



# MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)  
University Examinations for 2015/2016 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

FIRST SEMESTER EXAMINATION FOR DEGREE IN BACHELOR OF SCIENCE IN  
ENVIRONMENTAL AND RESOURCE CONSERVATION

ESU 302: STATISTICS

DATE: 9/8/2016

TIME: 11:00 – 1:00 PM

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## INSTRUCTIONS:

Answer QUESTION ONE and Any other TWO Questions

### QUESTION ONE (30 MARKS)

- a) Distinguish the following terms as used in statistics
- i) Sample and Population
  - ii) Descriptive statistics and inferential statistics
  - iii) Measures of central tendency and measures of dispersion (6 marks)
- b) 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)
- c) Briefly describe the four scales of measurement (8 marks)
- d) 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)
- e) State advantages of using standard deviation as a measure of variability (3 marks)

- f) Highlight the importance of statistics in research (3 marks)

**QUESTION TWO (20 marks)**

- a) 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

Using the data above determine;

- i) Average visits per week
  - ii) Median
  - iii) Mode and
  - iv) Standard deviation.
  - v) 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) 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

- i. State the hypotheses for the above tests (2 marks)
  - ii. Test whether the two drugs differ significantly with regard to their effect in increasing weight at  $\alpha = 5\%$  (6 marks)
- b) The data relates to the age of 10 employees of XYZ co. and sick off days in a particular month.

Age (years)	20	30	32	35	40	46	52	55	58	62
Sick off (days)	11	12	10	13	14	16	15	17	18	19

- i) Calculate the Karl Pearson's coefficient of correlation and interpret its value. (10 marks)
- ii) Calculate the coefficient of determination and interpret its value. (2 marks)

**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

- i. Determine the equation connecting Y on X
- ii. Calculate the value of Y given X=11
- iii. 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
- iv) Do the life span differ significantly for the two gender (use  $\alpha$ -level = 1%). (12 marks)

**QUESTION FIVE (20 MARKS)**

- a) Ten ladies were recruited for slim possible exercise, their weights were noted before and after the exercise as shown below.

Ladies	A	B	C	D	E	F	G	H	I	J
Before exercise	80	76	92	60	70	56	74	56	70	56
After exercise	84	70	96	80	70	52	84	72	72	50

- i) State the hypotheses for the above tests (2 marks)
- ii) By applying the t-test, can it be concluded that the ladies lost weight significantly?  
use  $\alpha=5\%$ . (10 marks)

- b) 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