higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

ELECTRONICS
NQF LEVEL 2

(10041012)

8 November 2018 (X-Paper)
09:00–12:00

Programmable calculators may NOT be used.

This question paper consists of 7 pages.

NCV

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TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions in each section.
2. Read ALL the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Round off ALL your final answers to THREE decimal places.
5. Write neatly and legibly.

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SECTION A

QUESTION 1

1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1.1–1.1.5) in the ANSWER BOOK.

1.1.1 An atom is made up of the following fundamental particles:

A Electrons and protons
B Protons and Neutrons
C A nucleus and neutrons
D Electrons, protons and a nucleus

1.1.2 What is the SI unit for power?

A W
B A
C V
D Ω

1.1.3 The process of converting AC to DC is called:

A Rectification
B Filtration
C Regulation
D Modulation

1.1.4 Which South African standard is used for wiring regulations?

A SANS 17025
B SANS 10125
C SANS 10400
D SANS 10142

1.1.5 The following must be observed when measuring current:

A Observe polarity, connect multimeter in series, select ammeter reading/scale
B Observe polarity, connect multimeter in parallel, select ammeter reading/scale
C Observe polarity, connect multimeter in series, select voltmeter reading/scale
D No need to observe polarity, connect multimeter in series, select ammeter reading/scale

(5 × 1) (5)

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1.2 Choose a/an item/word from COLUMN B that matches a description in COLUMN A. Write only the letter (A–J) next to the question number (1.2.1–1.2.5) in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.2.1	Device that allows current to flow in one direction	A	decimal number
1.2.2	Central system that connects telephone calls	B	dry joint
1.2.3	Light that shows that PLC is in program mode	C	communication light
1.2.4	Digital number that has base 2	D	telephone exchange
1.2.5	A joint that has not been made properly	E	binary number
		F	audio circuitry
		G	cold joint
		H	job card
		I	fault light
		J	diode

(5 × 1) (5)

1.3 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (1.3.1–1.3.5) in the ANSWER BOOK.

1.3.1 An atom is made up of protons only.

1.3.2 During amplitude modulation, the frequency and the amplitude of the signal are kept constant.

1.3.3 Analogue signals are electrical signals that have two distinct states (on/off or logic 1/logic 0).

1.3.4 A keyboard is an example of an output device

1.3.5 SANS 10400 is the standard or policy that regulates wiring.

(5 × 1) (5)

1.4 Give ONE word/term for each of the following descriptions. Write only the word/term next to the question number (1.4.1–1.4.5) in the ANSWER BOOK.

1.4.1 The output of … is logic one only if all inputs are logic 1.

1.4.2 An ammeter should always be connected in series when measuring …

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1.4.3 In a/an … joint the solder does not make good contact with the component lead or circuit board.

1.4.4 … is a device that transfers data or signals from the outside world into a computer for processing or transmission.

1.4.5 In a … .computers cover a wider area.

(5 × 1) (5)
[20]

TOTAL SECTION A: 20

SECTION B

QUESTION 2: FUNDAMENTALS OF ELECTRICITY AND BASIC ELECTRONIC THEORY AND CONCEPTS

2.1 List FOUR factors that influence the resistance of a conductor. (4)

2.2 10 Ω and 15 Ω resistors are connected in parallel and this combination is connected in series with a 5 Ω resistor. If a 50 V supply is connected to this circuit, then calculate the following:

2.2.1 Total resistance of the circuit (3)

2.2.2 Total current through the circuit (2)

2.2.3 Voltage across the 10 Ω resistor (2)

2.2.4 Colour code for the resistor in QUESTION 2.3.1 assuming that the tolerance is 10% (4)

2.2.5 Calculate the power consumed by the 10 Ω resistor. (2)

2.3 Draw an IEC (circuit symbol) symbol for each of the following components:

2.3.1 Polarised capacitor

2.3.2 Inductor

2.3.3 Transformer

2.3.4 Photodiode

2.3.5 Variable resistor

(5 × 1) (5)

2.4 Show by means of schematic diagrams the difference between forward bias and reverse bias in semiconductor devices. (4)

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2.5 Draw the IEC symbol and name one application for each of the following diodes:

2.5.1 PN junction diode

2.5.2 Light-emitting diode

(2 × 2) (4)
[30]

QUESTION 3:

3.1 A level 2 electronics student was electrocuted in a workshop while doing ISAT.

List the signs or the effects of the electrical shock. (5)

3.2 You should wear protective goggles if you are going to be working with hot metals or perform any activity that produces sparks.

List FIVE safety checks before you can use these protective equipments. (5)

3.3 List five tools that a technician needs in order to solder components on a printed circuit board or vero board. (5)

3.4 Describe the guidelines that must be followed to ensure that hand tools last longer and remain in good working order. (5)
[20]

QUESTION 4:

4.1 What is the difference between a *decimal number* and a *binary number*? (2)

4.2 Convert the following to binary:

4.2.1 12_{10} (1)

4.2.2 9_{10} (1)

4.2.3 Use your answers in QUESTIONS 4.2.1 and 4.2.2 to calculate:

(a) $12_{10} + 9_{10}$
(b) $12_{10} - 9_{10}$

(2 × 2) (4)

4.3 An output is logic one, only if all inputs are logic zero.

Name this gate and draw its IEC symbol. (4)

4.4 What are the precautions that should be taken before inserting a power supply to PLC systems? (3)

4.5 A CPU has various indicator lights.

List FIVE functions of these indicator lights. (5)
[20]

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QUESTION 5: BASIC CONCEPTS OF TELECOMMUNICATION

5.1 Briefly explain the operation of a simple telephone by means of a schematic diagram. (5)

5.2 Describe the following terms which are used in telecommunication systems:

5.2.1 Crosstalk

5.2.2 Termination

(2 × 1) (2)

5.3 Explain what is meant by a public switched telephone network (PSTN). (3)

[10]

TOTAL SECTION B: 80
GRAND TOTAL: 100

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