TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Applied & Health Sciences

DEPARTMENT OF MATHEMATICS & PHYSICS

DMLS 12J, DMLS 12M

AMA 2262: BIOSTATISTICS

END OF SEMESTER EXAMINATION
SERIES: APRIL 2013
TIME: 2 HOURS

<u>**Instructions to Candidates:**</u>
You should have the following for this examination
- *Answer Booklet*

This paper consist of **FIVE** questions in **TWO** sections **A** & **B**
Answer question **ONE (COMPULSORY)** and any other **TWO** questions
<u>Maximum marks for each part of a question are as shown</u>

This paper consists of **FOUR** printed pages

SECTION A (COMPULSORY)

Question One

a) Define the following terms as used in biostatistics:
   (i)   Discrete variable   **(1 mark)**
   (ii)   Quantitative data   **(1 mark)**

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

b) Show that the standard deviation, S can be given   **(5 marks)**
c) Show that the sum of deviation of a set from its mean to zero.   **(5 marks)**

d) The heights of a sample of 80 students are summarized by the equation.
   $$\sum (x - 160) = 240 \qquad \sum (x - 160)^2 = 8720$$
   and

   Find the standard deviation of the heights of the 80 students.   **(3 marks)**

e) The following are results of the height and weight of 1000 students.
   $$\overline{y} = 170cm, \ \overline{x} = 60kg, \ r = 0.6, \ \sigma_y = 6.5cm, \ \sigma_x = 5kg$$

   Anil weighs 45kg sunil is 165cm tall. Estimate the height of Anil from his weight and the weight from his height.   **(7 marks)**

f) Define the term 'A frequency Polygon' and hence draw a polygon from the given data below:

Class	10 – 15.9	16 - 21.9	22 – 27.9	28 – 33.9
Frequency	1	3	7	4

     (5 marks)

g) Give **THREE** disadvantages of the Arithmetic mean   **(3 marks)**

SECTION B (Answer any TWO questions from this section)

Question Two

a) The following data gives the distribution of seats in both houses of the Swedish parliament.

Political Party	A	B	C	D	E
Upper House	25	21	25	71	1
Lower House	33	35	43	113	9

Display the data using pie diagrams.   **(4 marks)**

b) Find the Arithmetic mean of the following data:

Marks	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 - 70
No of Students	6	5	8	15	7	6	3

(3 marks)

c) A study was done on the amount of converted sugar into grams used in certain process at various temperatures and recorded as below.

Temp	0.1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
Sugar	8.1	7.8	8.5	9.89.5							

    (i)   Estimate the linear regression line of y on x   **(6 marks)**
    (ii)   Draw the graph of the line on a scatter diagram   **(2 marks)**
    (iii)   Interpret the results.   **(2 marks)**

d) List any **THREE** characteristics of an ideal measure of dispersion.   **(3 marks)**

Question Three

a) A company has **THREE** establishments E1, E2, E3, in 3 cities. Analysis of the monthly salaries paid to the employees in the 3 establishment is given below.

	E₁	E₂	E₃
No of Students	100	150	250
$\overline{X}$	50	55	60
Variance	100	121	144

Find the combined mean and the combined standard deviation   **(6 marks)**

b) Calculate the measure of skewness based on Quartile from the following data.

Class	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80
Frequency	358	3417	976	129	62	18	10

(8 marks)

c) List any **TWO** measures of central tendency.   **(2 marks)**

d) A child welfare officer asserts that the mean sleep of young babies is 14 hours a day. A random sample of 64 babies shows that the mean sleep was only 13 hours 20 minutes with a standard deviation of 3 hours. At 5% level of significance test the assertion that sleep of babies is 14 hours a day.   **(4 marks)**

Question Four

a) Estimate the mode of the data given below:

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

(3 marks)

b) (i) Calculate the range and the semi-inter Quartile-Range (SIR) of the data below.

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

(6 marks)

(ii) State **FOUR** characteristics of an ideal class. **(4 marks)**

c) Compute the standard deviation of the following data:

Marks	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
No of students	7	6	15	12	10

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

d) In your understanding give any application of statistics in real life. **(1 mark)**

Question Five

a) List any **FOUR** advantages of the median. **(4 marks)**

b) 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. **(6 marks)**

c) Consider the following set of data:
2, 4, 3, 8, 17, 4, 5, 5, 8, 5, 3. Determine the median, state why the median is more reasonable a measure of central tendency than the mean in this set of data. **(5 marks)**

d) Define what is meant by the statement "Inverse linear correlation' **(1 mark)**

e) Drugs are parked into boxes forming a mean number of 250 in each packet and a standard deviation of 10, assume that a distribution. Find the probability that a box will contain less than 246 drugs. **(4 marks)**