higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

ELECTRONICS AND DIGITAL CONCEPTS FOR ROBOTICS
NQF LEVEL 2
(First paper)

18 February 2025

This marking guideline consists of 6 pages.

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SECTION A

QUESTION 1

1.1 B
1.2 B
1.3 C
1.4 A
1.5 D
1.6 A
1.7 A
1.8 C
1.9 A
1.10 B

(10 × 1) **[10]**

QUESTION 2

2.1 True
2.2 False
2.3 True
2.4 False
2.5 True

(5 × 1) **[5]**

QUESTION 3

3.1 M
3.2 H
3.3 F
3.4 J
3.5 B
3.6 I
3.7 L
3.8 D
3.9 E
3.10 A

(10 × 1) **[10]**

QUESTION 4

4.1 N-type
4.2 equal
4.3 impurity
4.4 majority
4.5 minority

(5 × 1) **[5]**

TOTAL SECTION A: 30

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SECTION B

QUESTION 5

5.1 5.1.1 $130\ 000 = 1{,}3 \times 10^5$

5.1.2 $256\ 000 = 2{,}56 \times 10^5$

5.1.3 $1\ 080\ 000\ 000 = 1{,}08 \times 10^9$

(3 × 1) (3)

5.2 $\bar{v}_1$ = displacement/time
= 80/30✓
= 2,667 m/s✓

$\bar{v}_2$ = 12 km/1h✓
= 12 000 m/3 600s✓
= 3,333 m/s✓

$\Delta v = \bar{v}_2 - \bar{v}_1$✓
= 3,333 – 2,667
= 0,666 m/s✓

$\alpha = \Delta v/\Delta t$✓
= 0,666/30✓
= 0,022 m/s^2✓ (10)

5.3 I = V/R✓
= 12/220 kΩ✓
= 54,545 µA✓ (3)

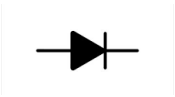
5.4



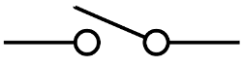
(4)
[20]

QUESTION 6

6.1 6.1.1 Inductor

6.1.2 

6.1.3 Transistor

6.1.4 

6.1.5 Rheostat

(5 × 1) (5)

6.2
- Small so requires small space
- Can be inserted in an IC holder
- Good reliability
- Simple circuit layout
- Low power requirement temperature ranges
- Cheap
- Easy to replace
- Less weight
- Fewer interconnections required (Any 5 × 1) (5)

6.3 A transducer converts energy from one form to another,✓✓ while a sensor detects a physical quality and converts it to a signal.✓✓ (2 + 2) (4)

[14]

QUESTION 7

7.1 7.1.1 Thermocouples are constructed by two wires made from two different types of metals twisted together at one end.

7.1.2 An open circuit is a circuit in which current does not flow.

7.1.3 Density is the measurement of how tightly or loosely packed (compacted) a give substance is into a given volume.

7.1.4 Energy is the ability to do work.

7.1.5 A logic gate is an electronic circuit with one or more than one input and only one output.

(5 × 1) (5)

7.2
- The soldering iron gets very hot (±400 °C) and it must be handled with care.
- Never leave a soldering iron laying on the workbench. Always put it back into its stand when it is not in use to prevent it from causing fires.
- Work in a well-ventilated room as many harmful fumes are generated during the soldering process.
- Hold wires/components to be soldered with tweezers or clamps to prevent burns.
- Turn the soldering iron off or unplug it when not in use.
- Always use lead-free solder.
- When soldering, bits of material fall – never try to catch hot material with bare hands.
- Always wear safety glasses when soldering.
- Take care not to let the nozzle of the solder sucker touch the hot tip of soldering iron, as this will melt the plastic nozzle.
- When desoldering, take care not to apply too much heat to the joint as this may damage the sometimes-thin copper tracks.
- After handling solder, make sure to wash your hands thoroughly.

(Any 5 × 2) (10)

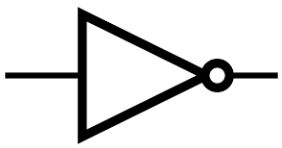
7.3 Personal protective clothing (1)
[16]

QUESTION 8

8.1
- Long-nose pliers
- Side cutter
- Soldering iron
- Soldering sucker
- Multimeter
- Voltmeter
- Wattmeter
- Ohmmeter
- Clamp meter
- Ammeter
- Frequency meter

(Any 6 × 1) (6)

8.2



(2)

8.3 A • (B • C) = (A • B) • C✓ and A + (B + C) = (A + B) + C✓ (2)
[10]

QUESTION 9

9.1
- Antistatic wrist strap
- Earth connection
- Shoes with rubber soles
- Dedicated antistatic areas
- Clean work area (5)

9.2
9.2.1 Warning sign
9.2.2 Information sign
9.2.3 Safety sign
9.2.4 Prohibition sign
9.2.5 Safety and fire sign

(5 × 1) (5)
[10]

TOTAL SECTION B: 70
GRAND TOTAL: 100

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