

1920/103  
BASIC ELECTRONICS  
NOVEMBER 2017  
Time: 3 hours



**THE KENYA NATIONAL EXAMINATIONS COUNCIL**  
**CRAFT CERTIFICATE IN INFORMATION TECHNOLOGY**

**BASIC ELECTRONICS**

**3 hours**

**INSTRUCTIONS TO CANDIDATES**

*Answer ALL questions in section A and any FOUR questions from section B in the answer booklet provided.*

*Candidates should answer the questions in English.*

**This paper consists of 4 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.

1. Outline **four** advantages of an alkaline battery. (4 marks)
2. Determine the decimal equivalent for each of the following number systems:
  - (i)  $5763_8$ ; (2 marks)
  - (ii)  $3C8F_{16}$ . (2 marks)
3. With the aid of sketches, use NAND gate in each case to represent the expressions:
  - (i)  $\overline{A \cdot B} = \overline{C}$  (2 marks)
  - (ii)  $V \cdot \overline{W} = \overline{X}$  (2 marks)
4. A motor gives an output power of 40 kW and operates with an efficiency of 80%. When the constant input voltage to the motor is 400 V, determine the constant current supply. (4 marks)
5. With the aid of a sketch, describe a pure germanium atom. (4 marks)
6. Explain **two** applications of nibbles in computers. (4 marks)
7. Simplify the BCD arithmetic  $000100000000111 / 0101$ . (4 marks)
8. Figure 1 represent a DC series circuit. Determine the current follow, given  $R_1 (10\Omega)$ ,  $R_2 (20\Omega)$ ,  $R_3 (30\Omega)$  and a voltage of 120 V. (4 marks)

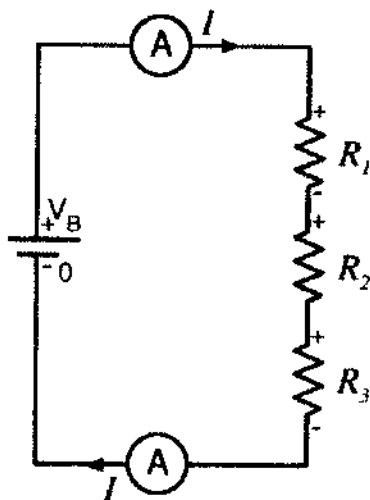


Figure 1

9. Evaluate each of the following binary arithmetic:
  - (i)  $10101\ 1111 + 10001\ 1100$ ; (2 marks)
  - (ii)  $1100 * 1101$ . (2 marks)
10. Explain **two** types of binary complements. (4 marks)

*Ans. Binary Subtraction  
Binary Number*

**SECTION B (60 marks)**

Answer any **FOUR** questions from this section.

11. (a) (i) Outline **three** AC wave form characteristics. (3 marks)  
(ii) Differentiate between *magnetic tapes* and *magnetic disks* as used in computers. (4 marks)
- (b) (i) There is a new trend where Light Emitting Diodes are replacing conventional light bulbs in some applications. Explain **two** reasons for this trend. (4 marks)  
(ii) A student came across the following terms during an electronics class. Explain each of the terms:  
(I) relay logic; (2 marks)  
(II) integrated circuit; (2 marks)

12. (a) (i) Explain **two** reasons for using DRAM as primary memory in the computer. (4 marks)  
(ii) ROM storage media is one of the memories used in making firmware. Explain **two** advantages of this media. (4 marks)
- (b) (i) Using a Karnaugh map represent the values of an OR gate. (3 marks)  
(ii) Figure 2 represents a sketch of a resistor. Explain the functions of the bands on the resistor labelled I. and II. (4 marks)



Figure 2

13. (a) (i) A diode has a power rating of 10W. When the diode voltage is 1.4V and current of 1.75A:  
(I) Determine the power dissipation. (2 marks)  
(II) Establish whether the diode will be destroyed. (2 marks)
- (ii) A circuit of 6 mA flows in a television resistor R when a potential difference of 12 V is connected. Determine the:  
(I) resistance; (3 marks)  
(II) conductance. (3 marks)

- (b) Simplify each of the following decimal number operations, giving your answer in hexadecimal equivalent:
- (i)  $774 + 869$ ; (2 marks)
  - (ii)  $22,234 - 13,345$ . (3 marks)

14. (a) (i) Explain **two** power sources of DC circuits. (4 marks)
- (ii) Semi-closed fuses are often used in special circuits. Outline **three** disadvantages of these fuses. (3 marks)
- (b) (i) Using excess-3, evaluate  $811 + 777$ , giving the answer in octal. (3 marks)
- (ii) Using reduction techniques, simplify the Boolean expression. (5 marks)

$$(X + Y)(X + Z)$$

15. (a) (i) Outline **two** properties of an atom. (2 marks)
- (ii) Differentiate between *NPN transistor* and *PNP transistor*. (4 marks)
- (b) (i) Table 1 represent a truth table for three valves that are controlled by the flow of water. Output = 0, close valve. Use the table to generate the Boolean expression for the output when the valve opens (output = 1) (4 marks)

Valves			Final Output
A	B	C	Water flows
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

Table 1

- (ii) With the aid of 3 NAND gates, construct a NOT gate which has two inputs. (5 marks)

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