

LAIKIPIA



UNIVERSITY

# UNIVERSITY EXAMINATIONS

1<sup>ST</sup> SEMESTER 2023/2024 ACADEMIC YEAR

SECOND YEAR EXAMINATION FOR THE DEGREE  
OF BACHELOR OF EDUCATION ARTS

**BUST 211: BUSINESS STATISTICS**

***STREAM:***

***TIME: 2 HRS***

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

***DATE: 14/12/2023***

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

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**QUESTION ONE ( COMPULSORY) 30 MARKS**

a) Distinguish between the following terms as they are used in statistics **(5 marks)**

- i) Descriptive and Inferential Statistics
- ii) Continuous and discrete data
- ii. Mode and median

b) In a given farm located in the UK the average salary of the employees is £ 3500 with a standard deviation of £150. The same firm has a local branch in Kenya in which the average salaries are Kshs 8500 with a standard deviation of Kshs.800. Determine the coefficient of variation in the 2 firms and briefly comment on the degree of dispersion of the salaries in the 2 firms. **(5 Marks)**

c) The managers of an import agency are investigating the length of time that customers take to pay their invoices, the normal terms for which are 30 days net. They have checked the payment record of 100 customers chosen at random and have compiled the following table:

<b>Days</b>	<b>Number of customers</b>
5 -10	4
10 - 15	10
15 -20	17
20 -25	20
25 -30	22
30 -35	16
35 - 40	8
40 -45	3

**Required:**

- i) Calculate the arithmetic mean. **(3 marks)**
- ii) Calculate the standard deviation **(5 marks)**
- iii) Construct a histogram and insert the modal value. **(8 Marks)**



- d) The following data was observed and it is required to establish if there exists a relationship between the two. Draw a scatter plot and use it to explain the nature of the correlation if any between X and Y **(4 Marks)**

X	5	4	5	3	5	4	4	6	7	8
Y	6	6	5	4	4	6	8	9	10	15

**QUESTION TWO (20 MARKS)**

- a) The incidence of a certain occupational disease is such that on the average 20% of workers suffer from it. If 10 workers are selected at random, find the probability that:
- i) Exactly 2 workers suffer from the disease. **(3 marks)**
  - ii) Not more than 2 workers suffer from the disease. **(3 marks)**
- b) Suppose that on an average 1 house in 1000 in NyahururuSub 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) Assume the mean height of soldiers to be 68.22 inches with a variance of 10.8 inches. How many soldiers in a regiment of 1, 000 would you expect to be over six feet tall? Assuming that the distribution of height is normal? **(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 beauty competition 3 assessors were asked to rank the 10 contestants using the professional assessment skills. The results obtained were given as shown in the table below

Contestants	1 <sup>st</sup> assessor	2 <sup>nd</sup> assessor	3 <sup>rd</sup> Assessor
A	6	5	7
B	1	3	4
C	3	4	6
D	7	6	3
E	8	7	9
F	2	1	5
G	4	8	2
H	5	2	8
J	10	9	4
K	9	10	1

**Required:**

Calculate the rank correlation coefficient and hence comment briefly on the value obtained

**(8 Marks)**

- c) The table below shows the data for time taken by 10 cyclists to cover various distances in Kms. It is assumed that the relationship between distance and time taken is linear. Develop a simple regression equation of the form  $Y=a + bX$  and use it to determine the time taken to cover 10 kilometers.

**(8 Marks)**

Distance x kilometers	Time y mins
3.5	16
2.4	13
4.9	19
4.2	18
3.0	12
1.3	11
1.0	8
3.0	14
1.5	9
4.1	16

**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)		
		Optimistic	Most likely	Pessimistic
A	-	3	4	11
B	-	5	8	11
C	A	10	12	20
D	B	12	15	18
E	A	8	11	20
F	B	4	6	14
G	C,D	10	13	16
H	C,D,E	3	4	11
J	F,G	6	9	12
K	H,J	8	10	12

**Required:**

- i) Expected duration for each activity **(2 Marks)**
- ii) Network diagram **(5 Marks)**
- iii) Determine the critical path and the expected project duration **(3 Marks)**
- iv) What is the probability of completing the project in 55 months **(4 Marks)**

**QUESTION FIVE (20 MARKS)**

- a) Find the second order derivative of  $Y=x^4 + x^2 + 2x - 3$  **(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).**