higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

ELECTRICAL SYSTEMS AND CONSTRUCTION
NQF LEVEL 3

(12041033)

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

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.
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

1.1 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (1.1.1–1.1.6) in the ANSWER BOOK.

1.1.1 SANS 10142-1 stands for South African Nosa Standards 10142-1.

1.1.2 The designer of an electrical installation must be aware of the operating environment of each part of the installation.

1.1.3 Hot- and cold-water systems need not be bonded to the installations earth continuity conductor.

1.1.4 Each distribution board shall be controlled by a switch disconnector mounted in or next to the distribution board.

1.1.5 No point of a distribution board that must be reached during normal operation shall exceed a height of 2,5 m above floor level.

1.1.6 The anticipated load of a circuit that feeds socket outlets shall exceed 5 kW.

(6 × 1) (6)

1.2 It is important for an electrician to prepare a parts list of the materials that will be required for a specific installation.

Explain what is meant by *numbered parts*. (2)

1.3 A circuit diagram should be drawn in such a way that it allows the reader to identify its purpose.

Give TWO guidelines to follow when drawing electrical circuit diagrams. (2)

1.4 State the purpose of the following tools:

1.4.1 A reamer

1.4.2 A spirit level

(2 × 2) (4)

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1.5 FIGURE 1 below refers to a geyser circuit. Labels the numbers 1.5.1–1.5.6 of the circuit. Write only the answer next to the question number (1.5.1–1.5.6) in the ANSWER BOOK.

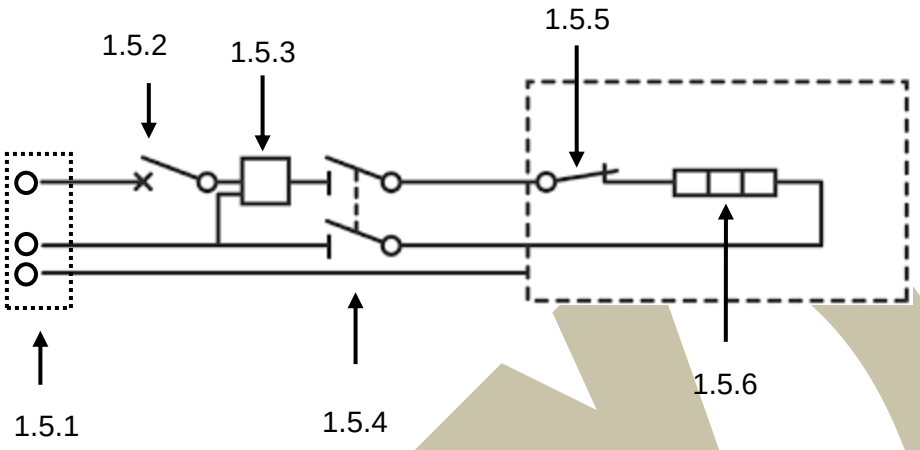

FIGURE 1

(6 × 1) (6)

1.6 Give THREE disadvantages of metal conduit. (3)

1.7 State the purpose of a compression gland. (2)

[25]

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QUESTION 2

2.1 The supplier's meter box houses the kilowatt-hour meter.

Give THREE types of kilowatt-hour meters. (3)

2.2 State the function of surge protection devices. (3)

2.3 You have to perform the voltage at no-load test (for each phase to neutral).

Explain how you will conduct the voltage at no-load test. (6)

2.4 A certificate of compliance for an electrical installation may be issued only by a registered person.

2.4.1 List FIVE sections that must be completed in the test report. (5)

2.4.2 How should a registered person act if a fault or defect is found prior to issuing a certificate of compliance. (2)

2.5 You are required to measure the resistance of the earth continuity conductor from the consumer's earth terminal to a socket outlet.

2.5.1 Name the instrument required for this test. (1)

2.5.2 Explain the procedure used to conduct this test. (5)

[25]

QUESTION 3

3.1 A risk control plan is developed to control the risks associated with the hazard.

3.1.1 State the risk control measure which is most effective when working with electricity.

3.1.2 Give an example of the risk control measure stated in QUESTION 3.1.1.

(2 × 1) (2)

3.2 Give THREE guidelines to follow when replacing fuses. (3)

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3.3 Choose a word or words from COLUMN B that matches a description in COLUMN A. Write only the letter (A–H) next to the question number (3.3.1–3.3.6) in the ANSWER BOOK.

COLUMN A		COLUMN B	
3.3.1	No voltage at stove plate	A	earth fault current
3.3.2	Earth leakage trips when appliance is switched on	B	short circuit
3.3.3	Circuit breaker trips when geyser is switched on	C	defective starter
3.3.4	High resistance across neutral conductor	D	faulty simmer stat switch
3.3.5	Fluorescent lamp flickers but does not light up	E	broken conductor
3.3.6	Lamp is dim when connected to a 230 V supply	F	cable resistance too high
		G	current too high
		H	faulty thermostat

(6 × 1) (6)

3.4 A fuse blows off each time it is connected in a circuit.

Give TWO possible remedies you might come up with to rectify the fault. (4)
[15]

QUESTION 4

4.1 State TWO disadvantages of a radial distribution system. (2)

4.2 Give TWO reasons for earthing the neutral conductor of a low-voltage system. (2)

4.3 Explain what is meant by the following:

4.3.1 Lock-out procedure

4.3.2 Tag-out procedure

(2 × 2) (4)

4.4 State TWO requirements for earthing on low-voltage apparatus. (2)
[10]

QUESTION 5

5.1 Briefly explain why tungsten is used in the manufacturing of incandescent lamp filaments. (2)

5.2 Give THREE factors that must be considered when selecting transformers for low-voltage halogen lamps. (3)

5.3 Compact fluorescent lamps are designed to replace incandescent lamps.

5.3.1 Give TWO main parts of a compact fluorescent lamp. (2)

5.3.2 Briefly explain the operation of a compact fluorescent lamp. (3)

5.4 Complete the following sentences by using the words in the list below. Write only the word or words next to the question number (5.4.1–5.4.3) in the ANSWER BOOK.

luminaires; washroom; 900 mm; flexible joint; 600 mm; thermal damage; lock; kitchen

5.4.1 Surface-mounted (a) ... shall be selected and installed so that (b) ... to the mounting surface is avoided. (2)

5.4.2 A luminaire pendant which is longer than (a) ... and not suitably stayed, shall have a ... . (2)

5.4.3 A suspended luminaire shall be out of arm's reach from the floor if the luminaire is installed in a ... (1)

[15]

QUESTION 6

6.1 Give THREE guidelines to follow when using a safety harness. (3)

6.2 State the purpose of glazing materials used on photovoltaic (PV) modules. (2)

6.3 State TWO configurations used for the connection of photovoltaic (PV) modules. (2)

6.4 Give THREE benefits of installing a solar water geyser on your premises. (3)

[10]

TOTAL: 100

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