Name _____ Index No. _____

1920/103
BASIC ELECTRONICS
July 2015
Time: 3 hours

Signature _____

Date _____

THE KENYA NATIONAL EXAMINATIONS COUNCIL

CRAFT CERTIFICATE IN INFORMATION TECHNOLOGY

BASIC ELECTRONICS

3 hours

INSTRUCTIONS TO CANDIDATES

Write your name and index number in the spaces provided above.
Sign and write the date of examination in the spaces provided above.
*Answer **ALL** questions in section **A** and any **FOUR** in section **B**.*
Candidates should answer the questions in English.

For Examiner's Use Only

Section	Question	Maximum score	Candidates score
A	1 - 10	40	
B	11	15	
	12	15	
	13	15	
	14	15	
	15	15	
		Total score	

This paper consists of 12 printed pages.

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

SECTION A (40 marks)

*Answer **ALL** the questions in this section in the spaces provided.*

1. Outline **four** advantages of electricity as a source of power in the society. (4 marks)

2. With the aid of a sketch, explain the alternating current (AC) through a pure inductor. (4 marks)

3. Explain **two** uses of special bit patterns in binary coded decimal. (4 marks)

4. Determine the decimal equivalent for each of the following number systems:

   (i) $F9A_{16}$. (2 marks)

   (ii) $11001\ 1011_2$. (2 marks)

5. Calculate each of the following hexadecimal arithmetic:

(i) EA6 + 424; (2 marks)

(ii) CD1 - 311. (2 marks)

CD1
- 311
9CD

6. A conductor wire of length 36 m has a resistivity of $6 \times 10^{-6}\ \Omega$ m and resistance of 9Ω. Determine the:

(i) cross sectional area of the wire; (2 marks)

(ii) conductivity of the wire. (2 marks)

7. Explain **two** methods used to encode Binary Coded Decimal (BCD) numbers. (4 marks)

8. Using two's complement, determine $1000\ 1001_2 - 1110\ 1111_2$. (4 marks)

9. With the aid of a diagram, outline a typical construction and terminals of a NPN transistor showing the flow of current. (4 marks)

10. Draw a truth table for a XNOR gate. (4 marks)

SECTION B (60 marks)

*Answer any **FOUR** questions in this section in the spaces provided.*

11. (a) (i) Explain **two** disadvantages of DRAM as used in computers. (4 marks)

(ii) Differentiate between *hard disk* and *optical disc* as used in computers. (4 marks)

(b) (i) Determine the excess-3 equivalent of the number 1658_{10}. (3 marks)

(ii) A potential difference of 5 V is connected to a uniform resistance wire of length 0.8 m and cross sectional area of 8×10^{-8} m^2 with 0.06 A of current flowing through the wire. Determine resistivity of the wire. (4 marks)

12. (a) (i) Outline **three** concentration of lattice defects that affect the low temperature resistivity. (3 marks)

(ii) Explain **two** types of charges that could be found in an atom. (4 marks)

(b) (i) Using BCD, evaluate 127 + 783. (3 marks)

(ii) Figure 1 shows an arrangement of logical gates. Construct a truth table showing the outputs O, P and Q. (5 marks)

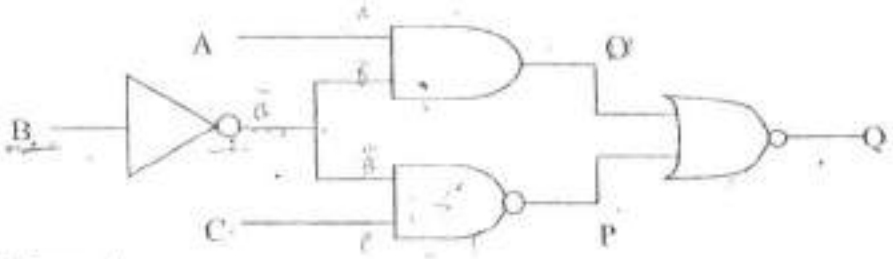

Figure 1

13. (a) (i) Draw a typical graph showing a phasor diagram of a sinusoidal waveform. (4 marks)

(ii) An a.c current of 30 mA (milliamps) is connected to a 60Ω resistor R. Determine the:

I. voltage of 4 V peak (maximum); (3 marks)

II. power in R in mW (milliwatts). (2 marks)

(b) Simplify each of the following binary arithmetic operations giving your answer in octal equivalent:

(i) 1100 1001 + 1001 1101; (3 marks)

(ii) 1110 0100 – 1111 0000. (3 marks)

14. (a) (i) Outline **two** ways of coping with challenges of emerging trends in electronics. (2 marks)

(ii) Differentiate between *silicon* and *germanium* semiconductor materials. (4 marks)

ii. current across the resistor R_4. (1 mark)

15. (a) (i) Outline **three** characteristics of a pure semiconductor. (3 marks)

(ii) Using the K-map, simplify the function:

$\sum m(1, 3, 5, 7, 9, 10, 11, 15)$ (5 marks)

(b) (i) A Technician at Tepex Company Ltd. intends to familiarize the employees on the different examples of ROMs used in computers. Outline **three** examples that could be mentioned. (3 marks)

(ii) An electrical door is controlled by three switches A, B and C. The door opens whenever switches A, B and C are in the same positions. When A and C are in same positions, the door opens on condition that switch B is high.

Draw a truth table to represent the information. (4 marks)