

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

**EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF
SCIENCE FOOD SCIENCE**

AGRI 291: STATISTICS FOR AGRICULTURE

STREAMS: BSC FOST Y2S2

TIME: 2 HOURS

DAY/DATE: TUESDAY 18/4/2023

2.30 P.M. – 4.30 P.M.

INSTRUCTIONS:

1. The paper contains section A and B
2. Answer all questions in section A and any two from section B
3. Marks for each question are indicated in parenthesis ()
4. Total marks =70

SECTION A: TOTAL MARKS 30 MARKS

QUESTION ONE

Differentiate the following statistical terms;

- i) Observation and variable (2 marks)
- ii) Parameter and Statistic (2 marks)

QUESTION TWO

A basket contains 6 oranges and 4 lemons. Two fruits are drawn with replacement from the basket. What is the probability that both of the fruits are lemons? (4 marks)

QUESTION THREE

- a) Statistics has two essential parts namely descriptive statistics and inferential statistics. Briefly explain these two essential parts. (6 marks)

- b) Find an estimate of the mean, variance and standard deviation of the following data for the marks obtained in a test by 88 students. (6 marks)

Table 1: Student marks

Marks (x)	Frequency (f)
$0 < x < 10$	6
$10 \leq x < 20$	16
$20 \leq x < 30$	24
$30 \leq x < 40$	25
$40 \leq x < 50$	17

QUESTION FOUR

An experiment was conducted to determine the effect of three (3) methods of soil preparation on the first year of growth of Mango seedlings. Four locations (Farm land) were selected and each location was divided into Three (3) plots. A RCBD was employed using locations as blocks. The method of soil preparation was: A (No fertilizer), B(light fertilization), C(Burning). The observations recorded were the average first year growth of seedlings on each plot. On the basis of the given information

- i) Provide a linear model for this experiment and define terms. (2 marks)
- ii) Explain the importance of hypothesis. (8 marks)

SECTION B: TOTAL MARKS 40**QUESTION FIVE**

- a) A factorial experiment was conducted with the following factors: 4 levels of A, 3 levels of B and 2 levels of C in a completely randomized design. On the basis of the aforementioned:
 - i) Determine the number of experimental units. (1 mark)
 - ii) Show the analysis of variance (ANOVA) with sources of variation and degrees of freedom. (7 marks)
- b) Variation in agricultural field experiments is a common phenomenon. Explain why variation occurs and how it can be minimized to reduce their impacts on results. (12 marks)

QUESTION SIX

An experiment was conducted to study the effects of two factors on the quality of pancakes. The two factors used were the amount of **whey** and **whether or not a supplement** was used. There are four levels of whey (**0%, 10%, 20% and 30%**) and two levels of supplement (used and not used) giving a total of treatment combinations. The higher the rating the better the quality. The results were as follows

Whey				
	0%	10%	20%	30%
No supplement	4.4	4.6	4.5	4.6
	4.5	4.5	4.8	4.7
	4.3	4.8	4.8	5.1
Total	13.2	13.9	14.1	14.4
Supplement	3.3	3.8	5.0	5.4
	3.2	3.7	5.3	5.6
	3.1	3.6	4.8	5.3
Total	9.6	11.1	15.1	16.3

- (i). Obtain the ANOVA table and test at $\alpha = 0.01$ to see if there is any variation among the whey and the supplements on the quality pancakes. ($F_{3,16} = 5.29$) (16 marks)
- (ii). Find if there is any interaction between the whey and supplements on the quality of pancakes. ($F_{3,16} = 5.29$) (4 marks)

QUESTION SEVEN

- a) Agricultural research is commonly carried out in form of field experiments. The accuracy of the results/data/findings from such experiments can be affected by poor experimental procedures and designs. Explain how you would apply the following principles and the importance of each in agriculture field experiments.
- (i). Replication (5 marks)
- (ii). Local control (4 marks)
- b) The outcome of agricultural research depends on the experimental design among other factors. Explain what to consider when choosing an experimental design. (6 marks)

- c) Agricultural researchers undertake experiments and research for different reasons. With examples, explain reasons for carrying out agricultural research in Kenya. (5 marks)
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