



# THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

**A. M. E. C. E. A**

**MAIN EXAMINATION**

**MAY - JULY 2016 TRIMESTER**

**FACULTY OF ARTS AND SOCIAL SCIENCES**

**DEPARTMENT OF DEVELOPMENT STUDIES**

**REGULAR PROGRAMME**

**SDS 311: STATISTICAL TECHNIQUES**

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**Date: JULY 2016**

**Duration: 2 Hours**

**INSTRUCTIONS: Answer Question ONE and ANY OTHER TWO Questions**

- Q1. a) Distinguish between the following terms
- i Qualitative and quantitative variables
  - ii Deterministic and random experiment
  - iii Null and alternative hypothesis **(6 marks)**
- b) Briefly explain how relevant statistics is to the following
- i Forecasting / prediction
  - ii Planning **(6 marks)**
- c) State the FOUR axioms of probability **(4 marks)**
- d) A die is rolled as a coin is tossed. Find the probability that the die shows
- i An odd number and the coin shows a head
  - ii An even number and the coin shows a tail **(6 marks)**
- e) Highlight TWO merits of using scatter diagram method to determine correlation. **(2 marks)**
- f) Explain THREE assumptions under lying the use of correlation coefficient. **(6 marks)**

- Q2. a) i Distinguish between dependent and independent events **(2 marks)**
- ii State the TWO laws of probability and state the circumstances under which each law is used. **(2 marks)**
- b) The probability that Harry, James and William are elected as CUEASSO chairperson are  $\frac{1}{3}$ ,  $\frac{2}{5}$  and  $\frac{3}{8}$  respectively. Find the probability that
- i The THREE of them are elected **(2 marks)**
- ii None of them is elected **(2 marks)**
- iii Only one of them is elected **(6 marks)**
- c) Briefly explain any TWO approaches to probability **(6 marks)**
- Q3. a) Highlight THREE qualities of a good hypothesis **(3 marks)**
- b) Distinguish between the following terms as used in hypothesis testing
- i Type I and II errors **(2 marks)**
- ii Acceptance and rejection regions **(2 marks)**
- iii One tailed and two tailed test **(2 marks)**
- c) The food and nutrition board of Kenya states that the recommended daily allowance (RDA ) of iron for adult females under 51 years is 18 mg. A sample of iron intake from 45 randomly selected female under 51 years was taken. It revealed that the sample mean  $\bar{x}$  was 14.68 mg. At 1% significance level, does the data suggest that adult females under 51 years are on average getting less than the RDA of 18mg of iron assuming that the standard deviation of the sample is 4.2mg. **(7 marks)**
- d) An experiment involving tossing a coin three successive times is conducted
- i State the sample space
- ii Find the probability of getting two heads. **(4 marks)**
- Q4. a) Define correlation **(1 mark)**
- b) Using diagrams, describe the THREE types of simple linear correlation **(9 marks)**

- c) The following table gives marks obtained out of 60 in CAT 1 and CAT 2 by a few students in SDS 311.

CAT 1	50	49	30	11	10
CAT 2	45	50	25	10	15

Determine whether there is a relationship between cat 1 and cat 2 using spearman's rank-order correlation coefficient. **(10 marks)**

- Q5. An employer wishes to establish the effect of the work experience his employees have on quality of their work. He collects the data as shown below

Number of years one has work	Cost of their drawing (ksh)
10	9,000
15	14,000
2	2,000
5	5,000
25	20,000
17	16,000

- a) Calculate the Pearson's correlation coefficient and hence comment on the relationship between work experience and the quality of work. **(13 marks)**
- b) Obtain the equation of the regression line of cost of drawing on number of years worked. Comment on the relationship justified by the line. **(7 marks)**

#### FORMUALE

Spearman's rank correlation coefficient

$$r = 1 - \frac{6 \sum D^2}{N(N^2 - 1)}$$

$$r_{xy} = \frac{N \sum XY - (\sum X)(\sum Y)}{\sqrt{[N \sum X^2 - (\sum X)^2][N \sum Y^2 - (\sum Y)^2]}}$$

Regression line equations

$$Y = a + bx$$

$$\text{Where } \sum Y = aN + b \sum X$$

$$\sum XY = a \sum X + b \sum X^2$$

**\*END\***