CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

SECOND YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE (CHEMISTRY)

MATH 102: FOUNDATION STATISTICS

STREAMS:BSC(CHEM)   **TIME: 2 HOURS**

DAY/DATE: THURSDAY 14/12/2017   **8.30 A.M – 10.30 A.M**

INSTRUCTIONS:
- **Answer question one and any other two questions.**
- **Adhere to the instructions in the answer booklet.**
- **Do not write on the question paper**

QUESTION ONE (30MARKS)

(a) Differentiate between discrete and continuous data.   [2marks]

(b) Define the following terms.   [3marks]

(i) Population

(ii) Sample

(iii) Frequency

(c) The retail price of a product costing ksh 200 is made up as follows . Materials ksh 100, labour ksh 200, research and development ksh 400, overheads ksh 700, profit ksh 600. Present these data on a pie diagram.   [4marks]

(d) The data given below refer to the gain of each of a batch of 40 transitors, expressed correct to the nearest whole number. Form a frequency distribution for these data having seven classes starting from70.   [4marks]

81	83	87	74	76	89	82	84
86	76	77	71	86	85	87	88
84	81	80	81	73	89	82	79
81	79	78	80	85	77	84	78
83	79	80	83	82	79	80	77

(e) Determine the mean, median and mode for the set { 3,4,3,8,4,7,1,13,5,5,7,3,2}
[5marks]

(f) Determine the standard deviation from the mean of the set of numbers {5,3,8,6,10,4} . correct to 4 significant figures. [5marks]

(g) A batch of 40 components contains 5 which are defective. If a component is drawn at random from the batch and tested and then a second component is drawn at random, calculate the probability of having one defective component, both without replacement.
[3marks]

(h) In an experiment to determine the relationship between force on a wire and the resulting extension, the following data are obtained.

Force (N)	10	20	30	40	50	60	70
Extension (mm)	0.22	0.40	0.61	0.85	1.20	1.45	1.70

Determine the linear coefficient of correlation for this data. [4marks]

QUESTION TWO (20 MARKS)

(a) The following are masses of 25 students in a certain institution.

49	51	50	60	55	45	56	51	58	59
44	59	42	50	62	46	43	57	56	52
43	41	40	54	44

(i) Draw a frequency distribution table with the lower classes as 40-43. [4marks]

(ii) Estimate the median mass. [2marks]

(iii) Draw a histogram for the data. [4marks]

(b) The table below show marks scored by 120 candidates in an examination.

Marks	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
frequency	2	6	10	a	24	21	19	12	8	1

(i) Determine the value of a. [1marks]

(ii) Taking 1 cm to represent 10 marks on the horizontal axis and 1 cm to represent 10 pupils on the vertical axis, draw an ogie curve. [3marks]

(iii) From your graph ;

    (I) Determine the median [2marks]

    (II) Determine the range of marks of the middle 60% of the students. [2marks]

    (III) If 63% is the pass mark for B+ , how many students will get B+ and above? [1mark]

    (IV) State the median class. [1mark]

QUESTION THREE (20MARKS)

(a) Define following terms. [4marks]

(i) Probability

(ii) Expectation

(iv) Dependent event

(v) Independent events

(b) A box contains 74 brass washers, 86 steel washer and 40 aluminium washers. Three washers are are drawn at random from the box without replacement. Find the probability there are two brass washers and either a steel or an aluminium washer when three are drawn at random. [8marks]

(c) The number x is chosen at random from the set (0,3,6,9) and the number y is chosen at random from the set (0,2,4,6,8) . Calculate the probability of each of the following separate events.

(i) $x + y = 11$. [2marks]

(ii) $x > y$ [2marks]

(iii) xy = 0 [2marks]

(iv) 10x + y < 34. [2marks]

QUESTION FOUR (20MARKS)

(a) Define correlation . [2marks]

(b) (i) Sketch a scatter diagram showing positive or direct linear correlation.

[3marks]

(ii) Sketch a scatter diagram showing negative or inverse linear correlation.

[3marks]

(iii) Sketch a scatter diagram showing no correlation. [3marks]

(c) (i) Explain the term regression . [2marks]

(ii) In an experiment to determine the relationship between frequency and the inductive reactance of an electrical circuit, the following results were obtained;

Frequency (HZ)	50	100	150	200	250	300	350
Inductive reactive ohms	30	65	90	130	150	190	200

Determine the equation of the regression line of inductive reactance on frequency, assuming a linear relationship. [7marks]

QUESTION FIVE (20MARKS)

(a) Find the mean, median and mode of the following marks
9,5,5,4,5,3,5,11,6,3,6,8,9,13,8,8,13,5,10,6. [5marks]

(b) The following table shows part of a cumulative frequency distribution table.

Class	1 -4	5 -9	10 - 14	15 – 19
Cumulative frequency	11	22	30	47

Determine the frequency of each class. [3marks]

(c) The table below shows the frequency distribution table of the masses in kg of 60 male aspirants in the students leadership body.

Mass (kg)	70-74	75 -79	80-84	85 -89	90 -94	95 -99	100 -104
Frequency	2	4	8	22	18	5	1

Using the data, calculate the;

(i)   Mean mass [3marks]
(ii)   Modal frequency and modal class. [3marks]
(iii) Median [3marks]
(iv)   The 80th percentile. [3marks]