



TECHNICAL UNIVERSITY OF MOMBASA
Faculty of Applied & Health
Sciences

DEPARTMENT OF MATHEMATICS & PHYSICS
DIPLOMA IN COMMUNITY HEALTH & MANAGEMENT

AMA 2201: BIostatISTICS

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: OCTOBER 2013

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Mathematical Tables*
- *Scientific Calculator*

This paper consist of **FIVE** questions in **TWO** sections **A & B**

Answer question **ONE (COMPULSORY)** and any other **TWO** questions
 Maximum marks for each part of a question are as shown
 This paper consists of **FIVE** printed pages
SECTION A (COMPULSORY)

Question One

a) Define the following terms as used in biostatistics:

- (i) A statistic (1 mark)
- (ii) A parameter (1 mark)

b) Given that $X = X_1, X_2, X_3, Y = Y_1, Y_2, Y_3$ where $X_1 = -5, X_2 = 2, X_3 = 1, Y_1 = 4, Y_2 = 3$

Find:

$$\sum_{i=1}^3 x \sum_{l=1}^3 y^2$$

- (i) (2 marks)

$$\sum_{i=1}^3 xy$$

- (ii) (2 marks)

c) For each of the following varieties state whether they are quantitative or qualitative and give 3 possible measurements or observations of the variate.

- (i) Height
- (ii) Age
- (iii) Eye colour
- (iv) Town of birth
- (v) Distance from college. (5 marks)

$$\sum (x - 160) = 240$$

d) The heights of a sample of 80 female students are summarized by the equation and

$$\sum (x - 160)^2 = 8720$$

. Find the standard deviation of the heights of the 80 female students. (5 marks)

e) Compute the Harmonic mean of the following data:

Class	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
Frequency	5	7	13	3	2

(2 marks)

f) Show that the following statements hold:

$$\sum_{i=1}^1 xi - \sum_{i=2}^2 i = x_1$$

- (i) (2 marks)

$$\sum_{i=1}^4 i^{-1} = 1.08333$$

(ii)

(2 marks)

g) Find the mean of the following data using an appropriate assumed mean.

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

h) Give TWO uses of ogives

(2 marks)

SECTION B (Answer any TWO questions from this section)

Question Two

a) Give TWO differences between a histogram and a bar chart.

(2 marks)

b) State whether each of the following is a discrete or continuous variable.

(i) The number of components in a machine

(1 mark)

(ii) The capacity of a container

(1 mark)

(iii) Time

(1 mark)

(iv) Height

(1 mark)

(v) Cost in kshs

(1 mark)

c) Show that the variance of a given sample is given by:

$$S^2 = \frac{\sum fx^2}{N} - \left(\frac{\sum fx}{N} \right)^2$$

(6 marks)

d) Give THREE advantages of an arithmetic mean

(3 marks)

e) Define what is meant by the term ‘conditional probability.’

(2 marks)

f) State any TWO measures of dispersion include.

(2 marks)

Question Three

a) Show that the sum of squares of the deviations of a set of data from any number say α is at least only

when $\alpha = \bar{X}$ where \bar{X} is the arithmetic mean.

(5 marks)

b) Compute the mean Absolute Deviation (MAD) for the data given below.

(6 marks)

Mass (gms)	Frequency
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491.5 – 495.5	4
495.5 – 499.5	11
499.5 – 503.5	18
503.5 – 507.5	10
507.5 – 511.5	7

c) At the end of a Biostatistics course, Diana sits two written papers, S and S₂ and hands in a piece of course work. Her marks out of 100 were 76 for S, and 67 for S₂, and she gained 81 marks for her course work. Her overall percentage mark for the course is weighted so that the two written papers count for 40% each and the course work for 20%. Find Diana's overall percentage mark. **(3 marks)**

c) Calculate the range and semi interquartile range of the data below.

Class	10 - 20	20 – 30	30 – 40	40 – 60	50 – 60	60 – 70
Frequency	12	19	5	10	9	6

(6 marks)

Question Four

a) The followings are results of an assessment test given to Biostatistics students that was marked out of 30 marks.

19.6	19.8	19.9	19.7	19.8	19.8	19.6	19.9	20.0
3	2	6	5	6	2	1	7	7
19.8	20.1	19.5	20.0	19.7	19.9	19.6	19.8	19.9
9	6	6	5	2	6	8	7	0
19.7	19.9	20.0	19.8	19.8	19.7	19.7	19.7	19.8
3	3	3	6	1	7	8	5	7
19.6	19.7	19.9	20.0	20.1	20.0	19.8		
6	7	9	0	1	1	4		

Arrange the marks into equal classes of 0.09mm and hence determine:

(7 marks)

(i) The lower class boundary of the third class

(2 marks)

(ii) The central value of the fifth class

(2 marks)

b) A racing car courts FIVE laps of circuit in a race, each lap covered at the following average speeds (in mph)

12.4, 132.8, 125.7, 126.9, 134.9

Find the average speed of the car for the whole race

(5 marks)

c) List FOUR advantages of the median

(4 marks)

Question Five

a) Group the following data taking a class limit of 4 using:

(i) Inclusive form of grouping

(3 marks)

(ii) Exclusive form of grouping

(3 marks)

Find the quartiles from the following distribution:

(iii) Compute the following data:

Age in years	Number of patients
15 – 20	10
20 – 25	40
25 – 30	52
30 – 35	68
35 – 40	95
40 – 45	75
45 – 50	45
50 – 55	20
55 – 60	5

standard deviation of the

Marks	0 – 10	40 – 50
No. of Students	7	10

And hence find the coefficient of standard deviation and coefficient of variation. **(6 marks)**

(iv) Show that the sum of deviations of a set from its mean is zero. **(3 marks)**

(v) Given the following data, find the mode for the data:

Class	20 – 24	25 – 29	30 – 34	35 – 39	40 – 44	45 – 49
Frequency	3	15	30	44	34	10

(3 marks)

(vi) Give **TWO** areas where statistics can be applied. **(2 marks)**