



Kasarani Campus  
 Off Thika Road  
 Tel. 2042692 / 3  
 P. O. Box 49274, 00100  
 NAIROBI  
 Westlands Campus  
 Pamstech House  
 Woodvale Grove  
 Tel. 4442212  
 Fax: 4444175

**KIRIRI WOMEN'S UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**UNIVERSITY EXAMINATION, 2024/2025 ACADEMIC YEAR**  
**SECOND YEAR, SECOND SEMESTER EXAMINATION**  
**FOR THE DIPLOMA IN INFORMATION & COMMUNICATION TECHNOLOGY**  
**DBA 1104 – QUANTITATIVE METHODS**

Date: 18<sup>TH</sup> April 2024  
 Time: 2:30PM – 4:30PM

**INSTRUCTIONS TO CANDIDATES**

**ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS**

**QUESTION ONE (30 MARKS)**

- a) Given a set of data: **71, 55, 69, 45, 65, 57, 71, 82, 55, 50** calculate the variance (4 Marks)  
 b) Determine the derivative of the following polynomial functions with respect to  $x$

$$y = 2x^4 - 2x^{-3} + 5x^2 - \frac{1}{3}x^3 \quad (3 \text{ Marks})$$

- c) Study the data below and use to:

Weight	120-129	130-139	140-149	150-159	160-169	170-179	180-189
Frequencies	8	10	13	11	9	6	3

**Find out the following**

- i) Mean (3 Marks)  
 ii) Median (4 Marks)  
 iii) Mode (2 Marks)
- d) A bag containing 3 white balls, 5 red and 4 black balls. A man picks 2 balls at random with replacement. Using a tree diagram, find the probability that the balls are of same color? (3 Marks)
- e) Use Elimination method to solve the simultaneous equations. (3 Marks)

$$\begin{aligned} 4x - 5y &= 13 \\ 3x - 2y &= 8 \end{aligned}$$

- f) Given the matrices  $A = \begin{bmatrix} 4 & 5 & 3 \\ 6 & -3 & 7 \end{bmatrix}$ ,  $B = \begin{bmatrix} 5 & 3 \\ 1 & -2 \\ -5 & 2 \end{bmatrix}$

Determine

- i)  $B^T$  (1 Mark)  
 ii)  $A^T - 2B$  (2 Marks)  
 iii)  $AB$  (2 Marks)
- g) Construct simple index number from numbers from the following data by using Fixed base method (2012 as base year) (3 Marks)

Year	2012	2013	2014	2015	2017	2018	2019
Price (Shs. 000)	85	72	60	58	78	110	140

### QUESTION TWO (20 MARKS)

a) Study the data below and use to:

<b>Wages</b>	<b>120</b>	<b>130</b>	<b>140</b>	<b>150</b>	<b>160</b>	<b>170</b>	<b>180</b>
<b>No of employees</b>	<b>8</b>	<b>10</b>	<b>13</b>	<b>11</b>	<b>9</b>	<b>6</b>	<b>3</b>

Find the following

- i) Geometric Mean (4 Marks)
- ii) Standard deviation (4 Marks)
- iii) Mean Absolute Deviation (4 Marks)

b) Given below is the data on staffing and running cost in each of the regions for a certain non-governmental organization.

<b>Number of staff (X)</b>	<b>10</b>	<b>8</b>	<b>14</b>	<b>12</b>	<b>11</b>	<b>9</b>
<b>Running cost ('000')</b>	<b>102</b>	<b>93</b>	<b>143</b>	<b>121</b>	<b>118</b>	<b>99</b>

- i) Determine the regression equation which may associate the number of staff to running costs (6 Marks)
- ii) Using the equation in (i) above, estimate the cost of running an office with 10 employees (2 Marks)

### QUESTION THREE (20 MARKS)

a) Two soccer judges were assigned the task of assessing 10 players of a team and each judge awarded each player points as shown in the table

<b>Player No.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
<b>Judge A</b>	<b>34</b>	<b>30</b>	<b>44</b>	<b>8</b>	<b>12</b>	<b>41</b>	<b>38</b>	<b>18</b>	<b>26</b>	<b>28</b>
<b>Judge B</b>	<b>26</b>	<b>22</b>	<b>42</b>	<b>10</b>	<b>18</b>	<b>32</b>	<b>46</b>	<b>17</b>	<b>12</b>	<b>30</b>

Compute the Spearman's Rank Coefficient of Correlation between the points awarded by the two soccer judges. (6 Marks)

b) Use Completing square method to solve for  $x$  in (3 Marks)

$$0 = 5x^2 - 9x + 4$$

c) Solve the following equations using the stated Substitution method. (3 Marks)

$$4x - 2y = 6$$

$$3x + 4y = 3$$

d) Find the first derivatives of the following function:

$$f(x) = x^{-3} + 5x^4 + 1 \quad (2 \text{ Marks})$$

e) Integrate the following functions

i)  $\int (3x^2 + 2x + 2) dx$  (3 Marks)

ii)  $\int (x^2 + 1)(2x + 4) dx$  (3 Marks)

### QUESTION FOUR (20 MARKS)

a) From the following data, calculate index numbers for 2020 taking 2018 as the base and using the following formulae:

i) Laspeyre's method (4 Marks)

ii) Paasche method (4 Marks)

iii) Fisher method (4 Marks)

Commodity	2018		2020	
	Prices (Shs)	Quantity (Bags)	Price (Shs)	Quantity (Bags)
Wheat	65	20	155	35
Beans	95	8	190	11
Rice	150	5	380	18

- b) A patient has a chance of 0.6 of finding a doctor in his surgery on a random visit. On the next three visits what is the probability that the patient finds the doctor:
- in exactly one visits (3 Marks)
  - in all visits (2 Marks)
  - on at least two visits (3 Marks)

**QUESTION FIVE (20 MARKS)**

- a) The following data have been collected regarding sales and advertising expenditure

Sales (Sh. M)	8	9	7	8	9	10
Advertising expenditure (Sh. M)	21	25	29	33	37	41

- Calculate the Karl Pearson's correlation coefficient between sales revenue and advertising expenditure. (8 Marks)
  - Comment on the results. (2 Marks)
- b) A company takes a random sample of 200 orders from its order book the value of the orders was distributed as shown in the table below.

Value of Order (In thousands Kshs)	1-5	6-10	11-15	16-20	21-25	26-30	31-35
Percentage of Orders (%)	22	25	21	14	8	7	3

- Calculate the
- Quartile deviation (5 Marks)
  - coefficient of variance (5 Marks)