



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**SCHOOL OF BIOLOGICAL PHYSICAL MATHEMATICS AND ACTUARIAL SCIENCE**  
**UNIVERSITY EXAMINATION FOR DEGREE OF BACHELOR OF SCIENCE**  
**RENEWABLE ENERGY**  
**2<sup>nd</sup> YEAR 1<sup>st</sup> SEMESTER 2021/2022 ACADEMIC YEAR**  
**REGULAR (MAIN)**

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**COURSE CODE: WMB 9201**

**COURSE TITLE: STATISTICS**

**EXAM VENUE: STREAM: (BSc. Renewable Energy)**

**DATE: EXAM SESSION: 9.00-11.00am**

**TIME: 2.00 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 (30 MARKS)**

a. The following data gives the number of ball bearings manufactured by a company per day for a sample of 12 days.

24    32    27    23    35    33    29    21    23    28    25    33

Calculate the coefficient of variation for these data. **[6 marks]**

b. The discrete random variable X has the probability function

$$P(X = x) = \frac{x}{15}; x = 1,2,3,4,5$$

Obtain the Expected value of X. **[6 marks]**

c. From past experience, the proportion of war planes that returned safely after attacking the opponent's territory is known to be **0.6**. One day **FIVE** such war planes left for war and attacked the opponent's territory. Find the probability that out of the **FIVE** planes;

- i. 3 returned safely
- ii. At most two returned safely. **[6 marks]**

d. Consider the following frequency distribution table

Class interval	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	5	10	11	10	6	5

Find

(i) The Mode of the data **[3 marks]**

(ii) The Median of the data **[3 marks]**

e. Use the Standard Normal table to evaluate the following

i)  $p(-1.72 < z < 2.31)$  **[3 marks]**

ii)  $p(|z| < 2.03)$  **[3 marks]**

**QUESTION TWO (20 MARKS)**

a. The daily expenditure in Ksh of 100 families is given below

Daily Expenditure	0-20	20-40	40-60	60-80	80-100
Number of families	13	$f_2$	27	$f_4$	16

If the mode is 44, find the missing frequencies  $f_2$  and  $f_4$  **[8 marks]**

b. The average printing mistakes per page is 1. Find the probability that in a randomly selected page;

- i. There are 5 mistakes **[2 marks]**
- ii. There are at most two mistakes **[4 marks]**
- iii. There are at least 3 mistakes **[2 marks]**
- iv. Suppose 5 pages are selected, what is the probability that there will be one or two mistakes? **[4 marks]**

**QUESTION THREE (20 MARKS)**

- a. In a class of 80 students 50 know English, 55 know French and 46 know German language. 37 students know English and French, 28 students know French and German, 25 know English and German. 12 students know all the three languages.
- Represent this information on a Venn diagram **[4 marks]**
  - Find the probability that a student knows only English **[2 marks]**
  - Find the probability that a student knows only one language **[3 marks]**
  - Find the probability that a student knows at least one of the languages **[2 marks]**
- b. Ten candidates sat for two aptitude tests A and B, and the results were as follows.

candidate	1	2	3	4	5	6	7	8	9	10
Test A	20	15	13	10	14	15	18	19	14	12
Test B	6	8	8	4	5	7	3	6	8	9

Find the Spearman's rank correlation coefficient for the data below **[9 marks]**

#### **QUESTION FOUR (20 MARKS)**

- a. The following data refer to the weights (X) in kgs and heights (Y) in inches of 8 students in a certain class in JOOUST.

X	62	63	58	72	65	77	71	56
Y	62	57	56	64	79	66	70	61

- Construct a scatter diagram for these data **[3 marks]**
- What relationship does the scatter diagram suggest? **[2 mark ]**
- Determine Karl Pearson correlation coefficient between weights (X) and height (Y) **[9 marks]**

#### **QUESTION FIVE (20 MARKS)**

- a. The comprehensive strength of samples of cement can be modeled by a normal distribution with mean of 6000 kilograms per square centimeter and a standard deviation of 100 kilograms per square centimeter. Find:
- The probability that a sample's strength is less than  $6250 \text{ kg/cm}^2$  **[3 marks]**
  - The probability that a sample's strength is between  $5800 \text{ kg/cm}^2$  and  $5900 \text{ kg/cm}^2$  **[3 marks]**
  - The strength exceeded by 95% of the samples **[4 marks]**
- b. Consider the following data with one independent variable recorded against a second dependent variable.

Independent X	1	2	3	4	5	6
Dependent Y	5	8	10	12	16	20

Find the regression line if X and Y are linearly related. **[10 marks]**