



## GARISSA UNIVERSITY

UNIVERSITY EXAMINATION **2017/2018** ACADEMIC YEAR **TWO**  
**FIRST** SEMESTER EXAMINATION

SCHOOL OF EDUCATION, ARTS AND SOCIAL SCIENCES

FOR THE DEGREE OF BACHELOR OF EDUCATION (ARTS)

COURSE CODE: STA 210

COURSE TITLE: PROBABILITY AND STATISTICS

EXAMINATION DURATION: 3 HOURS

**DATE: 07/12/17**

**TIME: 09.00-12.00 PM**

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### 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

*please turn over*



**QUESTION ONE (COMPULSORY)**

(a) State three appropriate methods of collecting primary data **[3 marks]**

(b) The data below have a mean of 8 and a mode of 5:

5, 6, 13, 5, 10, 13, 3,  $x$ ,  $y$ . Find the values of  $x$  and  $y$  and also the lower and upper quartiles **[4 marks]**

(c) A random variable  $X$  is normally distributed with a mean of 50 and a standard deviation of 10.  
 Compute  $p(45 \leq X \leq 62)$  **[4 marks]**

(d) Find the median of the following distribution **[4 marks]**

Class size	Cumulative frequency
$x < 10$	5
$10 < x < 20$	15
$20 < x < 30$	32
$30 < x < 40$	60
$40 < x < 50$	83
$50 < x < 60$	95
$60 < x < 70$	127
$70 < x < 80$	198
$80 < x < 90$	250

(e) Calculate the product moment – correlation for a set of data in which  $n = 5, \sum x = 31, \sum y = 90,$   
 $\sum x_i^2 = 225, \sum y_i^2 = 1702$  and  $\sum xy = 508$  **[4 marks]**

(f) Find  $\bar{y}$  given that  $\sum_{i=1}^{12} (y_i - 100) = 66$  **[3 marks]**

(g) A gambler has a biased coin for which the probability of a head is 0.55. He tosses the coin 8 times.  
 What is the probability of getting 6 heads **[3 marks]**



**QUESTION TWO**

(a) The marks % for 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

Estimate by calculation

- i. The pass mark if 30% of the candidates were to pass **[4 marks]**
  - ii. The minimum mark required to obtain grade A if only 5 students were to get A **[4 marks]**
  - iii. How many candidates were to pass if the pass mark was set at 25% **[5 marks]**
- (b) Find the mean absolute deviation for the data 2, 3, 6, 8 and 11. **[2 marks]**

**QUESTION THREE**

The masses of 100 patients in a hospital were distributed as shown in the table below:

Mass (kg)	0-9	10	19	20-29	30-39	40-49	50-59	60-69	70-79	80-89
Frequency	3	7	8	9	12	18	25	10	6	2

- (a) Find the mean and standard deviation **[8 marks]**
- (b) Obtain the mode of the data **[3 marks]**
- (c) Find the 70<sup>th</sup> percentile **[4 marks]**

**QUESTION FOUR**

- (a) A set of 12 numbers has a mean of 4 and a standard deviation of 2. A second set of 20 numbers has a mean of 5 and a standard deviation of 3. Find the mean and standard deviation of the combined set of numbers. **[11 marks]**
- (b) A set of values of a variable  $x$  has a mean of 6 and a standard deviation of 2. Values of a new variable  $y$  are obtained using the formula  $y = 4x - 3$ . Find the mean and standard deviation of the new set of values. **[4 marks]**



**QUESTION FIVE**

The data below represent the two types of nails manufactured by Mabati Rolling Mills (MRM).

X	1000	1012	1009	1007	1010	1015	1010	1011
Y	235	240	245	250	255	260	265	270

**Find**

- (a) The covariance **[5 marks]**
- (b) The product moment correlation **[6 marks]**
- (c) The least squares regression line  $y$  on  $x$  **[4 marks]**

**QUESTION SIX**

- (a) The following table gives the classification of all employees of a company by sex and college degree.

	<b>College Graduate</b>	<b>Not a College Graduate</b>	
	<b>(G)</b>	<b>(N)</b>	<b>Total</b>
Male (M)	7	20	27
Female (F)	4	9	13
Total	11	29	40

If one of these employees is selected at random for membership on the employee-management committee, what is the probability that this employee is a female and a college graduate **[4 marks]**



- (b) According to a survey, 60% of all homeowners owe money on home mortgages. 36% of the homeowners owe money on home car loans. Find the conditional probability that a homeowner selected at random owes money on a car loan given that this homeowner owes money on home mortgage. Use the symbols :

A = the homeowner family selected owes money on a home mortgage

B = the homeowner family selected owes money on a car loan **[3 marks]**

- (c) The probability that a patient is allergic to penicillin is 0.20. Suppose this drug is administered to three patients,

. Let A, B and C denote the events that the first, the second and the third patients are allergic to penicillin respectively and take  $\bar{A}$ ,  $\bar{B}$  and  $\bar{C}$  to be the complementary events.

- i. Find the probability that all the three patients are allergic to penicillin.
- ii. Draw a tree diagram to show all the outcomes of the experiment above

Find the probability that at least one of them is not allergic to it **[7 marks]**

- (d) Consider the following two events for an application filed by a person to obtain a car loan:

A = event that the car loan application is approved

B = event that the car loan is rejected. Find  $p(A \text{ and } B)$ . **[1 mark]**

