1601/103
1602/103
MATHEMATICS I
Oct./Nov. 2013
Time: 3 hours

Index No.: _____

Candidate's Signature: _____

Date: _____

THE KENYA NATIONAL EXAMINATIONS COUNCIL

CRAFT CERTIFICATE IN ELECTRICAL AND ELECTRONICS ENGINEERING
(POWER OPTION)
(TELECOMMUNICATION OPTION)

MODULE I

MATHEMATICS I

3 hours

INSTRUCTIONS TO CANDIDATES

Write your name and index number in the spaces provided above.
Sign and write the date of the examination in the spaces provided above.
You should have the following for this examination:
  Geometrical set:
  Electronic calculator Mathematical tables.
*This paper consists of **EIGHT** questions.*
*Answer any **FIVE** questions in the spaces provided in this question paper.*
All questions carry equal marks.
Maximum marks to each part of a question are as shown.
*Do **NOT** remove any pages from this booklet.*
Candidates should answer the questions in English.

For Examiner's Use Only

Question	1	2	3	4	5	6	7	8	TOTAL SCORE
Candidate's Score									

This paper consists of 20 printed pages.

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

Turn ove

Given the matrices:

$$A = \begin{pmatrix} -2 & 1 & 3 \\ 1 & 2 & 1 \end{pmatrix}, \quad B = \begin{pmatrix} 4 & -3 \\ 5 & 6 \\ 0 & 2 \end{pmatrix} \text{ and } C = \begin{pmatrix} 9 & 4 \\ 12 & -6 \end{pmatrix}$$

determine $AB + C$.

(7 marks)

(b) Determine the inverse of:

$$\begin{pmatrix} \frac{1}{3} & \frac{1}{2} \\ \frac{1}{5} & \frac{1}{4} \end{pmatrix}.$$

(5 marks)

(c) Solve by inverse matrix method the following simultaneous equation:

$7x + 4y = 18$
$8x - 6y = 10$

(8 mark)

4. (a) Simplify the following expression leaving your answer with positive indices:

$$\frac{(10x^{-3}y^{-\frac{1}{3}})(6z^{\frac{1}{3}})}{(15x^{8}y^{\frac{1}{4}}z^{\frac{1}{3}})}.$$

(5 mar)

(b) Solve for x in the following equation:

$$\frac{81^{2x} \times 27^{x}}{9^{x}} = 729.$$

(4 m)

(c) Given that $x = 36$ and $y = \left(\frac{1}{64}\right)$, find:

(i) $\frac{1}{3}y^{-\frac{1}{3}}$;

(ii) $\left(\frac{y}{x}\right)^{\frac{1}{2}}.$

(6 n)

(d) Using mathematical tables, evaluate the following expression to 3 significant figures:

$$\frac{43.25 \times 0.843}{\sqrt{2.641} \div 9.371}$$

(5

5. (a) Given that $M = \begin{pmatrix} 3-x & 1 \\ 2 & x \end{pmatrix}$ is a singular matrix, determine

    (i) the possible values of x;

    (ii) write down the **two** possible matrices. (6 marks)

    (b) Two resistors R_1 and R_2 connected in series have net resistance of 20 ohms. When the resistors are connected in parallel, they have a net resistance of 4.8 ohms. Determine the values of R_1 and R_2. (10 marks)

    (c) Solve for x in the following equation:

    $$\frac{5}{2^x} = 64^x.$$ (4 marks)

6. (a) John can complete a task in 5 hours while Amos can do the same task in 7 hours. Calculate the time they would take when working together. (5 marks)

    (b) Convert the decimal $0.1\dot{6}$ to fraction. (8 marks)

    (c) Three automatic switches A, B and C momentarily switch on after 12 minutes, 15 minutes and 25 minutes respectively. On a certain day, they went on simultaneously at 9.00 am. Determine the next time they will all be simultaneously on. (7 marks)

1. The length of 35 metallic conduits were measured and the results entered in a frequency table as shown in table 1.

Table 1

Length, m	Frequency
29.5 - 29.6	3
29.7 - 29.8	6
29.9 - 30.0	11
30.1 - 30.2	5
30.3 - 30.4	5
30.5 - 30.6	3
30.7 - 30.8	2

Using the data provided, calculate the:

(a)   mean length;

(b)   standard deviation;

(c)   median;

(d)   mode.   (20 marks)

2.   (a)   The second term of G.P. is -8 while the fifth is 1. Determine the sum of the first
ten terms of the series correct to 2 decimal places.
                                                                         (7 marks)

(b)   The fifth term of an A.P. is 19 and the sum of its first eight terms is 136.
Determine the:

    (i)   first term and common difference;

    (ii)   sum of the first twenty terms.

                                                                         (10 marks)
(c)   Evaluate the sum to infinity of a G.P. whose first term is 4 and the common difference
is $\frac{1}{2}$.
                                                                         (3 marks)