JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF AGRICULTURAL AND FOOD SCIENCES

THIRD YEAR SECOND SEMESTER UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN HORTICULTURE AND BACHELOR OF SCIENCE IN SOIL SCIENCE

2019/2020 ACADEMIC YEAR

REGULAR

COURSE CODE: ALS 3328

COURSE TITLE: BIOMETRY

EXAM VENUE: **STREAM: BSc. Horticulture/BSc. Soil Science**

DATE: **EXAM SESSION:**

TIME: 2 HOURS

Instructions:

Answer ALL questions in section A and ANY other 2 Questions in section B.

1. **Candidates are advised not to write on question paper.**
2. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

SECTION A: [30 MARKS]

Answer ALL questions from this Section

QUESTION ONE [6 MARKS]

Distinguish between the following terms:

a. Experiment and Experimental unit [2 Marks]

b. Completely Randomized Block Designs and Latin Square Designs [2 Marks]

c. 2^2 and 2^3 Factorial Designs [2 Marks]

QUESTION TWO [6 MARKS]

a. Distinguish between Latin Square Design (LSD) and Completely Randomized Design (CRD) [2 marks]

b. Given treatments A, B, C, D, E, F draw tables to show how they can be arranged in:

i. CRBD [2 marks]

ii. LSD [2 marks]

QUESTION THREE [9 MARKS]

a. i. Explain what is meant by P-value in hypothesis testing [2 marks]

b. Data for a statistical test concerning μ yielded n = 50, σ = 12.57 $\bar{y}$ = 48.2

i. Determine the P-value for testing the H_0: μ= 45 H_1: μ> 45 [4 marks]

ii. Is there evidence to support the claim that μ greater than 45 at α = 0.05 [3 marks]

QUESTION FOUR [9 MARKS]

Agronomist wants to know farmers' opinion on rainfall distribution in a county. She selected opinions of 800 farmers from various wards in the county.

Opinion	Reliable	Erratic	Unpredictable
Counts	68	311	421

At 5% significance level test the claim that the rainfall distribution has remained the same over years [9 marks]

SECTION B: [40 Marks]

Answer any Two Questions from this Section.

QUESTION FIVE [20 MARKS]

	Seed Variety		
Fertilizer	A	B	C
1	6	9	8
2	5	6	9
3	7	7	7
4	5	7	8
5	7	8	8

a. i. Name the type of experimental design in use giving your reason [2 marks]

ii. Identify the response variable [1 mark]

iii. Identify the treatment factor(s) and their levels(s) [4 marks]

b. Determine:

i. total variation [3 marks]

ii. treatment variation [3 marks]

c.i. State hypotheses to test treatment effects [2marks]

ii. Draw conclusions on the test at 1% significance level [6 marks]

QUESTION SIX [20 MARKS]

A drug on trial is said to reduce HDL Cholesterol level is tried in two doses (5mg and 10 mg) on a number of sheep of two age-groups (1-2 years, over 2 years) in a farm. Cholesterol level observed on the sheep are in the table below.

	Dosage	
Age (years)	5mg	10mg
1-2	9, 5,6	14, 12, 10
Over 2	3, 6, 7	10, 8, 7

a. i. Name the type of experimental design in use giving your reason [2 marks]

ii. Identify the response variable [1 mark]

iii. Identify the treatment factor(s) and their levels(s) [4 marks]

b. i. Do interaction plots [6 marks]

ii. Interpret the interaction plots [1 mark]

c. Determine the treatment main effects [6 marks]

QUESTION SEVEN [20 MARKS]

A researcher sets to determine the impact of providing warmth to brooding chicks on their weight gain. She uses three sources of heat (No heat, Charcoal Jiko, Solar heater) and observes heat gain on the chicks after four weeks.

No heat	Charcoal Jiko	Solar heater
6	9	8
5	6	9
7	7	7
5	7	8
7	8	8

a. i. Identify the experimental design [2 marks]

ii. State response variable [1 mark]

iii. State treatment factors and their levels [3 marks]

b. Determine: i. Total variation [3 marks]

ii. Variation in the treatments [3 marks]

c. i. State hypotheses to be tested [2 marks]

ii. Draw your conclusions [6 marks]

QUESTION EIGHT [20 MARKS]

Blood is classified as A, B, AB, O. In addition, blood is classified as Rh^+ or Rh^-. In a survey of 500 randomly selected individuals the following results were obtained.

	Blood-type			
Rh-status	A	B	AB	O
Rh^+	176	28	22	198
Rh^-	30	12	4	30

It is desired to test for independence of Rh-status and blood-type

a. i. Identify the test to be carried out [1 mark]

ii. State hypotheses for the test [2 marks]

iii. determine expected counts [3 marks]

b. Time for seeds to germinate was investigated by varying vegetable type (kales and spinach) and type of soil (loam and clay)

	Soil	
Vegetable	Loam	Clay
Kales	7,6, 10,8,7	6,5, 5,7,7
Spinach	5, 7, 7, 7, 4	8, 7, 8, 9, 8

i. Identify the experimental design [1 mark]

ii. Is there evidence of combined effect between Vegetable type and Soil used in germination time [4 marks]

c. The effect of three catalysts A, B, C on time of water intake of some cereals are under investigation. Time in days of water intake of three cereals P, Q, R was observed over three days and results are given in the table below.

	Day		
Cereal	1	2	3
P	B(12)	A(7)	C(17)
Q	C(10)	B(7)	A(4)
R	A(20	C(8)	B(12)

Identify:

i. type of design used [1 mark]

ii. response variable [1 mark]

iii. treatment factor [1 mark]

iv. determine significance of treatment effects at $\alpha = 5\%$ [6 marks]