TEVETA
Technical Education, Vocational and Entrepreneurship Training Authority

CERTIFICATE COMPUTER STUDIES

LEVEL 4 EXAMINATIONS

FINAL INTEGRATED SUMMATIVE EXAMINATIONS

SITTING: APRIL/MAY 2025

SUBJECT: MATHEMATICS AND STATISTICS

TIME: THREE (3) HOURS **TOTAL MARKS: 100**

PASS MARK: 50

INSTRUCTIONS TO CANDIDATE

1. Write your examination number and National Registration Card number on the answer Booklet provided. Ensure to append your signature in the space provided on the answer booklet.
2. Write your answer SCRIPT SERIAL NUMBER on the examination register provided and the entry slip.
3. There are Seven (7) questions in this paper.
4. Question one is COMPULSORY. Answer any other four (4) questions of your choice from the remaining six (6).
5. All questions carry equal marks.
6. Cell phones and programmable calculators are NOT allowed in the examination room.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

QUESTION 1: COMPULSORY

a) A firm has analyzed their operating conditions, prices and costs. The accountant has developed the following functions.

Revenue: $R(x) = 350x - 5x^2$ and Cost: $C(x) = x^2 + 20x + 60$.

where x = Number of units sold. The firm wishes to maximize profit.

Determine:

(i) The quantity to be sold in order to maximize profit (5 marks)

(ii) The price to maximize profit (4 marks)

(iii) The maximum profit (3 marks)

b) Differentiate:

(i) $f(x) = \frac{5}{\sqrt{x^3}}$ (4 marks)

(ii) $y = \sqrt{(3x^2 + 4x - 1)}$ (4 marks)

Total (20 marks)

QUESTION 2

a) Simplify: $(2a - 3) + 4a + 5 \times 6 - 3a$ (3 marks)

b) Solve: $4 - 3x = 2x - 11$ (3 marks)

c) Solve the following quadratic equation by completing the square method:

$4x^2 + 4x - 15 = 0$ (8 marks)

d) Solve the following simultaneous equations for x, y and z;

$4x + y + 2z = 12$

$3x - 2y + 2z = 5$

$5x - y - z = 0$ (6 marks)

Total (20 marks)

QUESTION 3

a) A box contains 6 blue cards and 4 white cards. Two cards are selected from the box, one at a time without replacement.

Find the probability of selecting:

(i) A blue card followed by a white card. (3 marks)

(ii)Two (2) white cards. (3 marks)

(iii) 60% of companies in an industrial estate own their premises, and 40% employ more than 30 people. Calculate the probability that a company owns its premises or employs more than 30 people. (4 marks)

b) On average, there are 0.8 number of accidents happening in a week at a certain point along Great east road.

Find the following:

(i) The probability that exactly three accidents happened in a week. (6 marks)

(ii) The variance of the number of accidents happening in a week. (4 marks)

Total (20 marks)

QUESTION 4

a) The following are ages (in years) of pupils in Grade three (3): 11, 7, 6, 8, 10, 7, 9, 8,6, and 8.

Calculate the mean deviation of the ages. (6 marks)

b) The marks obtained by 30 students in mathematics and Statistics are as shown in the following frequency distribution table.

MARKS	FREQUENCY
10 < 20	0
20 < 30	1
30 < 40	2
40 < 50	10
50 < 60	6
60 < 70	5
70 < 80	3
80 < 90	2
90 < 100	1

Compute the following:

(i) Modal mark by formulae method. (7 marks)

(ii) Median mark. (7 marks)

Total (20 marks)

QUESTION 5

a) A businessman purchases 20 tables, 80 chairs, and 2 water dispensers for his conference. The respective unit prices are K35, 000, K18,000 and K65,000. Apply matrices multiplication to compute the total expenditure of the items. (8 marks)

b) Given that $A = \begin{pmatrix} 2 & -1 & 5 \\ 1 & \frac{1}{2} & -7 \\ 0 & 6 & -3 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 2 & \frac{1}{2} \\ 3 & 1 & -2 \\ -1 & 1 & 3 \end{pmatrix}$

Find:

(i) AA^T (6 marks)

(ii) $A \times B$ (6 marks)

Total (20 marks)

QUESTION 6

a) A binomial distribution has been found that on average 5% of the eggs supplied to a supermarkets are cracked. If you buy a box of 6 eggs, find the probability that a box:

(i) Contain at most 2 cracked eggs. (3 marks)

(ii) Contain at least 2 cracked eggs (3 marks)

(iii) Calculate the mean, variance and standard deviation. (6 marks)

b) A machine produces parts that have a standard deviation in length of 1.4 cm. A random sample of 100 parts has a mean length of 80 cm. Calculate the 95% confidence interval for the mean length of all parts. (8 marks)

Total (20 marks)

QUESTION 7

The table below shows data relating to output of a product and Cost of production.

Output (000) x	10	12	20	32	40
Cost of production(K'000) y	10	20	30	50	58

a) Construct a scatter diagram for this data. (4 marks)

b) Determine the least-squares regression equation. (6 marks)

c) Determine the expected output if the cost of production is K15. (3 marks)

d) Calculate the correlation coefficient (r) by product moment formula. (7 marks)

Total (20 marks)