THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

Faculty of Applied & Health Sciences

DEPARTMENT OF PURE & APPLIED SCIENCES

DIPLOMA IN ANALYTICAL CHEMISTRY (DAC 10M)

STATISTICAL TECHNIQUES

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2011

TIME: 2HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer booklet*

This paper consists of **FIVE** questions

Answer Question **ONE** (**Compulsory)** from **SECTION A** and any other **TWO** questions from **SECTION B**

Maximum marks for each part of a question are clearly shown

This paper consists of **FOUR** printed pages

SECTION A (Compulsory)

Question One (30 marks)

a) Define the following terms
   i) Descriptive statistics (1 mark)
   ii) Histogram (1 mark)
   iii) Standard deviation (1 mark)
   iv) Quantitative data (1 mark)

b) Discuss the measures of central tendancy (4 marks)

c) (i) Show that the standard deviation S can be expressed as:

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

(4 marks)

(ii) The pass mark in an exam is 40. From previous exams it is known that the marks are normally distributed with a mean of μ = 48, δ = 15 (standard deviation. If 100 candidates sit for the exam, find the number of those that will pass (6 marks)

(iii) Draw a frequency polygon using the following data

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

d) Briefly explain the word correlation and hence state the modes of correlation (4 marks)

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

$\sum(X - 160) = 240$ and $\sum(X - 160)^2 = 8720$

Find the standard deviation of the heights of the 80 female students (4 marks)

SECTION B (Attempt any TWO questions)

Question Two (20 marks)

a) Define the following terms
   (i) Quartiles (2 marks)
   (ii) Deciles (2 marks)
   (iii) Percentiles (2 marks)

b) Give THREE advantages of a pie chart over a histogram (3 marks)

c) The table below shows values of x and y obtained from an experiment

X	1	2	5	6	8	9
Y	3	5	9	8	10	2

(i) Determine the coefficient of linear correlation using the product moment formular (5 marks)

(ii) Determine the equation of regression line of Y on X (6 marks)

Question Three (20 marks)

a) List the steps involved in a statistical exercise (4 marks)

b) Define the term 'Frequency Density' (2 marks)

c) Washers are parked into boxes forming a mean number of 250 in each packet and standard deviation of 10, assume a normal distribution. Find the probability that a box will contain less than 246 washers (6 marks)

d) Define the following terms

(i) Data (1 mark)

(ii) Relative frequency (1 mark)

(iii) Give the disadvantages of the mean (6 marks)

Question Four (20 marks)

a) 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) The size of workforce in a factory (1 mark)

(iv) The speed of rotation of a shaft (1 mark)

(v) The temperature of a coolant (1 mark)

b) (i) List the advantages of the median (4 marks)

(ii) Draw a frequency table from the data below

28 31 29 27 30 29 29 26 30 28 28 29 27
26 32 28 32 31 25 30 27 30 29 30 28
29 31 27 28 28 (3 marks)

c) The following data gives the distribution of segts in both hours of the Swedish parchment.

Upper Hse	25	21	25	25	71	1
Lower Hse	33	35	43	43	113	9

Display the data using pie charts (8 marks)

Question Five (20 marks)

The results for compressive strength test done on concrete cubes are as follows:

20	25	22	22	26	38	36	30	32	34	33
32	36	29	29	30	25	29	34	29	31	34
42	46	37	37	27	28	33	34	33	32	32

50	28	28	43	34	32	37	28	30	33	33

a) Classify the data into a frequency distribution table using a class internal of size 4 (8 marks)

b) Use the results obtained in (a) to determine the median (4 marks)

c) Calculate:
   (i) Mean compressive strength taking 33.5 as an assumed mean
   (ii) Standard deviation for the compressive strength (8 marks)