

LAIKIPIA



UNIVERSITY

# UNIVERSITY EXAMINATIONS

FIRST SEMESTER 2025/2026 ACADEMIC YEAR

SECOND YEAR EXAMINATION FOR THE DEGREE  
OF BACHELOR OF EDUCATION ARTS

**BUST 211: BUSINESS STATISTICS**

***STREAM: R***

***TIME: 2 HRS***

***DAY: WEDNESDAY [8.30 A.M-10.30 A.M]***

***DATE: 04/02/2026***

**THIS QUESTION PAPER CONSISTS OF SIX (6) PAGES**

**PLEASE DO NOT OPEN UNTIL THE INVIGILATOR SAYS SO.**

**Instructions****This paper contains FOUR Questions****Answer only THREE Questions****Question ONE is Compulsory****Answer any other TWO Questions****QUESTION ONE ( COMPULSORY) 30 MARKS**

- a) Distinguish between the following terms as they are used in statistics **(6 marks)**
- Parameter and Statistic
  - Nominal and Ordinal data
  - Range and Standard Deviation
- b) In A company has a branch in Kenya where the average monthly salary of employees is Ksh 50,000 with a standard deviation of Ksh 4,000. Its branch in Tanzania has employees earning an average salary of TZS 1,200,000 with a standard deviation of TZS 100,000.
- Calculate the coefficient of variation for the salaries in both branches. **(3 marks)**
  - Briefly comment on which branch has more relative dispersion in salaries **(1 marks)**
- c) The management of a supermarket chain wishes to analyze the waiting time of customers at the checkout counters during peak hours. A random sample of 100 customers was observed, and the following data were recorded:

<b>Waiting Time (minutes)</b>	<b>Number of Customers</b>
0 – 5	5
5 – 10	9
10 – 15	15
15 – 20	21
20 – 25	23
25 – 30	14
30 – 35	8
35 – 40	5

- Calculate the arithmetic mean waiting time. **(3 marks)**
- Calculate the standard deviation of the waiting times. **(5 marks)**
- Construct a histogram and indicate the modal class and estimated modal value. **(8 marks)**

- (d) The marketing manager of a retail company recorded the following data on advertising expenditure (X) in thousands of shillings and the corresponding monthly sales revenue (Y) in millions of shillings for ten consecutive months:

<b>X (Advertising Expenditure (KSh'000))</b>	2	3	4	4	5	6	6	7	8	9
<b>Y (Sales Revenue, (Million Kshs))</b>	5	6	7	6	8	9	10	11	12	14

Draw a scatter plot of the data and describe the nature of the correlation, if any, between advertising expenditure and sales revenue. **(4 Marks)**

**QUESTION TWO (20 MARKS)**

- a) A factory produces electronic components, and experience shows that on average 15% of them are defective. If 8 components are selected at random, find the probability that:
- i) Exactly 3 components are defective. **(3 marks)**
  - ii) Not more than 3 components are defective **(3 marks)**
- b) Suppose that on an average 1 house in 1000 in Nyahururu Sub County has a fire during a year. If there are 2,000 houses in that sub county, what is the probability that exactly 5 houses will have a fire during the year? (Apply Poisson distribution) **(5 Marks)**
- c) The heights of adult male athletes in a sports academy are normally distributed with a mean of 70 inches and a variance of 9 inches. If there are 1,200 athletes in total, how many would you expect to be taller than 74 inches? **(5 Marks)**
- d) A grinding machine is so set that its production of shafts has an average diameter of 10.10 cm and a standard deviation of 0.20 cm. the product specifications call for shaft diameters between 10.05cm and 10.20 cm. What production of output meets the specifications presuming normal distribution? **(4 Marks)**

**QUESTION THREE (20 MARKS)**

- a) Distinguish between correlation and regression **(4 marks)**
- b) In a public speaking competition, three judges were asked to rank 10 contestants based on their presentation skills. The results obtained are shown in the table below:

<b>Contestant</b>	<b>Judge 1</b>	<b>Judge 2</b>	<b>Judge 3</b>
A	4	3	6
B	1	2	1

Contestant	Judge 1	Judge 2	Judge 3
C	5	4	5
D	8	7	8
E	6	5	7
F	2	1	3
G	9	8	10
H	3	6	2
J	10	9	9
K	7	10	4

Calculate the **Spearman's rank correlation coefficient** between:

- i) Judge 1 and Judge 2 **(3 marks)**
- ii) Judge 1 and Judge 3 **(3 marks)**
- iii) **Comment briefly** on the nature and strength of the relationship between the judges' rankings. **(2marks)**

c) The table below shows data collected on the fuel consumed (in litres) and the corresponding distance covered (in kilometers) by 10 different cars during a road test. It is assumed that the relationship between fuel used and distance covered **is** linear.

<b>Fuel Used (X) Litres</b>	2.0	3.5	1.5	4.0	2.8	3.2	1.0	4.5	2.2	3.8
<b>Distance Covered (Y) Km</b>	18	30	12	34	24	27	10	38	20	32

- i) Develop a **simple linear regression equation** of the form  $Y = a + bX$  where (Y) is the distance covered and (X) is the fuel used. **(6 Marks)**
- ii) Use the equation obtained to estimate the distance covered when 5 litres of fuel are used **(2 Marks)**

#### QUESTION FOUR (20 MARKS)

- a) Define the following terms as used in network analysis **(5 marks)**
  - i. Activity
  - ii. Event
  - iii. Optimistic time
  - iv. Pessimistic time
  - v. Most likely time

vi. Dummy activity

b) A building project consists of the following activities

Activity	Predecessor	Duration (Months)
A	-	4
B	-	8
C	A	12
D	B	15
E	A	11
F	B	6
G	C,D	13
H	C,D,E	4
J	F,G	9
K	H,J	10

**Required:**

- i) Network diagram **(7 Marks)**  
 ii) Determine the critical path and the expected project duration **(7 Marks)**

**QUESTION FIVE (20 MARKS)**

- a) Find the second order derivative of  $Y=3x^5 + 2x^3 -x +7$  **(4 marks)**  
 b) Work out  $\int (6x^3+ 3x^2 + 3) dx$  **(4 marks)**  
 c) Explain the FOUR components of time series data **(4 Marks)**  
 d) Digital Ltd. Manufactures and sells floppy disks at Nairobi Industrial Area. The average total cost (ATC) and Average Revenue (AR) (in thousands of shillings) of producing x floppy disks are given by the following functions:  $ATC = \frac{1}{2}x^2 - \frac{5}{2}x + 50 + \frac{500}{x}$  and  $AR = 800 - 2x^2$  Where: x is the number of floppy disks produced

**Required:**

- i) The profit function **(3 marks)**  
 ii) The number of floppy disks required to maximize profit **(3 marks)**  
 iii) The maximum profit **(2 marks)**

**QUESTION SIX**

The table below shows the company quarterly sales for a period of four years

	Quarters			
Year	Q1	Q2	Q3	Q4
1	20	30	45	29
2	21	42	40	34
3	23	31	42	54
4	27	33	46	47

**Required**

- i) The trend line equation of the form  $Y = a + bX$  **(8 Marks)**
- ii) Using the trend line in i above, compute the forecast sales for each quarter **(4 marks)**
- iii) Calculate the seasonal variation given that  $S = \frac{\text{Actual Sales}}{\text{Forecast sales}} \times 100\%$  **(4 marks)**
- iv) Calculate the average the percentage seasonal variations **(4 marks).**