Name:_____   Index No:_____/_____

1920/103
BASIC ELECTRONICS   Signature:_____
November 2013
Time: 3 hours   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.*
*This paper consists of 15 (**fifteen**) questions in **Two** sections: A and B.*
*Answer **ALL** the questions in **Section A** in the spaces provided in this paper.*
*Answer any **FOUR** questions in **Section B** in the spaces provided in this paper.*
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 10 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 over

SECTION A (40 MARKS)
*Answer **ALL** the questions in this section in the spaces provided.*

1. Define the following terms as used in electricity:

   (i) volt; (2 marks)

   _____

   _____

   (ii) watt. (2 marks)

   _____

2. The following is an outline of the colours of two resistors. Determine the resistance in each case.

   (i) Orange, blue, green, gold. (2 marks)

   _____

   _____

   (ii) White, red, yellow, silver. (2 marks)

   _____

   _____

3. (a) Explain **one** advantage of 8421 BCD. (2 marks)

   _____

   (b) Convert 120 Ω to milliohms. (2 marks)

   _____

   _____

4. Determine the binary equivalent for each of the following decimal numbers:
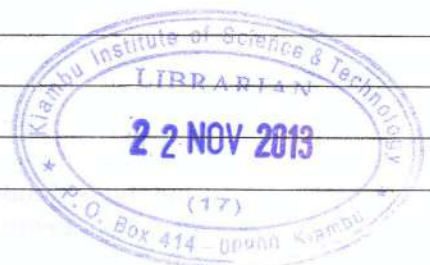
   (i) 689; (2 marks)

   _____

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   _____

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(ii)   54.375.   (2 marks)

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5.   Determine the octal equivalent for each of the following binary numbers:

(i)   1111 1011 1100;   (2 marks)

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(ii)   11 0001 1010.   (2 marks)

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6.   (a)   With the aid of a diagram, outline a closed circuit *resistors* in series.   (2 marks)

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(b)   With the aid of a sketch, outline a diode schematic symbol as used in electronics.   (2 marks)

_____

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7.   Outline **four** characteristics of integrated circuits.   (4 marks)

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8. Using one's complement, evaluate $1101\ 0011_2 - 1010\ 1011_2$; (4 marks)

9. Ruth intends to write a term paper on types of bonds between atoms. Outline **four** types of bonds she is likely to mention. (4 marks)

10. Distinguish between *OR* and *AND* logic gates. (4 marks)

SECTION B (60 MARKS)

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

11. (a) (i) Explain **two** advantages of using flash memory. (4 marks)

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   (ii) Differentiate between *PROM* and *EPROM* as used in computers. (4 marks)

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   (b) (i) Determine the excess-3 equivalent 756_8. (3 marks)

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   (ii) With the aid of a block diagram, describe an open d.c. circuit showing the flow of current. (4 marks)
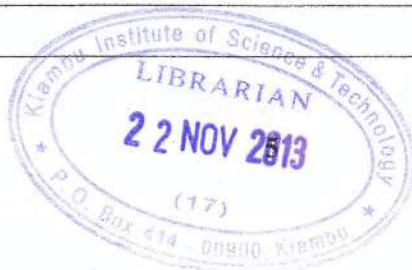
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12. (a) (i) Outline **three** factors that could affect the resistivity of metal conductors. (3 marks)

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(ii) Explain **two** uses of the reverse bias of a diode. (4 marks)

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(b) (i) Using BCD, evaluate 456 + 234. (3 marks)

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(ii) Figure 1 shows an arrangement of logical gates. Use it to answer the question that follows.
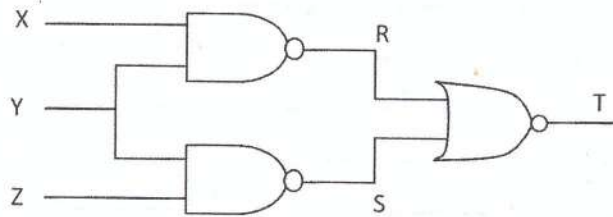
Figure 1

Construct a truth table showing the outputs R, S and T. (5 marks)

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13. (a) (i) Convert each of the following BCD numbers into hexadecimal equivalent:

I. 0100 0011 0110 0010; (2 marks)

_____

_____

II. 1000 0101 0001 0011. (2 marks)

(ii) Figure 2 shows three capacitors with capacitance C_1 (24 μ F), C_2 (42 μ F), and C_3 (36 μ F) connected across a 300V d.c supply. Use it to answer the question that follows.

Figure 2

Determine:

I. the total in capacitance in farads (F); (2 marks)

II. the charge on each of the capacitors. (3 marks)

(b) Evaluate the following arithmetic operations giving your answer in octal.

(i) $A1_{16} + 6C_{16}$ (2 marks)

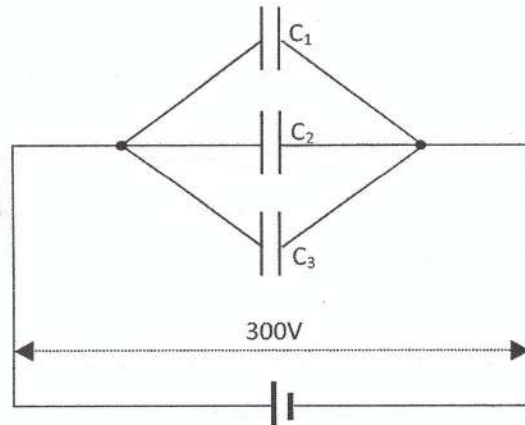(ii) $F7_{16} - 5D_{16}$ (2 marks)

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(iii) $96_{16} / 3_{16}$ (2 marks)

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14.   (a)   (i)   Outline **three** challenges of emerging trends in the basic electronics.   (3 marks)

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

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(b)   (i)   Using laws of Boolean algebra, evaluate the function.

$\sum m$ (0, 2, 4, 6, 8, 10, 12, 14)   (5 marks)

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(ii)   Simplify the Boolean expression $\overline{\overline{\overline{AB}} + \overline{BC}} + \overline{ABC}$.   (3 marks)

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15.   (a)   (i)   Outline **three** components of an atom structure.   (3 marks)

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     (ii)   A current of 4 mA flows in a resistor R when a p.d of 16 V is connected. Determine the values of:

       I.   the resistance;   (2 marks)

_____
_____

       II.   the conductance.   (2 marks)

_____
_____

(b) (i) Chris has procured optical media for the storage of his personal data. Outline **three** activities he would carry out to maintain the media. (3 marks)

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(ii) A light bulb is controlled by three switches. The bulb glows whenever switches A and C are in the same position. When A and C are in different positions, the bulb glows on condition that switch B is high.

Draw a truth to represent the information. (5 marks)

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