

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DIPLOMA IN ANIMAL HEALTH AND PRODUCTION

AGRI 0291: AGRICULTURAL STATISTICS AND EXPERIMENTATION

STREAMS: DIP. ANHE

TIME: 2 HOURS

DAY/DATE: FRIDAY 07/12/2018

2.30 P.M. – 4.30 P.M.

INSTRUCTIONS:

This examination has two section A and B. the candidate should answer all questions in section A and any two (2) questions in section B. this examination contributes 70 marks to the final grade

SECTION A (Short answer questions. Answer all questions in this section) – 30 marks]

QUESTION 1

- (a) What is an experiment? [3 marks]
- (b) Why is randomization important during experimentation? [2 marks]

QUESTION 2

Data scrutiny is important during the time of conducting experiments

- (a) Who does the data scrutiny? [2 marks]
- (b) The yield data in kilograms collected from a trial testing the performance of 3 Rhodes grass varieties was as follows:

Variety	Block I	Block II	Block III
A	28.5	24.7	30.2
B	40.3	35.2	38.7
C	29.5	5.2	30.7

What data is of concern to the researcher and why?

[3 marks]

QUESTION 3

- (a) What is a single factor experiment? [2 marks]
- (b) Briefly explain the technique of analyzing data from a single factor experiment. [3 marks]

QUESTION 4

- (a) Define analysis of variance (ANOVA) [2 marks]
- (b) The Least Significance Difference (LSD) is a popular procedure of comparing means from a field trial. What are the characteristics of this procedure? [3 marks]

QUESTION 5

- (a) Completely Randomized Design (CRD) is frequently used in field experiments. What are the advantages and disadvantages of this design? [5 marks]
- (b) Compare and contrast Randomized Complete Block Design (RCBD) and Latin Square Design. Which design is appropriate for experiment with two (2) known sources of variation [5 marks]
- (c) Why are factorial experiments useful in testing effects of two or more experimental variables [5 marks]

SECTION B: Answer any two (2) questions from this section (40 marks)

QUESTION 6

A field experiment was conducted at Chuka University Research farm to compare the performance of two varieties A and B of Napier grass in a uniform field divided into 20 equal experimental plots. Using a random process the varieties were planted to plots with 10 plots for each variety. Below are the yields in kg/plot.

Variety	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 9	Plot 10
	83.9	65.2	63.9	73.2	73.6	78.7	61.8	56.7	86.2	65.7
	47.7	51.3	53.1	37.8	54.9	40.5	53.3	37.8	38.7	40.5

Using the data provided in the table above answer the following:

- (a) The total and average yield of each variety [5 marks]
- (b) The sum of squares for each variety [5 marks]
- (c) The uncorrected sum of squares for each variety [5 marks]
- (d) The variance [5 marks]

QUESTION 7

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A randomized Complete Block Design (RCBD) experiment consisted of 4 treatments in 3 replicates. The experiment field was divided into three (3) blocks. On the basis of the foregoing information:

- (a) Determine the following:
 - (i) The total degrees of freedom [3 marks]
 - (ii) The blocks degrees of freedom [3 marks]
 - (iii) The treatments degrees of freedom [3 marks]
 - (iv) The error degrees of freedom [3 marks]
- (b) What are the advantages of using Randomized Complete Block Design [3 marks]
- (c) After analyzing the data from the experiment the researcher rejected the true null hypothesis. What type of error was committed in this experiment? [2 marks]
- (d) Why is it necessary to test the block effects when using the Randomized Complete Block Design? If there were no block effects, which design would appropriate for the experiment? [5 marks]

QUESTION 8

In a Latin Square Design randomization is done first in rows and then in columns of a randomly chosen square.

- (a) In a Latin Square design experiment with 4 columns, 4 rows and 4 treatments determine the sources of variation and corresponding degrees of freedom to analyze the experimental data. Show the workings to get full credit [10 marks]
 - (b) List the advantages and disadvantages of using a Latin Square design [5 marks]
 - (c) What is the ideal number of treatments for the Latin Square design and what would happen if there is interaction observed between the rows and columns? [5 marks]
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