TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Applied & Health Sciences

DEPARTMENT OF MATHEMATICS & PHYSICS

DIPLOMA IN MEDICAL LABORATORY SCIENCES (DMLS 12M)

AMA 2262: 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 **FOUR** printed pages

SECTION A (COMPULSORY)

Question One

a) Define the following terms as used in Biostatistics:
(i) Sample **(1 mark**)
(ii) A variable **(1 mark)**

b) Group the following data taking a class size of 5; using:
(i) Inclusive form of grouping **(2 marks)**
(ii) Exclusive form of grouping **(2 marks)**

2,4,2,3,1,5,7,9,21,13,15,18,17,14,10,12,16,7,6,19,7,6,19,7,6,19,22,11,23,22,24,2,5,3,4,3,2.

c) A machine is set to produce drugs in form of capsules of nominal diameter 20.0 units. The diameters of the samples are measured and the following results obtained.

19.63	19.82	19.96	19.75	19.86	19.82	19.61	19.97	20.07
19..89	20.16	19.56	20.05	19.72	19.96	19.68	19.87	19.90
19.73	19.93	20.03	19.86	19.81	19.77	19.78	19.75	19.87
19.66	19.77	19.99	20.00	20.11	20.01	19.84		

Arrange the values into equal classes of width 0.09mm **(7 marks)**
Find:
(i) The modal class **(1 mark)**
(ii) The lower class boundary of the third class **(2 marks)**

d) Show that the standard deviation σ can be given by:

$$S = \sqrt{\frac{\sum_{l=1}^{n} fx^2}{N} - \left(\sum_{l=1}^{n} \frac{fx}{N}\right)^2}$$

(5 marks)

e) State **FOUR** desirable properties of the mean **(4 marks)**

f) There are 12 boys and 13 girls, in a class of 25 students, who are given a test. The mean mark for the 12 boys was 31, and the standard deviation of the boys, marks was 6.2. The mean mark for the girls was 36 and the standard deviation of the girls marks was 4.3 find the mean mark and the standard deviation of the marks of the whole class of 25 students. **(5 marks)**

SECTION B (Answer any TWO questions from this section)

Question Two

a) Consider the following set of data 2,4,3,8,17,4,5,5,7,5,3. 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)**

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. **(5 marks)**

c) 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, and 134.9. Find the average speed of the car for the whole race. **(3 marks)**

d) Calculate the Harmonic mean of the following data:

Class	40 – 50	50 – 60	60 – 70	70 – 80	80 – 90	90 – 100
Frequency	20	25	36	72	51	40

(5 marks)

e) Show that:

$$\sum_{l=1}^{4} i^2 = 30$$

(i) **(1 mark)**

$$\sum_{l=1}^{1} x_i = x_1$$

(ii) **(1 mark)**

Question Three

a) Calculate the regression equation of x on y and y on x from the following data:

X	1	2	3	4	5
Y	2	5	3	8	7

(8 marks)

b) Define the term expectation (E) of an event happening **(2 marks)**

c) Determine the percentile coefficient of Kurtosis of the data given below.

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

(6 marks)

d) List the FOUR steps involved in a statistical exercise. **(4 marks)**

Question Four

a) Draw an Ogive from the following data and give 3 uses of it.

Mid pts of classes	10	11	12	13	14	15	16
Frequency	2	4	17	48	57	16	4

b) Determine the standard deviation for the following grouped data.

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

c) Define the term "skewness" and illustrate 2 forms of it. **(5 marks)**

d) In your own understanding give 3 areas whose statistics can be applied. **(3 marks)**

Question Five

a) The following is the distribution of students joining the Technical University of Mombasa (TUM)

Weight	80 – 89	90 – 99	100 – 109	110 – 119	120 – 129	130 – 139	140 - 149
Frequency	4	23	49	38	17	6	3

Find the median of the data above. **(4 marks)**

$$\log G.M = \frac{1}{N}\sum_{i=1}^{n} fi \log xi \qquad N = \sum_{i=1}^{n} fi$$

b) Show that where G.M is the geometric mean an n **(5 marks)**

c) Give 3 characteristics of an ideal class **(3 marks)**

d) In two hospitals A and B engaged in treatment of the same disease average weekly reports and variance is as follows:

Hospital	$\overline{X}$	S2	n	Serial No.
A	460	2500	100	01
B	490	1600	80	02

Which hospital shows greater variability in the distribution of patients? **(4 marks)**

e) Differentiate between Discrete and Continuous variables and give 2 examples of each. **(4 marks)**