higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

ELECTRONIC CONTROL AND DIGITAL ELECTRONICS
NQF LEVEL 2

(12041022)

1 March 2018 (X-Paper)
09:00–12:00

Calculators may be used.

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.

NCV

QUESTION 1: COMPONENTS AND CIRCUIT DRAWINGS

1.1 Define the following atomic terms:

1.1.1 Matter

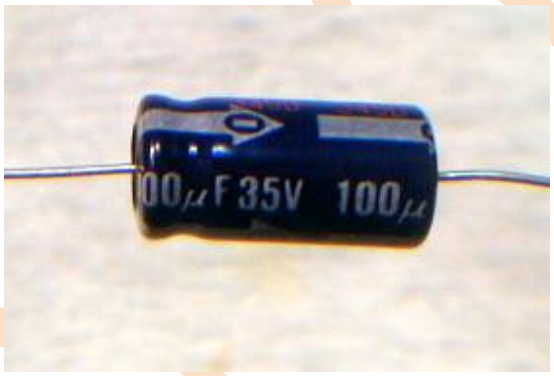
1.1.2 Free electrons

1.1.3 Atomic number

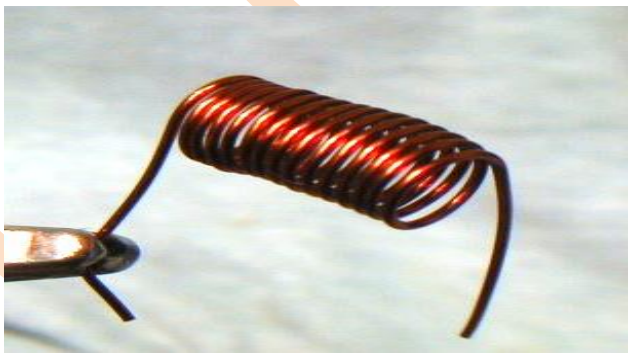
(3 × 1) (3)

1.2 Identify the following electronic components:

1.2.1



1.2.2



(2 × 1) (2)

1.3 What is the colour code of an 820 Ω ±5% resistor? (4)

1.4 Distinguish between an *intrinsic conductor* and an *extrinsic conductor.* (2)

1.5 Briefly explain how a diode operates when it reverses bias. (4)

1.6 Name TWO functions of a transistor. (2)

1.7 Name THREE terminals of a transistor. (3)

[20]

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QUESTION 2: COMPONENTS AND CIRCUIT DRAWINGS

2.1 Define the term *integrated circuit.* (1)

2.2 Discuss the differences between a *positive voltage regulator* and a *negative voltage regulator.* (4)

2.3 Explain how you would test the following electronic components:

2.3.1 Capacitor

2.3.2 Transistor

(2 × 3) (6)

2.4 Name TWO types of multimeters commonly used in electronics. (2)

2.5 State TWO advantages of using a breadboard over a vero board. (2)

2.6 State THREE safety precautions to be observed when working with solder. (3)

2.7 TWO inductors with values of 5 mH and 7 mH respectively, are connected in series.

Calculate the total inductance. (2)

2.8 Explain the use of the following tools:

2.8.1 Solder sucker

2.8.2 Side cutter

2.8.3 Soldering iron

(3 × 1) (3)

2.9 State TWO main advantages of operational amplifiers. (2)

[25]

QUESTION 3: DIGITAL ELECTRONICS

3.1 State FIVE advantages of *digital signals* over *analogue signals*. (5)

3.2 Explain how voltage levels are used to represent bits. (2)

3.3 Convert 14_{10} to a binary number. (4)

3.4 Add up the following binary numbers:

$10001_2 + 1101_2$ (2)

3.5 Use TWO's complement to subtract 3_{10} from 5_{10}. (6)

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3.6 Define an *even parity bit.* (2)

3.7 Draw a truth table of a NAND gate and explain its operation. (6)

3.8 Name any TWO types of logic gates. (2)

3.9 Draw an IEC symbol of an SR flip-flop. (4)

3.10 Name TWO outputs of a flip-flop. (2)

[35]

QUESTION 4: BASIC COMPUTER COMPONENTS

4.1 Explain the following terms:

4.1.1 Byte

4.1.2 Network

4.1.3 Shareware

(3 × 1) (3)

4.2 Name the following computer components:

4.2.1



4.2.2



4.2.3



(3 × 1) (3)

4.3 Give the full name for RAM and ROM and state the difference between RAM and ROM. (4)
[10]

QUESTION 5: TRANSDUCERS USED IN PROCESS CONTROL

5.1 Explain the operation of the following transducers:

5.1.1 Capacitive probes

5.1.2 Thermistor

5.1.3 Photo transistor

(3 × 3) (9)

5.2 Define a *transducer.* (1)
[10]

TOTAL: 100

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