

Name \_\_\_\_\_ Index No. \_\_\_\_\_ / \_\_\_\_\_

1920/103  
BASIC ELECTRONICS  
November 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 each of the following electrical quantity units:

(i) joule; (2 marks)

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(ii) watts. (2 marks)

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2. With the aid of a diagram, outline each of the following types of diodes:

(i) photodiode; (2 marks)

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(ii) light emitting diode (LED). (2 marks)

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3. Explain two reasons for using binary codes in computers. (4 marks)

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

(i)  $714_8$ ; (2 marks)

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(ii)  $973_{16}$ .

(2 marks)

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5. Calculate each of the following octal arithmetic:

(i)  $456 + 424$ ;

(2 marks)

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(ii)  $761 - 312$ .

(2 marks)

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6. A conductor wire of length 30 m has a cross-sectional area of  $6 \times 10^{-6} \text{ m}^2$  and resistance of  $40\Omega$ . Determine the conductivity of the wire.

(4 marks)

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7. Explain two disadvantages of BCD multiplication. (4 marks)

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

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9. With the aid of a diagram, outline a typical construction and terminals of a PNP transistor. (4 marks)

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

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**SECTION B (60 MARKS)**

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

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

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- (ii) Differentiate between *flash memory* and *hard disk* as used in computers. (4 marks)

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- (b) (i) Determine the excess-3 equivalent of the number  $1878_{10}$ . (3 marks)

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- (ii) A potential difference of 5 V is connected to a uniform resistance wire of length 0.16 m and resistivity of  $8 \times 10^{-8} \Omega\text{m}$  with 0.02 A of current flowing in the wire. Determine the cross sectional area of the wire. (4 marks)

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12. (a) (i) Outline **three** factors that increases the resistivity of a metal conductor. (3 marks)

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(ii) Explain **two** functions of a neutron of an atom. (4 marks)

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(b) (i) Using BCD, evaluate 321 - 512. (3 marks)

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(ii) Figure 1 shows an arrangement of logical gates. Construct a truth table showing the outputs X, Y and Z. (5 marks)

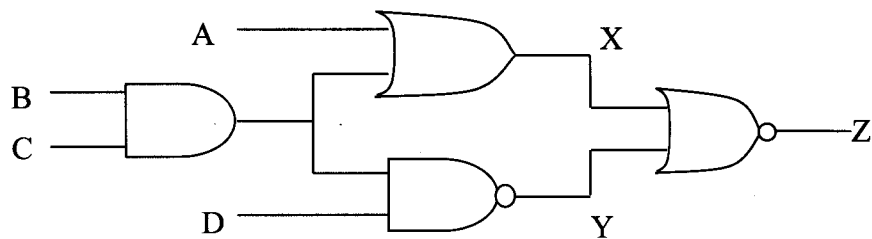


Figure 1

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13. (a) (i) Draw a typical graph showing current is a maximum for a resistor as a function of time. (4 marks)

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- (ii) An a.c voltage of 4 V peak (maximum) is connected to a  $100\Omega$  and resistor R. Determine the:  
I. current in R in mA (milliamps); (3 marks)

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

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

(i)  $1100\ 1001 + 1111\ 1101$ ; (3 marks)

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(ii)  $1110\ 0000 - 1111\ 1011$ . (3 marks)

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14. (a) (i) Outline two challenges of the emerging trends in electronics components. (2 marks)

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(ii) Differentiate between *extrinsic* and *intrinsic* semiconductors. (4 marks)

(b) (i) Using the k-map, evaluate the function.  
 $\Sigma m(0, 2, 4, 6, 8, 10, 12, 14)$  (5 marks)

(ii) Figure 2 shows a simple electric circuit with five resistors of resistance  $R_1$  ( $10 \Omega$ ),  $R_2$  ( $70 \Omega$ ),  $R_3$  ( $30 \Omega$ ),  $R_4$  ( $50 \Omega$ ) and  $R_5$  ( $90 \Omega$ ) and voltage of  $180 \text{ V}$ . Use it to answer the questions that follow.

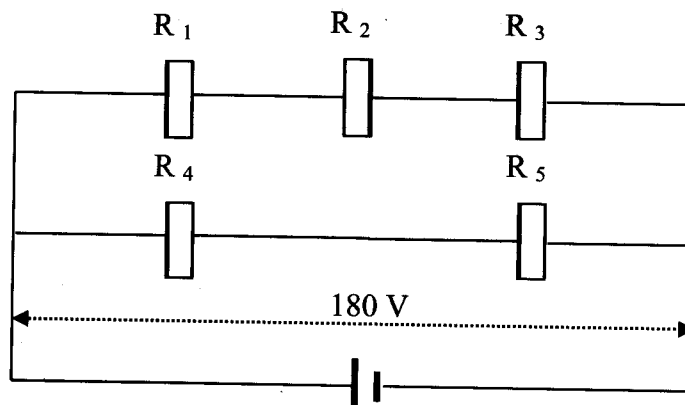


Figure 2

Determine the:

I. the total resistance in the circuit; (3 marks)

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II. the current across the resistor  $R_5$ . (1 mark)

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15. (a) (i) Outline **three** characteristics of reverse biasing of a junction diode. (3 marks)

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(ii) Using the Boolean algebra, simplify the expression:

$$\overline{A}BCD + \overline{A}BC\overline{D} + \overline{A}B\overline{C}D + \overline{A}B\overline{C}\overline{D} + \overline{A}B\overline{C}D + \overline{A}B\overline{C}\overline{D}. \quad (5 \text{ marks})$$

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- (b) (i) Students of a certain college were required to procure optical storage media devices. State six examples of optical media that they could have acquired. (3 marks)

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- (ii) A vendor machine is controlled by three switches. The machine gives a snack whenever switches A, B and C are in same positions. When B and C are in different positions, the machine gives a snack on condition that switch A is high.

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

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