

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

FIRST YEAR EXAMINATION FOR THE AWARD OF DEGREE OF MASTER OF SCIENCE IN CROP PROTECTION, MASTER OF SCIENCE IN DRYLAND FARMING, MASTER OF SCIENCE IN AGROECOLOGY AND CLIMATE CHANGE, MASTER OF SCIENCE IN PLANT BREEDING, MASTER OF SCIENCE IN ANIMAL SCIENCE, MASTER OF SCIENCE IN ANIMAL BREEDING AND GENOMICS, MASTER OF SCIENCE IN BIOCHEMISTRY, MASTER OF SCIENCE IN CHEMISTRY, MASTER OF SCIENCE IN BOTANY (PLANT PATHOLOGY), MASTER OF SCIENCE IN MEDICAL PARASITOLOGY, MASTER OF SCIENCE IN GENETICS, MASTER OF SCIENCE IN AGRICULTURAL EXTENSION, MASTER OF SCIENCE IN AGRICULTURAL ECONOMICS AND MASTER OF SCIENCE IN HORTICULTURE

AGRI 891: DESIGN AND ANALYSIS OF EXPERIMENTS

AGEC 850: STATISTICS FOR AGRICULTURE

AECC 881: BIOMETRY FOR AGRO-ECOLOGY AND CLIMATE CHANGE

BOTA 803: BIOMETRY EXPERIMENTATION AND METHODOLOGY

CHEM 801: ADVANCED CHEMOMETRICS

MATH 800: BIOMETRY

MEPA 830: BIostatISTICS AND EPIDEMIOLOGY

STREAMS: MSC

TIME: 3 HOURS

DAY/DATE: TUESDAY 10/12/2024

2.30 P.M – 4.30 P.M.

INSTRUCTIONS

Answer all questions in section I and any **TWO** questions in section II.

Use of calculators and statistical tables is allowed.

Do not write anything on the question paper.

SECTION ONE (COMPULSORY)

QUESTION ONE (20 MARKS)

(a) Discuss the various types of data measurements.

(6 marks)

(b) The following computer output show two sets of the analysis of results from an experiment on the effect of media type and temperature of bacteria growth. Interpret the two outputs. (14 marks)

Model I-Response variable: Growth rate

Analysis of variance

Source of variation	df	Sum of Squares	Mean Square	F Value
Model	1	739603	739603	1557.06
Error	225	106875	474.99900	
Corrected Total	226	846478		

Statistics

Root MSE	21.79447	R-Square	0.8737
Dependent Mean	231.38799	Adj R-Sq	0.8732
Coeff Var	9.41902		

Estimates of regression coefficients

Variable	df	Parameter Estimate	Standard Error	t Value
Intercept	1	12.71642	5.72734	2.22
Temperature	1	11.85934	0.30054	39.46

Model II-Response variable: Growth rate

Analysis of variance

Source of variation	df	Sum of Squares	Mean Square	F Value
Model	2	769744	384872	1123.51
Error	224	76734	342.56179	
Corrected Total	226	846478		

Statistics

Root MSE	18.50842	R-Square	0.9093
Dependent Mean	231.38799	Adj R-Sq	0.9085
Coeff Var	7.99887		

Estimates of regression coefficients

Variable	df	Parameter Estimate	Standard Error	t Value
Intercept	1	-85.57970	11.55292	-7.41
Temperature	1	11.26744	0.26291	42.86
Growth media	1	1711.39569	182.44902	9.38

SECTION II (40 MARKS): ANSWER ANY TWO QUESTIONS
QUESTION TWO (20 MARKS)

An experiment to determine the effect of temperature (at 2 levels) and pressure (at 3 levels) on the strength a synthesis material was laid down in Randomised Complete Block Design (RCBD) and replicate three time.

- (i) State an appropriate hypothesis. (1 marks)
- (ii) Generate a layout for this experiment. (6.5 marks)
- (iii) Write down the statistical model. (3 marks)
- (iv) Show the possible results of the analysis. (9.5 marks)

QUESTION 3 (20 MARKS)

The following results are coded values of yield of cowpea under different treatments (Factor A) and grown at three locations (Factor B).

Location	Block	Treatment 1	Treatment 2
Embu	1	12	9
	2	10	7
	3	11	8
Chuka	1	10	5
	2	9	6
	3	11	4
Meru	1	15	10
	2	14	11
	3	15	10

- (a) Give the design model for the experiment. (2 marks)
- (b) Perform the analysis of variance. Use $\alpha=0.05$. (15 marks)
- (c) Apply the Least Significance Difference (LSD) to separate the means of the Factor B. (3 marks)

QUESTION FOUR (20 MARKS)

An experiment was carried out to test the effect of temperature on bacterial growth giving the following data.

	Block	A	B	C
20°C	1	37	41	36
	2	35	37	38
	3	38	42	39
25°C	1	42	37	33
	2	39	43	37
	3	44	47	41
30°C	1	44	45	39

	2	47	49	39
	3	48	46	46

Analyse the data using an appropriate design. Use $\alpha=0.05$.

(20 marks)
