

1503/103

MATHEMATICS I

Oct./Nov. 2019

Time: 3 hours

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THE KENYA NATIONAL EXAMINATIONS COUNCIL

CRAFT CERTIFICATE IN AUTOMOTIVE ENGINEERING

MODULE I

MATHEMATICS I

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Answer booklet;

Mathematical tables;

Non programmable scientific calculator.

This paper consists of FOURTEEN questions in TWO sections; A and B.

Answer ALL questions in section A and any THREE questions from section B in the answer booklet provided.

All questions carry equal marks.

Candidates should answer the questions in English.

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This paper consists of 4 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

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SECTION A

Answer ALL the questions from this section.

1. Solve the equation $3^{2x-4} = 81^{x+3}$. (4 marks)

2. Convert:

(a) 75_{10} to a binary number.

(b) 1100110_2 to a denary number.

(4 marks)

3. Given the matrices $A = \begin{bmatrix} 2 & 4 \\ -3 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -6 \\ 3 & 2 \end{bmatrix}$ determine $AB - 2B$.

(4 marks)

4. The third and fifth terms of an arithmetic progression are 10 and -10 respectively. Determine the first term and the common difference.

(4 marks)

5. Given the data: 1, 2, 3, 5, 7, 7, 7, 4, 5 determine the:

(a) mean;

(b) mode;

(c) median.

(4 marks)

6. Simplify: $\frac{4}{7} \left[\frac{2 - \frac{3}{2} \times \frac{1}{4}}{\frac{6}{5} + \frac{1}{5} \text{ of } \frac{3}{5}} \right]$ leaving the answer in fraction form.

(4 marks)

7. Convert 4.56° into fraction form.

(4 marks)

8. Determine the LCM of 36, 45 and 60.

(4 marks)

9. Solve the equation: $\log_{10}(6x-2) - 1 = \log_{10}(x-3)$.

(4 marks)

10. Determine the interest on Ksh 21,000 invested for 5 years at Ksh 15% compound interest.

(4 marks)

$$A = P \left(1 + \frac{r}{100} \right)^n = 21,238.50$$

$$I = A - P$$

SECTION B

Answer any **THREE** questions from this section.

11. (a) Given the matrices $A = \begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix}$ and $B = \begin{bmatrix} 6 & 3 \\ 8 & 6 \end{bmatrix}$ determine:

(i) $3A + 5B;$

(ii) $C = A^T B;$

(iii) $C^{-1}.$

Handwritten calculations for question 11(a):

For (i): $3A + 5B = \begin{bmatrix} 39 & 21 \\ 55 & 51 \end{bmatrix}$

For (ii): $C = A^T B = \begin{bmatrix} 38 & 39 \\ 71 & 51 \end{bmatrix}$

For (iii): $C^{-1} = \frac{1}{|C|} \begin{bmatrix} 17 & -13 \\ -37 & 28 \end{bmatrix} = \frac{1}{36} \begin{bmatrix} 17 & -13 \\ -37 & 28 \end{bmatrix}$

(10 marks)

(b) Two pencils and three biro pens cost Ksh 126 while four pencils and five biro pens cost Ksh 224. Use Cramer's rule to determine the cost of each item.

(10 marks)

Handwritten: Pencil = 21, Biro = 28

12. (a) The 4th and 7th terms of an arithmetic progression are 11 and 17 respectively. Determine the sum of the first 12 terms.

(6 marks)

Handwritten: $S_{12} = 1320$

(b) In a geometric progression, the ninth term is sixteen times the fifth term and the sum of the 4th seventh terms is 72. Determine the:

(i) common ratio;

(ii) first term;

(iii) sum of the first eight terms.

Handwritten calculations for question 12(b):

$r = 2$, $a = 28$

$21 \times 2 + 28 \times 3 = 126$

$28 \times 2 + 28 = 72$

$(21 \times 2) + 3(28) = 126$

(8 marks)

(c) A man invested Ksh 80,000 at 10% compound interest. Determine the total amount of his investment after 5 years.

(3 marks)

Handwritten: $A = P(1 + \frac{r}{100})^n = 128840.8$

(d) The value of a vehicle depreciates at 17% per annum. If its initial value is Ksh 850,000, determine its value after 7 years.

(3 marks)

13. (a) Use logarithms to evaluate:

$$\sqrt{\frac{4.562 \times 0.038}{0.82}}$$

(7 marks)

(b) Evaluate:

$$\frac{625^{\frac{3}{4}} \times 4^{\frac{3}{2}} \times 0.42}{12^{\frac{1}{2}} \times 3^{\frac{3}{2}}}$$

(7 marks)

(c) Solve the equation: $9^x + 3^{2x+1} = 36$

(6 marks)

Handwritten solution for 13(c):

$3^{2x} + 3^{2x+1} = 36$

$3^{2x} + 3 \times 3^{2x} = 36$

$4 \times 3^{2x} = 36$

$3^{2x} = 9$

$2x = 2$

$x = 1$

14. (a) Two forces F_1 and F_2 in Newtons acting on a mechanical system satisfy simultaneous equation.

$$4F_1 - 5F_2 = 13; \quad f_1 = 2$$

$$3F_1 - 2F_2 = 8. \quad f_2 = -1$$

Use the inverse matrix method to solve the equations.

(8 marks)

- (b) Table 2 shows the number of components produced by a machine:

Table 2

Number of components	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70
Frequency	6	14	10	4	2	3	1

Determine the:

(i) 30th percentile; $= 45$

(ii) 8th decile; $= 52.5$

(iii) interquartile range.

(12 marks)

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- (i) 30th percentile;
(ii) 8th decile;
(iii) interquartile range.

(12 marks)

$$P \text{ class } = \frac{P/2 - CF}{f}$$

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THE KENYA NATIONAL EXAMINATIONS COUNCIL
TECHNICAL EDUCATION EXAMINATIONS RESULT SLIP



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 101 INFORMATION COMMUNICATION TECHNOLOGY & ETREPRENEURSHIP
 102 APPLIED SCIENCE & ELECTRICAL PRINCIPLES
 103 MATHEMATICS I
 104 TECHNICAL DRAWING I
 105 VEHICLE TECHNOLOGY, BODYWORK & WORKSHOP TECHNOLOGY
 106 TRADE PRACTICE I

GRADE
 3 (THREE)
 3 (THREE)
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RESULT: CREDIT
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EXAMINATION COUNCIL

CRAFT CERTIFICATE IN AUTOMOTIVE ENGINEERING

KNEC PAST PAPERS

MODULE 1

Course Outline

Mathematics 1

Technical drawing

Applied Science and Electrical Principles

Entrepreneurship and ICT

Vehicle Tech Workshop and Bodywork

Trade Practice

The Kenya National Examinations Council



Craft Certificate

IN TECHNICAL, VOCATIONAL, ENTREPRENEURSHIP AND TRAINING (TVET)

This is to certify that the candidate named below sat for the Craft Certificate in TVET examination in the modules named below and was awarded this certificate. The candidate attained the awards shown below:

CRAFT CERTIFICATE IN AUTOMOTIVE ENGINEERING

CANDIDATE'S NAME: JAN LUNDI ILUTWA

INSTITUTION: RURAL AID KENYA TRAINING INSTITUTE

1st JULY LEVEL I CREDIT

2nd JULY LEVEL II CREDIT

OVERALL RESULT: **CREDIT**

LAST EXAMINATION DATE: 15

Chief Executive Officer
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