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UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DIPLOMA IN AGRICULTURE
AND ANIMAL SCIENCE

AGRI 0291: AGRICULTURAL STATISTICS AND EXPERIMENTATION

STREAMS: DIP. AGRIC & ANSC (Y2S2)

TIME: 2 HOURS

DAY/DATE: TUESDAY 11/04/2023

2.30 P.M. – 4.30 P.M.

INSTRUCTIONS:

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

SECTION A (40 MARKS)

QUESTION ONE

- (a) What is replication and its purpose [5 marks]
- (b) Differentiate between type I and Type II error in an experimentation [5 marks]

QUESTION TWO

- (a) What is the importance of measures of central tendency and measures of dispersion. [5 marks]
- (b) Enumerate the elements of descriptive and inferential statistical problems. [5 marks]

QUESTION THREE

The weight of nine randomly selected orange fruits were shown in the table below in grams.

Table 1: The weight of orange fruits in grams

SN	WEIGHTS
1	6
2	7
3	10
4	11
5	11
6	13
7	16
8	18
9	25

Find:

- (i) Sample means [2 marks]
- (ii) Sample variance [2 marks]
- (iii) Sample median [2 marks]
- (iv) Sample range [2 marks]
- (v) Standard deviation [2 marks]

QUESTION FOUR

- (a) Define the term analysis of variance (ANOVA) [2 marks]
- (b) An experiment was conducted using Randomized Complete Block Design (RCBD) with four (4) replications, six (6) treatments and three (3) samples from each experimental unit. On the basis of the foregoing information. Show the analysis of variance (ANOVA) with sources of variation and degrees of freedom. [5 marks]
- (c) A good experimental design is key for a successful agricultural experiment. Explain the factors to consider when choosing a good experimental design. [3 marks]

SECTION B (40 MARKS)

QUESTION FIVE

- (a) What is hypothesis testing [2 marks]
- (b) Enumerate the characteristics of a good hypothesis [3 marks]
- (c) Explain the steps in hypothesis testing [10 marks]

QUESTION SIX

A random sample of 10 avocado farmers from Meru County were surveyed to know the yields they achieve during the short rains and long rains respectively. The results were given in tons as shown in the table below. The county government would like to develop a regression equation which they will use to predict yields for the next long rains.

Table 2: the short and long rain avocado yields in ton/ha

Farmer	Short rain yield (tons/ha) (X)	Long rain yield (tons/ha) (Y)	X ²	XY
1	98	90	9604	8820
2	66	74	4356	4884
3	100	98	10000	9800
4	96	88	9216	8448
5	88	80	7744	7040
6	45	62	2025	2790
7	76	78	5776	5928
8	60	74	3600	4440
9	74	86	5476	6364
10	82	80	6724	6560
Total Σ				

- (a) Develop the regression equation the county government will use for predicting the next long rain yields for Avocado. [10 marks]
- (b) If the short rains yields were 60 and 80 tons respectively. What are the projected long rain yields for?
- (i) 60 tons [2 marks]
- (ii) 80 tons [2 marks]
- (iii) Explain the projected long rain yields in (i) and (ii) [1 mark]

QUESTION SEVEN

In the table below you are given a plan and yield kg/plot of a 5 x 5 Latin square experiment on wheat crop carried out for testing the effects of five manorial treatments A, B, C, D and E. note A denotes control

Table 3: Wheat crop manorial treatments plan and yield kg/plot

15 (B)	8 (A)	15 (E)	20 (D)	17 (C)
9 (A)	21 (D)	19 (C)	16 (E)	13 (B)
18 (C)	12 (B)	23 (D)	8 (A)	17 (E)
18 (E)	16 (C)	10 (A)	15 (B)	23 (D)
22 (D)	15 (E)	13 (B)	18 (C)	10 (A)

Analyze the data and state your conclusions of the treatments given the α level at 5%=3.26.

[15 marks]
