

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

THIRD YEAR EXAMINATION FOR THE AWARD OF DEGREE
OF BACHELOR OF SCIENCE IN BIOLOGY, BACHELOR OF SCIENCE IN
BIOCHEMISTRY & BACHELOR OF SCIENCE IN BIOMEDICAL

BOTA 302: BIOSTATISTICS

STREAMS: BSC (BIO), BSC (BIOC) & BSC (BIOMED) Y3S1

TIME: 2 HOURS

DAY/DATE: MONDAY 02/12/2019

11.30 A.M. – 1.30 P.M.

INSTRUCTIONS:

- Answer all questions in section I and TWO questions in section II
- Use of calculators and statistical tables is allowed
- Do not write anything on the question paper

SECTION I (30 MARKS)

1. Explain the following terms as used in experimental design:
 - (a) Treatment [2 marks]
 - (b) Randomization [2 marks]
 - (c) Replication [2 marks]
 - (d) A factor [2 marks]
2. Differentiate between the following terms:
 - (a) Cluster and stratified random sampling [2 marks]
 - (b) Point estimate and interval estimate [2 marks]
 - (c) Parametric test and non-parametric test [2 marks]
 - (d) Type I error and type II error [2 marks]
3. The population of the elephants in Mt. Kenya is divided into three strata such that $N_1=1650$, $N_2 = 1480$, $N_3=1360$. Show how a sample size of $n = 384$ should be allocated to the three strata if proportionate sampling is adopted. [3 marks]

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4. A technologist claims that it is faster to test a disease using kit A than kit B. To test the claim, eight technicians of proven ability were assigned each to the two kits and the time taken to test the disease was recorded as follows:

Technician	1	2	3	4	5	6	7	8
Kit A	21	33	35	17	27	28	26	36
Kit B	29	39	39	23	23	37	29	43

At a 5% level of significance, determine if the technologist claim is valid. [6 marks]

5. It is expected that the distribution of certain disease in a given population is 3:1:1 for under 16, 16-25 and over 25 years. A random sample of 400 individuals was taken and 240 individuals were under 16, 60 were between 16-25 while the rest were over 25 years. Find if the observed information agrees with the expected ratios at 5% significance level

[5

marks]

SECTION II (40 MARKS)

QUESTION SIX (20 MARKS)

- (a) The following set of measurements was taken from a normally distributed population: 45, 52, 70, 72, 49, 85, 82, 88, 86, 46, 27, 79, 35, 42, 58, 63, 56 and 36. Construct a 95% confidence interval for the population mean. [5 marks]
- (b) Using the following data set, calculate the mean, mode, median, standard deviation coefficient of variation and Pearson measure of skewness of successive sale of a given firm. [15 marks]

Number of sales	0-5	6-11	12-17	18-23	24-29	30-35
Number of salesmen	2	18	38	56	44	28

QUESTION SEVEN (20 MARKS)

- (a) The following data set show the rating of two types of milk products on a scale of 1 – 9 by 9 technicians.

Technician	1	2	3	4	5	6	7	8	9
Product 1	4	8	5	2	6	5	4	5	7
Product 2	6	4	2	6	9	3	7	8	5

At 5% level of significant level determine if the two milk products have equal rating.

[8

marks]

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(b) Using the following data fit a regression model and obtain a correlation coefficient

[12

marks]

x	1	2	3	4	5	6	7
y	9	16	19	27	38	43	58

QUESTION EIGHT (20 MARKS)

The amounts of oil extracted from a sunflower variety using four different extraction methods was obtained as follows:

Extraction method	Replicate 1	Replicate 2	Replicate 3
A	20	20	15
B	27	16	18
C	15	16	21
D	14	17	16

Perform analyze of variance and test an appropriate hypothesis. Take
