

1204/311  
MATHEMATICS  
June/July 2012  
Time: 3 hours



**THE KENYA NATIONAL EXAMINATIONS COUNCIL**

**ELECTRONIC CRAFT COURSE**

**MATHEMATICS**

**3 hours**

**INSTRUCTIONS TO CANDIDATES**

*You should have the following for this examination:*

- Answer booklet
- Mathematical tables/Scientific calculator

*Answer any FIVE of the EIGHT questions in this paper*

*All questions carry equal marks*

*Maximum marks for each part of a question are as shown.*

**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.**

1. (a) Solve for  $x$ :  $9(4^{2x+2}) = 0.96^{-x}$  correct to three decimal places. (5 marks)
- (b) Veni, Pita and Nesbit shared Ksh.31,950. The ratio of shares of Veni to Pita was 4:5 and that of Nesbit to Veni was 3:7. Calculate the money each received. (5 marks)
- (c) Two capacitors when placed in parallel have an effective capacitance of  $0.4375\mu\text{F}$ . When placed in series the effective capacitance is  $4\mu\text{F}$ . Calculate the capacitance of each capacitor. (10 marks)
2. (a) The value of  $D$  is directly proportional to  $r$  and inversely proportional to the square of  $x$ . Find the percentage change in  $D$  when  $x$  is doubled and  $r$  is increased by 5%. (6 marks)
- (b) An electric iron box costing Ksh.2,500 cash can be bought on hire purchase for 14 monthly instalments of Ksh.300. Find the monthly rate of compound interest charged. (5 marks)
- (c) A solid frustum of a right pyramid of vertical height 44 cm has a base of 78 cm by 27 cm. Its top is 26 cm by 9 cm. Calculate its:
- (i) volume;
- (ii) total surface area. (9 marks)
3. (a) The life time in hours of a sample of fuses from a factory were recorded in the table given:

Life time	Frequency
800 - 849	10
850 - 899	23
900 - 949	30
950 - 999	36
1000 - 1049	77
1050 - 1099	24
1100 - 1149	15
1150 - 1199	11

Draw a less than ogive. Hence determine the:

- (i) median;
- (ii) quartile deviation;
- (iii) 8th decile;
- (iv) 69th percentile.

(17 marks)

- (b) Determine the mode. (3 marks)
4. (a) An electric workshop employs workers for its operations. The number of workers employed shall follow an arithmetic progression on monthly basis. The number of workers employed in years 6 and 14 were 110 and 254 respectively. Calculate the:
- (i) total number of workers employed in the first 10 years;
- (ii) time it will take to employ a total of 2,480 workers. (9 marks)
- (b) A firm produced 2,000 inductors in first year. The number of inductors produced follows a geometric progression for subsequent years. This number shall increase by 4% per annum. Find the:
- (i) number of inductors produced in the 10 years;
- (ii) total number of inductors produced within the first 16 years;
- (iii) time it will take for the total number of inductors to amount to 6,000 inductors. (8 marks)
- (c) A box contains 6 resistors, 4 capacitors and 5 inductors. Another box contains 4 resistors, 10 capacitors and 6 inductors. A box is selected at random and a component selected. Find the probability of selecting an inductor. (3 marks)
5. (a) Solve for  $-180^\circ \leq \theta \leq 180^\circ$  the equation  $6 \sin 2\theta - 4 \cos 2\theta = 1$  (8 marks)
- (b) Two alternating voltages are given by  $V_1 = 9 \sin (\theta + 60^\circ)$  and  $V_2 = 6 \cos (\theta - 30^\circ)$ . Draw the graph of  $V_1$  and  $V_2$  on the same axes for  $0^\circ \leq \theta \leq 360^\circ$  at intervals of  $30^\circ$ . (12 marks)
6. (a) (i) Convert  $1249_{10}$  into binary. (3 marks)
- (ii) Convert  $101100111_2$  into base 10. (3 marks)
- (b) A lady deposited Ksh.21,460 in a bank offering a simple interest of 12% per annum. Calculate the:
- (i) total savings after 13 years;
- (ii) time taken for the savings to triple. (7 marks)

- (c) Wagi deposited Ksh.14,237 in a bank offering a compound interest of 8% per annum. Calculate:
- total savings after 11 years;
  - time taken for the interest to amount to Ksh.10,140.
- (7 marks)
7. (a) Three forces of magnitude 240N, 156N and 287N are acting at a point with bearings of  $065^\circ$ ,  $190^\circ$  and  $320^\circ$  respectively. Calculate the magnitude and the direction of the resultant force. (7 marks)
- (b) Vena and Alice were each given Ksh.10,540 to go and buy bulbs. The difference in prices was Ksh.6 and Alice bought 15 more bulbs than Vena. Calculate the cost of the bulbs. (6 marks)
- (c) Kanu bought 8 pencils and 5 rulers at a total cost of Ksh.271 from a bookshop. Deno bought 14 pencils and 21 rulers from the same bookshop at a total cost of Ksh.707. Use matrix inverse method to determine the cost of the items. (7 marks)
8. (a) Convert  $0.92\bar{5}$  into a fraction. (3 marks)
- (b) Make  $s$  the subject of the formula  $Qs = \sqrt{ts^2 + ws} - p$ . Hence find the value of  $s$  when  $p = 1$ ,  $Q = 5$ ,  $t = 9$  and  $w = 6$ . (6 marks)
- (c) Income tax for all the income earned was charged at the rates shown in table 1.

Total income per month in Kenya pounds	Rate in shillings per pound
1 - 1,985	2
1,986 - 3,970	3
3,971 - 5,955	4
5,956 - 7,940	5
7,941 - 9,925	7
9,926 - 11,910	9

Naru earned a basic salary of Ksh.158,000 and a house allowance of Ksh.60,000 per month. He received a single relief of Ksh.960 per month. Calculate his net pay per month in pounds.

(11 marks)