	Venn diagram			
c	Single factor experiments			
d	On-farm research			

[22 marks]

QUESTION 4

A researcher plans to conduct an experiment on the response of dry beans [*Phaseolus vulgaris* (L.)] varieties to three plant densities [100,000, 200,000 and 300,000 plants/ha] at the Luyengo. The inter-row spacing is 50 cm.

(a) What experimental design would you recommend and why? [4 marks]
(b) Give your hypothesis for the experiment [2 marks]
(c) How many replicates would you use and why? [4 marks]
(d) Calculate the intra-row spacings for each treatment [3 marks]
(e) Write a skeletal analysis of variance table for the experiment for sources of variation and degrees of freedom [3 marks]
(f) If the researcher plans to use limestone ammonium nitrogen [LAN] as a source of nitrogen for the experiment, how many grams of LAN should the researcher apply per plant at the medium plant density? [6 marks]

(22 Marks

QUESTION 5

You have been appointed as a Research Officer [Agronomist] for Root and Tuber Crops at Malkerns Research Station, Malkerns, in the Ministry of Agriculture. Explain how you would determine and set your research priorities.

(22 Marks)