higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

ELECTRONIC CONTROL AND DIGITAL ELECTRONICS
NQF LEVEL 2

(12041022)

12 November 2018 (X-Paper)
09:00–12:00

This question paper consists of 6 pages.

NCV

TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. Read ALL the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Write neatly and legibly.

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QUESTION 1: COMPONENTS AND CIRCUIT DRAWINGS

1.1 Explain each of the following atomic concepts:

1.1.1 Valence electrons

1.1.2 Insulator

(2 × 1) (2)

1.2 Draw the structure of an atom. (3)

1.3 Explain the function of each of the following components:

1.3.1 Capacitor

1.3.2 Inductor

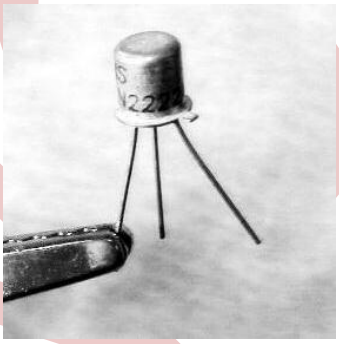
(2 × 1) (2)

1.4 Identify each of the following electronic components:

1.4.1



1.4.2



(2 × 1) (2)

1.5 Describe how N-type material is formed (4)

1.6 Explain the difference between *electron flow* and *hole flow.* (2)

1.7 Give ONE application of each of the following diodes.

1.7.1 LED

1.7.2 Zener

(2 × 1) (2)

1.8 A transistor has an emitter current of 1 mA and a collector current of 7,5 mA.

Calculate the value of the base current. (3)

[20]

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QUESTION 2: COMPONENTS AND CIRCUIT DRAWINGS

2.1 State THREE disadvantages of integrated circuits. (3)

2.2 State THREE basic applications of operational amplifiers. (3)

2.3 Sketch the circuit symbol of each of the following components:

2.3.1 Resistor

2.3.2 Polarised capacitor

2.3.2 Battery

(3 × 1) (3)

2.4 State THREE faults that can occur in diodes. (3)

2.5 Explain how a voltmeter is used when measuring voltage in a circuit. (4)

2.6 Name THREE tools used when soldering components in a vero-board. (3)

2.7 Four resistors of values 2Ω, 5Ω and 8 Ω are connected in parallel across a 10 V supply.

Calculate the following:

2.7.1 Total resistance of the circuit (3)

2.7.2 Total current of the circuit (2)

2.8 Give ONE danger of electrostatic charges. (1)

[25]

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QUESTION 3: DIGITAL ELECTRONICS

3.1 Differentiate between *analogue* and *digital signals*. (2)

3.2 Briefly compare a serial transfer to a parallel transfer. (2)

3.3 Convert the following decimal numbers to binary and perform the functions in binary. Convert your answer to decimal. Show ALL the steps.

$3_{10} + 10_{10}$ (8)

3.4 Use one's complement to subtract the following binary numbers:

$1010_2 – 111_2$ (6)

3.5 Explain the operation of the OR gate and complete its truth table. (6)

3.6 Distinguish between a latch and a flip-flop. (4)

3.7 Define *odd parity bit.* (2)

3.8 Draw an IEC symbol of a clocked J-K flip-flop. (4)

3.9 Assign an odd parity bit to the binary number 1101_2. (1)

[35]

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QUESTION 4: BASIC COMPUTER COMPONENTS

4.1 Explain each of the following computer terms:

4.1.1 Hardware

4.1.2 Software

4.1.3 Firmware

(3 × 1) (3)

4.2 Identify each of the following computer components:

4.2.1 

4.2.2 

4.2.3 

(3 × 1) (3)

4.3 Distinguish between *volatile* and *nonvolatile memory.* (4)
[10]

QUESTION 5: TRANSDUCER

5.1 List FIVE transducers that sense the physical conditions. (5)

5.2 Explain the operation of a bimetal strip with the aid of a diagram. (5)
[10]

TOTAL: 100

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