25.4.12.24

TEVETA

Technical Education Vocational and Entrepreneurship Training Authority

CERTIFICATE COMPUTER STUDIES

TQF LEVEL 4 EXAMINATIONS

FINAL INTEGRATED SUMMATIVE EXAMINATIONS

SITTING: NOVEMBER/DECEMBER 2024

SUBJECT: MATHEMATICS AND STATISTICS

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

PASS MARK: 50

INSTRUCTIONS TO CANDIDATES

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 (1) is compulsory. Answer question ONE (1) and any other FOUR (4) questions of your choice.
5. All questions carry equal marks.
6. Cell phones and programmable calculators are NOT allowed in the examination room.

DO NOT TURN THIS PAPER UNTIL YOU ARE TOLD TO DO

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SECTION A:

QUESTION 1 (COMPULSORY)

a) Solve the quadratic equation by factorization method: (3 marks)

$x^2 - 4x - 21 = 0$

b) Differentiate the function; $f(x) = 2x^2 + 3x$ (2 marks)

c) The data below shows the allocation of study time a student pursuing a course in Computer Studies spends every Saturday morning.

Course name	Study time
Computer Application	90^0
Computer Programming	18^0
Architecture	36^0
Business Mathematics	216^0

(i) Draw a pie chart for the above data. (2 marks)

(ii) Calculate the percentage of time allocated to Computer Programming and Business Mathematics. (8 marks)

d) Find the 8th term in a sequence; 48, 40, 32, 24, ... (5 marks)

Total (20 marks)

QUESTION 2

a) A company manufactures two types of phones: Android brand **(X)** and Apple brand **(Y)** on which its aim is to maximize the profit. The company wishes to know the ideal combination of X and Y. All the electronic components are produced in three stages: Assembly, Inspection & Testing, and Packaging. Basic requirements are as shown in the table below;

Product	Assembly	Inspection & Testing	Packaging
X	1	1	3
Y	2	4	20
Maximum available (hours)	600	60	3600

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The profit contribution per product X is K10 and Y is K15.

(i) State the objective function. (2 marks)

(ii) State the constraint of the function. (5 marks)

(iii) Draw the graph of the constraint functions. (3 marks)

(iv) Find the maximum profit. (3 marks)

b) Mr.Chiang runs a mobile booth. Each day, he receives mobile deposits from his clients worth K50.00, K100.00, K120.00, K70.00, K80.00, K50.00, K100.00, K170.00, K100.00 and K150.00. Find the;

(i) Mean number of deposits received per day. (2 marks)

(ii) Modal number of deposits received per day. (1 mark)

(iii) Standard deviation of the orders received. (4 marks)

Total (20 marks)

QUESTION 3

a) Calculate the present value of K48, 000.00 in 5 years at 10% simple interest. (3 marks)

b) The sum of K30, 000.00 is invested in an account that offers 15% interest compounded annually for three (3) years.

Calculate the future value of the investment after three (3) years. (5 marks)

c) A machine costing K50, 000.00 depreciates to a scrap value of K1, 500.00 after 10 years.

Calculate:

(i) the annual percentage rate of depreciation using reducing balance method. (5 marks)

(ii) the book value of the machine at the end of the sixth year. (4 marks)

d) If 40 men can dig a trench of drainage in 6 days, calculate the number of men needed to do the same job in 15 days. (3 marks)

Total (20 marks)

QUESTION 4

a) Given matrix $P = \begin{bmatrix} 2 & 1 \\ 1 & 0 \end{bmatrix}$ and $Q = \begin{bmatrix} 1 & 3 \\ 1 & 4 \end{bmatrix}$

Determine; $(P + Q)^{-1}$ (5 marks)

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b) The following data relate to a set of commodities used in a particular process.

Commodity	2021		2022	
	Price (K)	Quantity (units)	Price (K)	Quantity (units)
A	36	100	50	90
B	70	20	80	10
C	45	35	56	12
D	5	1200	8	100

Taking 2021 as base year, calculate;

(i) Simple price index number for commodity A. (3 marks)

(ii) Laspeyres price index number for 2022. (6 marks)

(iii) Paasche price index numbers for 2022. (6 marks)

Total (20 marks)

QUESTION 5

a) Differentiate the following functions using chain rule.

(i) $y = (x^2 + 3)^5$ (5 marks)

(ii) $y = \sqrt{4x^2 - x}$ (5 marks)

b) A computer manufacturer can sell all the computers of a particular type produced. The total cost of producing x computers is C(x) = $300x + 2000$. The demand function is estimated as P(x) = $500 - 2x$.

(i) Derive the Revenue function, R. (2 marks)

(ii) Obtain the Total Profit function. (3 marks)

(iii) Find the number of computers that should be produced in order to maximize profit. (3 marks)

(iv) Find the maximum profit. (2 marks)

Total (20 marks)

QUESTION 6

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QUESTION 6

a) Solve the system of simultaneous equation using elimination method.

$3x + 2y = 30$

$2x - 5y = 1$ (4 marks)

b) A factory produces 4% defectives on computers components. The components are packed in boxes of 20. A box is selected at random.

Calculate the probability that;

(i) The box contains exactly one defective computer component. (3 marks)

(ii) There are at least two defective computer components. (3 marks)

c) A box contains 10 calculators, 3 of which are defective. Two calculators are drawn in succession without replacement.

(i) Construct a tree diagram for the information above. (2 marks)

(ii) Calculate the probability that one calculator is defective. (4 marks)

(iii) Calculate the probability that both calculators drawn are defective. (4 marks)

Total (20 marks)

QUESTION 7 ✓

a) The cost of output at a factory is dependent on the number of units produced. The data below shows the number of units produced per month and their associated costs in 7 months.

Month	Output units (x)	Cost (K) (y)
January	5	190
February	10	240
March	15	235
April	20	300
May	20	255
June	30	300
July	50	350

(i) Draw a scatter diagram. (4 marks)

(ii) Find the correlation coefficient by product moment method. (12 marks)

b) Solve for x in the following expression: $x - 2(1 - 3x) = 6 + 3(4 - x)$. (4 marks)

Total (20 marks)

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