



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY SCHOOL OF  
MATHEMATICAL & ACTUARIAL SCIENCE**

**UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE**

**RENEWABLE ENERGY**

**2<sup>ND</sup> YEAR 1<sup>ST</sup> SEMESTER 2013/2014 ACADEMIC YEAR**

**CENTRE: MAIN**

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**COURSE CODE: SMA 3231**

**COURSE TITLE: STATISTICS**

**EXAM VENUE: LR**

**STREAM: (Renewable Energy)**

**DATE: 15/4/2014**

**EXAM SESSION: 2.00 – 4.00 PM**

**TIME: 2 HOURS**

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**Instructions:**

- 1. Answer question 1 (compulsory) and ANY other 2 questions.**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

**QUESTION ONE- COMPULSORY (30 MARKS)**

a. Consider the data below

Mass	310-400	410-500	510-600	610-700	710-800	810-900
frequency	8	14	18	20	11	9

- i. Suppose we guess the mean of the data as  $\bar{x}$ , use the coding method to calculate the actual mean and the standard deviation of the data. (4 marks)
- ii. Estimate the median and the modal mass. (5 marks)

b. The number of messages sent per hour over a computer network has the following distribution

X	10	11	12	13	14	15
P(X=x)	0.08	a	0.30	b	0.20	0.07

It is known that  $P(x \leq 12) = 0.53$ ,

- i. Find the values of the constants *a and b* (3 marks)
- ii. Find the mean number of messages sent per hour. (3 marks)

c. Weekly wages and income tax paid by 10 manual workers were recorded as shown.

Wage (\$)	76	78	84	85	88	89	95	95	100	110
tax	8	6	12	12	15	10	16	20	19	22

- i. Given that wages is variable x while tax is variable y and further that  $\sum x^2 = 81,956$ ,  $\sum y^2 = 2,214$  and  $\sum xy = 13,054$ , calculate the product moment correlation coefficient (PMCC) between weekly earnings and the amount of income tax. (4 marks)
- ii. Comment on the degree of association between weekly earnings and income tax paid by each member. (2 marks)

d. The masses in grams of some grape are given below

159.5	151.2	175.7	155.5	153.5	175.5	144.2	159.5	165.3	149.8
141.4	141.0	169.4	167.4	163.3	136.4	154.3	153.7	162.2	164.5

- i. Construct a grouped frequency distribution for the data using  
 $u = 1, k = \text{round up} \left( \frac{\log n}{\log 2} \right)$  (5 marks)
- ii. Estimate from the grouped frequency distribution the upper quartile and the fortieth percentile. (4 marks)

**QUESTIONS TWO (20MARKS)**

- a. The data below represents the masses of some containers sampled from a warehouse

Mass	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74
Frequency	1	2	4	5	10	8	5	2	1

Use the data to calculate:

- i. The lower and upper quartiles (4marks)
- ii. The coefficient of variation (6marks)
- b. The values of two variables which are known to have a linear relationship were recorded as follows:

X	1	3	4	6	8	9	11	14
Y	1	2	4	4	5	7	8	9

Using the method of least squares, find the equation of regression of:

- i. X on Y
- ii. Y on X (10 marks)

**QUESTION THREE (20 MARKS)**

- a. Explain the following terms as used in descriptive statistics:
- i. Skewness
- ii. Kurtosis
- iii. Regression (6 marks)
- b. Compute and explain Bowley's coefficient of skewness for the distribution given below. (10marks)

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
frequency	7	10	15	17	8	4	6	7

c. Consider the following information on the Heights of seedlings in centimeters. (4marks)

Height	1-2	3-6	7-9	10-11	12-14	15
frequency	6	30	27	28	12	5

**QUESTION FOUR (20 MARKS)**

a) Two random samples drawn from two normal populations were recorded as follows:

A	66	67	75	76	82	84	88	90	92		
B	64	66	74	78	82	85	87	92	93	95	97

Use an F-test at 5% level of significance to test whether or not the two populations have the same variance. (10 marks)

b) In a small survey, 350 car owners from four districts P, Q,R, S were found to have cars in the price ranges A, B,C and D in hundreds of thousands as shown.

	P	Q	R	S
A	9	10	12	19
B	13	20	18	29
C	24	29	12	25
D	34	41	18	37

- i. Obtain the Chi-square statistic and state the hypothesis for this problem
- ii. Test the hypothesis at 5% level. (10marks)

**QUESTION FIVE (20 MARKS)**

a. A study of automobiles produced the following results:

Model year	Proportion of all vehicles	Chance of getting an accident
1997	0.16	0.05
1998	0.18	0.02
1999	0.20	0.03
others	0.46	0.04

An automobile from one of the model years 1997, 1998, and 1999 was involved in an accident. Determine the probability that the model year of this automobile is

i. 1997.

ii . others

(10mks)

a. If

$$f(x) = \begin{cases} K(x - x^2), & 0 < x < 1 \\ 0, & \text{otherwise} \end{cases}$$

Determine:

i.  $P(X < \frac{1}{K})$

ii.  $P(X > \frac{1}{K})$

(10marks)