Name	Index No.	
1920/103	Signature	V-
BASIC ELECTRONICS		
July 2014	Date	





#### THE KENYA NATIONAL EXAMINATIONS COUNCIL

# CRAFT CERTIFICATE IN INFORMATION TECHNOLOGY MODULE I

## **BASIC ELECTRONICS**

#### 3 hours

## **INSTRUCTIONS TO CANDIDATES**

Time: 3 hours

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	
	11	15 .	
	12	15	
В	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.

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SECTION A (40 MARKS)

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

Determine the colour code in each case of the following resistors.	(2 marks
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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
(a) Explain one limitation of excess-3 code as used in computers.	(2 marks
(b) Convert 24,900 m $\Omega$ to ohms.	(2 marks
	· · · · · · · · · · · · · · · · · · ·

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(i)	654 <sub>8</sub> ;	(1 mark)
(ii)	123 <sub>16</sub> .	(1 mark)
(iii)	1004 <sub>8</sub> ;	(1 mark)
(iv)	AF9 <sub>16</sub> .	(1 mark)
Evalu	nate 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)
	`	

•	(2 mai
(b) Outline two types of resistors used in basic electronics.	(2 ma
Explain two methods of BCD subtraction.	(4 ma
·	
Using two's complement, determine 1000 0011 <sub>2</sub> – 1010 1111 <sub>2</sub> .	(4 ma
Using two's complement, determine 1000 00112 – 1010 11112.	(4 ma

9. Figure 1 shows the outline of current in a semiconductor material. Identify the parts labelled (i), (ii), (iii) and (iv) -(i) - (iii) (iv) Figure 1 10. With the aid of a diagram in each case, outline the structure of each of the following logic gates: NOR; (2 marks) (i) XOR. (ii) (2 marks)

SECTION B (60 MARKS)

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

(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 cor	mputers. (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
	(11)	meters and a cross sectional area of 0.09 m <sup>2</sup> with 0.01 A of current flow wire. Determine the resistivity of the material.	ving in the (4 marks)

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I.	metal;	(1 mark
		(
П.	glass;	(1 mark
III.	semiconductor.	(1 mark
i) Expl	ain two characteristics of an extrinsic semiconductor.	(4 marks
Conv	vert each of the following numbers to BCD.	
I.	11111010 <sub>2</sub> ;	(2 marks)
II.	100001002.	(1 mark)
	Conv. I.	III. semiconductor.  Explain two characteristics of an extrinsic semiconductor.  Convert each of the following numbers to BCD.  I. 11111010 <sub>2</sub> ;

(ii) Figure 2 shows an arrangement of logical gates. Use it to answer the question that follows.

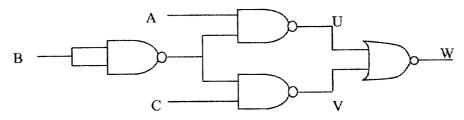


Figure 2

		Construct a truth table showing the outputs U, V and W.	(5 marks)
(a)	(i)	Perform each of the following BCD arithmetic:	
		I. 111011010 + 1100101;	(2 marks)
		II. 10101100 + 10000001.	(2 marks)
		·	

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13.

(ii) Figure 3 shows three capacitors with capacitance  $C_1$  (4  $\mu$  F),  $C_2$  (12  $\mu$  F), and  $C_3$  (24  $\mu$  F) connected across a 480V d<sub>2</sub>c supply. Use it to answer the question that follows.

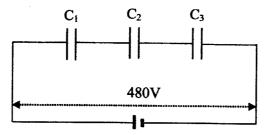


Figure 3

Determine the:

	I.	total capacitance in farads (F);	(2 marks)
		•	
	II.	p.d across capacitors C <sub>1</sub> and C <sub>3</sub> .	(3 marks)
			,
	93444444		
(b)	Determin	e the following binary arithmetic operations giving your a	answer in hexadecimal.
	(i) 11	00 1011 + 1000 1101;	(3 marks)
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	(ii)	1110 1111 – 1111 1001;	(3 marks
(a)	(i)	Outline three opportunities created by emerging trends of electronics co	mponents. (3 marks
	(ii)	Differentiate between forward bias and reverse bias junction diodes.	(4 mark
(b)	(i)	Using laws of Boolean algebra, evaluate the function:	
		$\sum m (1, 3, 5, 7, 9, 11, 13, 15).$	(5 mark
			***************************************

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

$\overrightarrow{ABCD} + \overrightarrow{ABCD} + \overrightarrow{ABCD} + \overrightarrow{ABCD} + \overrightarrow{ABCD}$ .	(3 marks)
	**
Outline three characteristics of an electron.	(3 marks
	Outline three characteristics of an electron.

(ii) Figure 4 shows a simple electric circuit with three resistor of R  $_1$  (50  $\Omega$ ), R  $_2$  (40  $\Omega$ ) and R  $_3$  (60  $\Omega$ ) and voltage of 450 V. Use it to answer the questions that follow.

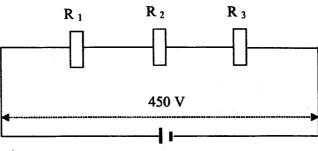


Figure 4

Determine the:

I. total resistance; (2 marks)

		II.	current ac	cross the resistors	<b>S.</b>		•	(2 marks)
				.:				
					-			
						N		
		· · · · · · · · · · · · · · · · · · ·						
		·		····			- -	
(b)	(i)	With t Showi	he aid of a	diagram, outline k and sectors.	the structure	of a comp	outer magne	etic disk. (3 marks)
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			· · · · · · · · · · · · · · · · · · ·	· .	<del></del>			
	·		<u> </u>	· · · · · · · · · · · · · · · · · · ·		····		
	(ii)			ntrolled by three d Z are in the sar				
								different
		positio	ons, warm v	water flows on co	ondition that s	witch Z is		(5 marks)
		positio	ons, warm v	water flows on co	ondition that s	witch Z is		
	-	positio	ons, warm v	water flows on co	ondition that s	witch Z is		
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