



MASENO UNIVERSITY
UNIVERSITY EXAMINATIONS 2016/2017

**THIRD YEAR FIRST SEMESTER EXAMINATION FOR DEGREE
OF BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCE
WITH INFORMATION TECHNOLOGY**

MAIN CAMPUS

NES 303: ENVIRONMENTAL STATISTICS I

Date: 2nd December, 2016

Time: 12.00 - 3.00pm

INSTRUCTIONS:

- Answer Question ONE and any other TWO.
- Illustrate your answers with suitable examples, diagrams and figures wherever appropriate.



1. (a) The table below shows the monthly income levels of people living in an urban estate and frequency of dumping solid wastes in a skip dumpsite in a month. Construct histogram showing the relationship between monthly income levels and frequency. [12 marks]

Monthly income levels in thousands shillings	Frequency dumping solid wastes
90 – 100	5
81 – 90	7
71 – 80	10
61 – 70	15
51 – 60	16
41 – 50	20
31 – 40	12
21 – 30	8
11 – 20	6
1 – 10	2
Total	101

- (b) The following table shows the mean amount of solid wastes in tonnes generated in selected residential urban estates in Kisumu City within a month. Draw a bar chart illustrating the amount of solid wastes generated. [8 marks]

Residential Estate	Amount of solid waste generated in tonnes
Manyatta	20
Arina	21
Okore	16
Migosi	17
Kibuye	18
Makasembo	14
Polyview	13
Milimani	10

- (c) The table below shows the body weights of Tilapia in a fish pond and age of tilapia in months and the frequency. In order to make statistical inference, the data must be normally distributed and hence the normality must be tested.

Tilapia body weights (kg)	Age (months)	Frequency
59.5– 62.5	61	5
63.5– 65.5	64	18
66.5– 68.5	67	42
69.5– 71.5	70	27
72.5– 74.5	73	8

Use the above data to calculate the skewness and kurtosis, and interpret the results. [10 marks]

2. Estimated populations of Thomson's gazelles in 24 counties in Kenya are given below.
- 547, 495, 562, 631, 548, 543, 557, 512, 566, 582, 545, 535, 542, 601, 576, 562, 531, 531, 529, 564, 612, 573, 584, 503
- (a) Make a back-to- back stem and leaf plot of populations. [8 marks]
- (b) Explain the distribution of the data and the application of stem and leaf plot in environmental data analyses. [4 marks]
- (c) Calculate the measures of central tendency and explain their advantages and limitations. [8 marks]
3. The data below show the distribution of the heights of indigenous trees (in metres) in Kakamega Forest.
- 54.7, 49.5, 56.2, 63.1, 54.8, 54.3, 55.7 51.2, 56.6, 58.2, 54.5, 53.5, 54.2, 60.1, 59.7, 57.6, 56.2, 53.1, 53.1, 52.9, 56.4, 61.2, 57.3, 58.4, 50.3, 37.5, 45.6, 39.4, 46.7, 42.8, 43.6, 48.2, 44.5, 49.0, 50.6, 41.6, 38.8, 39.7, 41.6, 42.1, 44.3, 43.2, 48.9, 37.1, 45.3, 46.4, 47.1, 44.3, 43.7, 40.4
- Demonstrate methods of exploring the data and measuring variability of the data. [20 marks]

4. The table below shows samples of soil depth in Centimeters in Kakamega forest.

100	99	97	96	95	90	89	88	87	85	85	84	82	81	80	79
79	77	78	76	76	75	74	74	73	72	71	70	69	69	68	67
66	66	65	64	63	62	61	59	59	58	57	57	57	56	56	56
55	55	54	53	52	51	50	49	49	49	49	49	48	48	48	47
46	46	46	45	43	43	42	41	40	39	39	39	38	38	37	37
35	34	33	32	31	30	29	28	27	25	24	22	21	20	19	18

- (a) Construct a frequency polygon. [9 marks]
- (b) Elucidate the importance of normal distributions in statistics (3marks)
- (c) The concentration of the pollutant cadmium in five streams has a mean of 10ppm and standard deviation of 2ppm. Using the 68% - 95% - 99.7% rule for normal distributions, calculate and illustrate the lowest and highest concentrations. [8 marks]
5. (a) The table below shows the frequencies of human activities and types of environmental pollution they cause.

	Agricultural pesticides	Industrial emissions
Water pollution	900	200
Air pollution	100	800

Use Lambda to calculate statistical association between human activities and environmental pollution. Explain the implications of the associations. [7 marks]

- (b) The table below shows the frequencies of air pollution from less to highly industrialized regions.

Air Pollution	Less industrialized	Middle industrialized	Highly industrialized
High	200	400	700
Medium	500	900	400
Low	800	300	100

Use Gamma to calculate statistical association between air pollution to industrialisation. Explain the implications of the associations.

[13 marks]