



# MACHAKOS UNIVERSITY

University Examinations 2018/2019  
SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS, STATISTICS AND ACTUARIAL SCIENCE  
SECOND YEAR SPECIAL/ SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF AGRIBUSINESS AND AGRICULTURE EDUCATION.

AGB 202/ KCU 200: STATISTICS FOR AGRICULTURE

DATE: 27/9/2019

TIME: 11:00 – 1:00 PM

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## INSTRUCTIONS

Answer question one and any other two

Time:

### QUESTION ONE (30 MARKS)

- a) Distinguish the following terms as used in statistics
- Sample and Population
  - Descriptive statistics and inferential statistics
  - Discrete and continuous random variable (6 marks)
- b) Suppose the time taken by a herd of animals to leave a den is assumed to be normally distributed with mean time of 10 minutes and standard deviation 4 minutes. If an animal is randomly taken from the herd determine the probability that
- It takes exactly 6 minutes
  - If the herd has 300 animals, determine the number of animals taking between 6 to 12 minutes to leave the den (5 marks)
- c) The following information relates to Kilimo farm estate; grazing takes 42 acres of land which is 35% of its total land, cropping 20%, farm houses settlement 5%, forests 25% and training facilities take 15% of the land. Determine the land size in acres for each sector and present the information in a pie chart. (7 marks)
- d) Briefly describe the three principles of experimentation designs as used in the Agricultural Experiments (6 marks)

- e) A mixed choir of 5 boys and 7 girls is to be chosen from 9 boys and 11 girls. In how many ways can this be done (3 marks)
- f) The function  $\hat{y} = 3.5 + 1.23x_1 + 0.78x_2$  is model of predicting the expected yield (kg '000') per hectare of a certain crop as influenced by fertilizer  $k63(x_1)$  and the farm size ( $x_2$ ). Interpret the values 3.5, 1.23 and 0.78 (3 marks)

### QUESTION TWO (20 MARKS)

Given below is the random sample of the number of students visiting the University clinic per week in the year 2014.

<i>Students</i>	11-20	21-30	31-40	41-50	51-60
Frequency (weeks)	3	6	11	3	2

- a) Using the data above determine;
- Average visits per week
  - Median
  - Mode and
  - Standard deviation.
  - Spearman's coefficient of skewness (16 marks)
- b) Test whether the sample mean of the measures differed significantly from the hypothesized population mean of 45 using ( $\alpha$ -level = 5%). (4 marks)

### QUESTION THREE (20 MARKS)

- a) By citing examples define the term test statistics (3 marks)
- b) Distinguish the following terms as they apply in test of hypothesis
- Null and alternative hypothesis
  - One tailed and two tailed hypothesis testing
  - Type I and Type II error in Hypothesis testing
  - Critical region and acceptance region n (8 marks)
- c) A quality control officer in NCPB store claims that 70% of the cereals in the store are bad. A random sample of 50 bags showed that 35 of them were bad. Are these sample results consistent with the claim of the officer? Use  $\alpha = 0.05$  (4 marks)

- d) An examination of eight applicants for an accountant post was taken by a firm. From the Marks obtained by the applicants in the Accountancy and Aptitude tests, compute Rank coefficient of correlation. (8 marks)

Applicant	A	B	C	D	E	F	G	H
Marks in Accountancy	15	20	28	12	40	60	20	80
Marks in Aptitude test	40	30	50	30	20	10	30	60

#### QUESTION FOUR (20 MARKS)

- a) By using the least square method and the data below

<b>X:</b>	1	2	3	4	5
<b>Y:</b>	2	5	3	8	7

- Determine the equation connecting Y on X
  - Calculate the value of Y given X=11
  - Determine the residue values using the  $\hat{y} = a + bx$  obtained in (i) (8 marks)
- b) The information relates health records from County XYZ randomly selected

Gender	Males	Females
Average lifespan	50	58
Standard deviation	12	9
Sample size	100	150

Determine; i) The gender with the higher dispersion lifespan

ii) The combined standard deviation

iii) State the hypotheses for testing life expectancy for the two genders

iii) Do the life span differ significantly for the two gender (use  $\alpha$ -level = 1%).

(12 marks)

#### QUESTION FIVE (20 MARKS)

- a) Two different types of drugs A and B were tried on certain patients for increasing weight, 5 persons were given drug A and 7 persons were given drug B. The increase in weight (in KG) is given below:

Drug A	8	12	13	9	3	-	-
Drug B	10	8	12	15	6	8	11

- State the hypotheses for the above tests
- Test whether the two drugs differ significantly with regard to their effect in increasing weight at  $\alpha = 5\%$  (6 marks)

- b) Four machines A, B, C, and D are used to produce item K22. Four different random samples from each machine's one hour output were noted as summarized below.

Machine	A	B	C	D
Outputs	8	6	14	20
	9	8	12	22
	11	10	18	25
	12	4	9	23

- i) Obtain the analysis of variance table
- ii) Test whether or not there is any significant difference in the performance of the four machines; use  $\alpha = 0.01$ . State the statistical conclusion.
- iii) If there is any significant difference determine which machines (14 marks)