

Name _____ Index No. _____ / _____

1920/103
BASIC ELECTRONICS
July 2014
Time: 3 hours

Signature _____

Date _____



THE KENYA NATIONAL EXAMINATIONS COUNCIL
CRAFT CERTIFICATE IN INFORMATION TECHNOLOGY
MODULE I

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 the questions in Section A and any FOUR in Section B.

Candidates should answer all the questions in English.

For Examiner's Use Only

Section	Question	Maximum score	Candidate's 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. Define the unit of measure for each of the following electrical quantities:

(i) electromotive force; (2 marks)

(ii) current. (2 marks)

2. Determine the colour code in each case of the following resistors.

(i) $2.4 \times 10^7 \Omega$ 10%. (2 marks)

(ii) $5.3 \times 10^{10} \Omega$ 5%. (2 marks)

3. (a) Explain one limitation of excess-3 code as used in computers. (2 marks)

(b) Convert 24,900 m Ω to ohms. (2 marks)

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

(i) 654_8 ; (1 mark)

(ii) 123_{16} . (1 mark)

(iii) 1004_8 ; (1 mark)

(iv) $AF9_{16}$. (1 mark)

5. Evaluate each of the following binary arithmetic. Show your working

(i) $1111\ 0011 + 1011\ 1010$. (2 marks)

(ii) $1011\ 0001 - 1010\ 1101$. Use the 1's complement. (2 marks)

6. (a) With the aid of a diagram, outline a close circuit showing resistors in parallel and series. (2 marks)

- (b) Outline two types of resistors used in basic electronics. (2 marks)

7. Explain two methods of BCD subtraction. (4 marks)

8. Using two's complement, determine $1000\ 0011_2 - 1010\ 1111_2$. (4 marks)

9. Figure 1 shows the outline of current in a semiconductor material. Identify the parts labelled (i), (ii), (iii) and (iv) (4 marks)

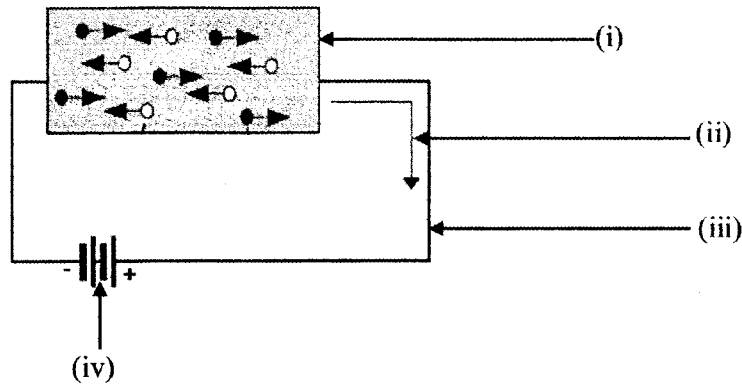


Figure 1

10. With the aid of a diagram in each case, outline the structure of each of the following logic gates:

(i) NOR; (2 marks)

(ii) XOR. (2 marks)

SECTION B (60 MARKS)

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

11. (a) (i) Explain **two** risks of using secondary storage media in computers. (4 marks)

- (ii) Differentiate between *optical memory* and *magnetic tapes* as used in computers. (4 marks)

- (b) (i) Determine the excess-3 equivalent of the hexadecimal number 7AD. (3 marks)

- (ii) A potential difference of 10 V is connected to a uniform resistance wire of length 3 meters and a cross sectional area of 0.09 m^2 with 0.01 A of current flowing in the wire. Determine the resistivity of the material. (4 marks)

12. (a) (i) Comment on the conductivity and resistivity of each of the following materials:

I. metal; (1 mark)

II. glass; (1 mark)

III. semiconductor. (1 mark)

(ii) Explain two characteristics of an extrinsic semiconductor. (4 marks)

(b) (i) Convert each of the following numbers to BCD.

I. 11111010₂; (2 marks)

II. 10000100₂. (1 mark)

(ii) Using the k-map, simplify the Boolean expression:

$$\overline{A}BCD + \overline{A}BC\overline{D} + \overline{A}B\overline{C}D + \overline{A}B\overline{C}\overline{D} + \overline{A}BCD.$$

(3 marks)

15. (a) (i) Outline three characteristics of an electron.

(3 marks)

(ii) Figure 4 shows a simple electric circuit with three resistor of R_1 (50Ω), R_2 (40Ω) and R_3 (60Ω) and voltage of 450 V . Use it to answer the questions that follow.

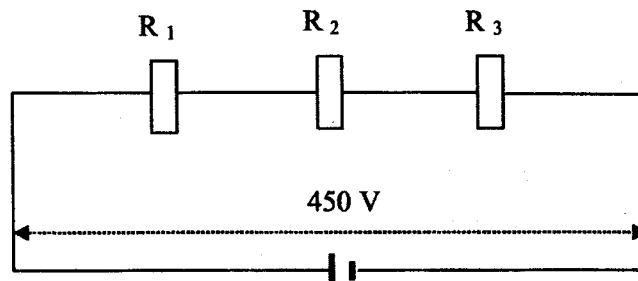


Figure 4

Determine the:

I. total resistance;

(2 marks)
