MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF AGRIBUSINESS MANAGEMENT AND TRADE

THIRD YEAR SPECIAL/ SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENSION

AGR 291: STATISTICS FOR AGRICULTURE

DATE: 19/01/2021   TIME: 8.30-10.30 AM

INSTRUCTIONS;

Instructions: Answer question ONE and any other TWO questions

QUESTION ONE

a)   Distinguish the following terms:

     i.   Parameter and statistics   (2 marks)

     ii.   Sample and population   (2 marks)

b)   Explain three types of variables considered in collecting any survey data   (6 marks)

c)   Explain when to use the following types of analysis   (4 marks)

     i.   Correlation

     ii.   Regression

d)   i)   Explain three characteristic to consider before choosing the type of measures of central tendencies   (3 marks)

     ii)   Using the data given in Table 1 below determine the mean   (4 marks)

Table 1: Frequency distribution data

Class limits	Frequency (fi)
5-10	1
10-15	4

15-20	3
20-25	9
25-30	13
30-35	12
35-40	4
40-45	2
45-50	2

e)   You collected data on animal weights and obtained the results given below.

    i)   95% limits: lower 681.8 g   upper 851.6 g

    ii)   99% limits: lower 646.9 g   upper 886.5 g

    Interpretation the data   (2 marks)

f)   i)   Explain four reasons why randomized complete block design (RCBD) is preferred when carrying out field experimentation   (4 marks)

    ii)   Explain three advantages of using completely randomized design (CRD)   (3 marks)

g)   Explain the following terms as used in statistics

    i)   Standard error of mean   (2 marks)

    ii)   Coefficient of variation   (2 marks)

    iii)   Type I error (α)   (2 marks)

h)   Explain the different between null and alternate hypotheses in crop production research

                                                         (4 marks)

SECTION B: Answer any FOUR Questions (40 Marks)

QUESTION TWO

a)   A plant breeder conducted an experiment to test whether his new variety of tomato yielded better than the existing variety. He found that the yield of his new variety was higher than that   of existing variety, and that the **difference was significant** between 0.05 and 0.01 levels of probability (i.e. 0.05<P>0.01).

    i.   State the null and alternate hypothesis   (4 marks)

    ii.   State and explain which level of significance indicates greater degree of confidence in the above context   (5 marks)

iii.   Explain the term **'difference was significant'** in the context of the study carried out

(4 marks)

iv.   State and explain the statistical test that was likely used in this study   (4 marks)

b)   Explain the implications of acceptance limits   when testing differences between two sample means   (3 marks)

QUESTION THREE

a)   The following data in Table 2 below,   was obtained from an experiment conducted to determine the effect of insecticides on number of dead insects after a spray on a marked area.

Table 2: Observations on number of dead insects after a insecticide spray

Insecticide	Sample size (n_i)	Observations	Mean	Total
A	4	10, 8, 12, 10	10	40
B	6	24, 27, 30, 26, 29, 32	28	168
C	5	18, 21, 17, 20, 19	19	95
Total				303

Table 3: ANOVA table

Sources of Variation	Degrees of Freedom (df)	Sum of Squares (SS)	Mean square (MS)	F Calculated (F_{cal})	F Table (F_{table}) 1%
Insecticides					
Error					
Total					

i)   Complete the ANOVA table in Table 3 above   (10 marks)

ii)   Identify design used   (2 marks)

iii)   Interpret the results   (2 marks)

b)   Assume you intent to carry out a survey on adoption of technology by farmers and marketers in Makueni county, explain three methods of sampling your respondents

(6 marks)

QUESTION FOUR

a)   i)   Table 4 below gives a summary of effects of different acids on shoot growth. Mean separation was done based on least square difference. Draw your conclusions at the 95% confidence level   (4 marks)

Table 4: Mean performance of different acids on plant shoot growth

Treatment	Mean	LSD
Control	4.19	a
HCl	3.87	b
Propionic	3.73	c
Butyric	3.64	c

Explain why the scientist should not have used complete random design

(4 marks)

b)   Use the data given for the average weight (g) of fruits per plant of tomato grown in 12 plots to answer the questions below.

840	750
680	890
890	1000
720	570
540	830
720	770

i.   Calculate the mean   (2 marks)

ii.   Calculate the standard deviation   (6 marks)

iii.   Determine the standard error   (2 marks)

QUESTION FIVE

a) Explain three principles of experimental designs (6 marks)

b) After an extended dry period, measurements were taken on atmospheric pollution in urban and rural locations. The data were summarized as shown in the table below:

Table 5: Summary of data on atmospheric pollution in urban and rural set up

	Urban	Rural
n	11	10
$\overline{X}$	24 ppm	18 ppm
S^2	91	100

i. State the null and alternative hypotheses if the experimenter is looking for evidence of effect of higher pollution to agricultural production in the urban locations

(4 marks)

ii. Determine if there was a significant difference in pollution levels between urban and rural locations (10 marks)