JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION 2012/2013

3RD YEAR 1ST SEMESTER EXAMINATION FOR THE DEGREE OF BED. (SCIENCE)

(SCHOOL BASED-MAIN)

COURSE CODE: SZL 302

TITLE: BIOSTATISTICS

DATE: 30/4/2013 **TIME: 14.00-16.00PM**

DURATION: 2 HOURS

INSTRUCTIONS

1. **Answer ALL questions in Section A**
2. **Answer ANY two Questions from Section B**
3. **Use illustrations where possible**

SECTION A (ANSWER ALL QUESTIONS)

a) A scientist performed a preliminary study on the concentration of chemicals in a river. He is particularly interested in the concentration of dissolved SO_4^{2-}. In a preliminary sample collected from 25 locations in the river, he found the following estimates for the $S0_4^{2-}$ concentration. Mean = 61.92, standard deviation = 5.24. What is the 95% confidence interval of the mean? (3 marks)

b) Define the following terms:

i. Mean
ii. Median
iii. Midrange
iv. Range
v. Variance
vi. Standard deviation (3 marks)

c) Distinguish between a point estimate and interval estimate. (3 marks)

d) Explain why scientists do not conduct a population census when they set out to carry a scientific research.

(3 marks)

e) Explain how one can use their knowledge of a population standard deviation and the maximum error of estimate of a statistic to determine the sample size of a study.

(3 marks)

f)

i. List the assumptions of Analysis of Variance. (3 marks)

ii. State the hypotheses of Analysis of variance test comparing three means.

(3 marks)

g) Explain the procedure for a sign test. (5 marks)

h) State the parametric equivalent test for the following statistical tests:

i. Kruskal-Wallis test
ii. Mann-Whitney test
iii. Paired sign test

iv. Spearman rank correlation doefficient (4 marks)

SECTION B: ANSWER ANY TWO QUESTIONS

QUESTION TWO

a) Discuss the paired t test procedure describing its use, test statistics and how to make inferences from its results.

(10 marks)

b) A consultant nutritionists has recommended to poultry keepers that the minimum vitamin content in egg laying chicken feed should be 200 (mg/kg). The local poultry keepers then decide to hire a private nutritionist to investigate if the feed available in the market meet the recommended minimum level. He comes up with the following data.

212	226	205	233	222
225	220	230	239	232
197	186	234	208	225
183	207	219	243	205
238	189	192	224	267

Use the data in the table above to test whether there are enough vitamins (as per nutritionist's recommendation) in the chicken feed being marketed?

(10 marks)

QUESTION 3

The data below shows the results obtained from a survey on the relationship between age and blood pressure.

a)

AGE (YEARS)	**BLOOD PRESSURE (mmHg)**
39	110
53	112
53	117
54	122
60	123
64	140
66	142
71	155
72	155
73	160

Using this data calculate the correlation coefficient. (5 marks)

b) Explain the relationship between age and blood pressure? (2 marks)

c) Calculate the percentage of the variability accounted for by the relationship between age and blood pressure? (1 mark)

d) Determine the equation of the regression line explaining the relationship between age and blood pressure. (8 marks)

e) Predict the blood pressure of a person aged 62 years. (4 marks)

QUESTION 4

A genetic experiment involving a FI cross between plants heterozygous for two genes affecting the texture of leaves and plant height gave the results tabulated below:

PHENOTYPE	FREQUENCY
Normal leaves, tall	55
Mottled leaves, dwarf	53
Normal leaves, dwarf	8
Mottled leaves, tall	7

a) Explain the results in relation to the 9:3:3:1 ration of Mendel's law. (14 marks)

b) Compare and contrast goodness of fit tests and a contingency tables. (3 marks)

c) State the assumptions of goodness of fit test. (3 marks)

QUESTION 5

You have been asked to conduct a study in Siaya County to find out if a new invasive species of a lepidopteran pest that lays its eggs in the stems of maize is present in all districts.

a) Discuss the sampling technique that you would use. (5 marks)

b) Describe the type of data that you would collect. (4 marks)

c) State the hypothesis that you would use in your study. (3 marks)

d) Based on your hypothesis, describe a statistical test that you would use. (8 marks)