



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND PHYSICS

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN MEDICAL LABORATORY SCIENCES,

AMA2201: BIOSTATISTICS

END OF SEMESTER EXAMINATION

SERIES : DECEMBER 2016

TIME : 2 HOURS

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of FIVE questions. Attempt: QUESTION ONE in section A and any other

TWO in section B

Do not write on the question paper.

SECTION A (30MKS)

Question one

1. Define the following terms as used in biostatistics

- a) -A continuous variable (1mk)
- Array data (1mk)
- A statistic (1mk)

b) The following data in the table below represents the mean yields of soya beans grains (Per plant) obtained in response to ozone exposure over the growing season,

Ozone ppm : x	Yield gm/PH:Y
0.02	242
0.07	247
0.11	231
0.15	201

- i. Sketch a scatter graph of yield against ozone exposure (2mks)
 - ii. Determine the regression line of yield against ozone exposure (6mks)
 - iii. Interpret the results (2mks)
- c) The probability of a component failing in 1 year , due to excessive temperature is $\frac{1}{20}$, due to excessive vibration is $\frac{1}{25}$, and due to excessive humidity is $\frac{1}{50}$ determine the probability that during 1 year period, a component.

- i. Fails due to excessive temperature and vibration (3mks)
 - ii. Fails due to excessive vibration or excessive humidity (2mks)
 - iii. Will not fail because of excessive temperature and humidity (2mks)
- d) Let $x_i(i=1,2,\dots,n)$ is a sample of a given population, show that $\sum(x_i-\bar{x})^2 = \sum x_i^2 - (\sum x_i / n)^2$, where \bar{x} is the arithmetic mean (5mks)
- e) Let $x_i(i=1,2,\dots,n)$, $y_i(i= 1,2,\dots,n)$, be samples of a given population, the following data is given from the samples,

$x_i (i=1,2,3)$	6	1	2
$Y_i(i=1,2,3)$	5	3	4

show that;

- i. $\sum (x_i + y_i) = \sum x_i + \sum y_i$ (2mks)
 - ii. $\sum 2x_i = 2\sum x_i$ (2mks)
- f) List any 3 uses of the ogive curves (3mks)

SECTION B

Question two (20mks)

- a. A company has 3 establishments in 3 cities. Analysis of the monthly salaries paid to the employees in the 3 establishments is given below.

	E₁	E₂	E₃
Number of Students	100	150	250
\bar{x}	50	55	60
Variance	100	121	144
Serial No.	001	002	003

Find the combined mean and combined standard deviation of the data (8mks)

- b. Calculate the percentile co-efficient of kurtosis of the following data

Class	492-495	496-499	500-503	504-507	508-511
Frequency	4	11	18	10	7

(8mks)

- c. List any four methods of collecting data.

(4mks)

Question three (20mks)

- a. Let $x_i (i=1, 2, \dots, n)$ be a sample of a given population, show that the sum of squares of the deviations of a set of data from any number say K is least only when $K - \bar{x} = 0$, where \bar{x} is the arithmetic mean, (6mks)
- b. Find the Arithmetic mean of the following data given below, using an appropriate Assumed mean. (6mks)

Class	5-20	21-36	37-52	53-68	69-84	85-100
Frequency	6	12	17	11	3	1

- c. The heights of 80 students is summarized by the equation $\sum (x-160) = 240$, and $\sum (x-100)^2 = 8720$. Find the standard deviation of the heights of the 80 students

(5mks)

- d. Consider the following data given below

2, 4, 3, 8, 17, 4, 5, 5, 3, 5, 8. Determine the median, and state why the median is a more reasonable measure of central tendency than the mean in this set of data

(3mks)

Question four (20mks)

- a. In a certain hospital, the lab section collected the following data from 8 patients on the levels of two variables X and Y which they were investigating from each patient.

X : 15 20 18 16 19 20 18 22
Y : 12 12 22 14 14 17 15 18

- i. Calculate the product correlation coefficient between the two variables (6mks)
- ii. Comment on the relationship (2mks)
- b. Calculate the rank correlation coefficient for the following data of marks of 2tests, given to candidates for a clerical job. (5mks)

Preliminary test	92	89	87	86	83	77	71	63	53	50
Final test	86	83	91	77	68	85	52	82	37	57

- c. Let $x_i(i=1,2, \dots,n)$, $y_i(i=1,2, \dots,n)$ be given samples .show that if y represents a linear transformation on x, then the mean of y is given by the same transformation as on the mean of x (5mks)
- d. List any 2 desirable properties of the mean (2mks)

Question five (20mks)

- a. A racing car counts five laps of a circuit in a race, each lap covered at the following average speeds (in mph) 123.4, 132.8, 125.7, 126.9, 134.9, Find the average speed of the car for the whole race (2mks)
- b. Given the following data below.
2, 4, 3, 1, 5, 7, 9, 21, 13, 15, 18, 17, 14, 10, 12, 16, 7, 6,
19, 7, 6, 19, 22, 11, 23, 22, 24, 5, 2, 3, 4, 3, 2.

Group it using

- i. inclusive form (2mks)
- ii. exclusive form (2mks)

c. Find the range and semi-interquartile range (SIR) for the data given below,

Age in yrs	10-20	20-30	30-40	40-50	50-60	60-70
No. of individuals	12	19	5	10	9	6

(6mks)

d. Find the mean absolute deviation (MAD) of the following data below (4mks)

Marks	491.5-495.5	495.5-499.5	499.5-503.5	503.5-507.5	507.5-511.5
Frequency	4	11	18	10	7

e. Illustrate the two laws of probability

(4mks)