



GARISSA UNIVERSITY COLLEGE

(A Constituent College of Moi University)

**UNIVERSITY EXAMINATION 2016/2017 ACADEMIC YEAR ONE
SECOND SEMESTER EXAMINATION**

SUPPLEMENTARY/SPECIAL EXAMINATION

SCHOOL OF EDUCATION, ARTS AND SOCIAL SCIENCES

FOR THE DEGREE OF BACHELOR OF EDUCATION (ARTS)

COURSE CODE: STA 100e

COURSE TITLE: PROBABILITY AND STATISTICS

EXAMINATION DURATION: 3 HOURS

DATE: 28/09/17

TIME: 2.00-5.00 PM

INSTRUCTION TO CANDIDATES

- **The examination has SIX (6) questions**
- **Question ONE (1) is COMPULSORY**
- **Choose any other THREE (3) questions from the remaining FIVE (5) questions**
- **Use sketch diagrams to illustrate your answer whenever necessary**
- **Do not carry mobile phones or any other written materials in examination room**
- **Do not write on this paper**

This paper consists of FIVE (5) printed pages

Supplementary / special exam

1

please turn over

Good Luck – Exams Office



QUESTION ONE (COMPULSORY)

- (a) Differentiate between descriptive and inferential statistics **[2 marks]**
- (b) Consider the following data for a group of ten students showing the number of times each was late for mathematics lectures in a semester:

6 7 5 8 14 6 5 4 6 9.

Find the mode and median **[2 marks]**

- (c) The following table shows a complete frequency distribution of masses in kilograms of a population of 100 street boys in Nairobi. Each mass was recorded to the nearest 100g.

Mass(kg)	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
No of boys	14	x	27	y	15

Find the value of x and y **[5 marks]**

- (d) 60% of all households in GUC subscribe to the Star Newspaper, while 80% subscribe to the Nation and 50% subscribe to both papers. A household is selected at random. What is the probability that it subscribes to
- At least one of the two papers **[2 marks]**
 - Exactly one of the two papers **[2 marks]**
- (e) The mean of 5 observations is 4.4 and the variance is 8.24. If three of the five observations are 1, 2 and 6, find the other two **[3 marks]**
- (f) Compute the value of the product moment correlation coefficient for a set of data in which $n = 5, \sum x = 31, \sum y = 90, \sum x^2 = 225, \sum y^2 = 1702$ and $\sum xy = 508$ **[4 marks]**
- (g) In Garissa County, the probability that a woman attends a family planning clinic is 0.4 and the probability that her husband attends the clinic is 0.1. the probability that a husband attends the clinic given that his wife does is 0.8. Find the probability that
- both husband and wife attend clinic **[1 marks]**
 - The wife will attend the clinic given that the husband does **[2 marks]**
 - At least one of the two persons attends clinic **[2 marks]**



QUESTION TWO

A sample of 100 closing prices on the National Stock Exchange (NSE) resulted in the distribution given below. The prices are rounded to the nearest dollar

Class	20 - 25	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55
Frequency	2	8	9	19	26	20	16

Determine the

- i. Median [3 marks]
- ii. Mode [3 marks]
- iii. Mean using 37.5 as assumed mean [3 marks]
- iv. Standard deviation [4 marks]
- v. Coefficient of variation [2 marks]

QUESTION THREE

A director of a multinational company gave a written interview. The marks, out of 100, for the 100 candidates were distributed as shown below

Marks	11-20	21-30	31-40	41-50	51-60	61-70	71-80
Frequency	4	16	27	32	15	4	2

Find

- i. The mean and standard deviation [6 marks]
- ii. The 80th percentile [2 marks]
- iii. The pass mark if 30 % of the candidates were to fail [2 marks]
- iv. The minimum number of marks required to obtain grade A if only 5 candidates were to get A [2 marks]
- v. How many candidates were to pass if the pass mark was set at 25 marks [3 marks]



QUESTION FOUR

A first insurance company wants to relate the amount of fire damage (X) in major residential fires to the distance between the residence and the nearest fire station in km(Y). The study is to be conducted in Garissa County. A sample of 10 recent fires is selected and the printout is shown below:

X	3.4	1.8	4.6	2.3	3.1	5.5	0.7	3.0	2.6	4.3
Y	26.2	17.8	31.3	23.1	27.5	36.0	14.1	22.3	16.6	31.3

- (i) Obtain the least squares regression line of x on y [6 marks]
- (ii) Given that $x = 1.1$, estimate the value of y . [3 marks]
- b) given the data in the table below, obtain Karl Pearson's correlation coefficient [6 marks]

Subject	1	2	3	4	5	6
Age (x)	43	21	25	42	57	59
Mass level(y)	99	65	79	75	87	81

QUESTION FIVE

- (a) Only one in a thousand adults is afflicted with a rare disease for which a diagnostic test has been developed. The test is such that when an individual actually has the disease, a positive result will occur 99% of the time while an individual without the disease will show a positive result only 2% of the time. If a randomly selected individual is tested and the result is positive, what is the probability that the individual has the disease [6 marks]
- (b) The mean mass of 150 students in a class is 60kg. The mean mass of boys is 70kg, and that of girls is 55kg. Find the number of boys and the number of girls in this class [4 marks]
- (c) Suppose events A and B are such that $p(A) = \frac{1}{3}$, $p(B) = \frac{1}{3}$ and $p(A \cup B) = \frac{2}{5}$, determine $p(A \cap B)$. Are A and B independent [5 marks]



QUESTION SIX

(a) A continuous random variable x has a probability density function $f(x)$ given by

$$f(x) = \begin{cases} kx, & 0 \leq x \leq 2 \\ \frac{1}{2}kx(4-x), & 2 \leq x \leq 4 \\ 0, & \text{otherwise} \end{cases}$$

Where k is a constant.

Find

- i. The value of k **[4 marks]**
 - ii. $E(X)$ and $Var(X)$ **[5 marks]**
- (b) Two discs are drawn without replacement from a box containing 3 red discs and 4 white discs. The discs are drawn at random. If X is the random variable “number of discs drawn,” find
- i. The expected number of red discs **[3 marks]**
 - ii. The standard deviation of X **[3 marks]**

