higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NON-NATIONAL CERTIFICATE

INSTALLATION RULES
(First paper)

(11040412)

15 November 2022 (X-paper)
09:00–12:00

Drawing instruments and non-programmable calculators may be used.

This question paper consists of 6 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
INSTALLATION RULES
(First paper)
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. Start each question on a new page.
5. Your answer must show that you fully understand the context of the relevant question.
6. The necessary tables are supplied.
7. Candidates must pass PAPER 1 and PAPER 2 with 50% each.
8. Candidates may write both examination papers during the same examination period.
9. For accreditation purposes, all candidates must meet the requirements prescribed by the Department of Labour.
10. No condonations will be considered.
11. Write neatly and legibly.

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QUESTION 1: SANS 10198-1: DEFINITIONS AND STATUTORY REQUIREMENTS

Define the following terms:

1.1 Close overcurrent protection (2)

1.2 Earth leakage protection device (3)

1.3 Fault current (1)

1.4 Sustained current rating (1)

1.5 Voltage drop (3)

[10]

QUESTION 2: SANS 10292: EARTHING OF LOW VOLTAGE (LV) DISTRIBUTION SYSTEMS

Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to question number (2.1–2.10) in the ANSWER BOOK.

2.1 This standard gives requirements and recommendations for the provision of safe electricity supply to the consumer.

2.2 This standard applies to distributors that operate at voltages that does not exceed 1 000 V AC and 1 500 V DC.

2.3 The earthing of the neutral of a low-voltage (LV) system should be able to maintain the neutral of the LV system as close as possible to earth potential.

2.4 In the system earthing identification code, Letter T means one or more parts are connected directly to the neutral conductor.

2.5 For new distributors and new services of existing distributors, only TN-C and TN-S system earthing shall be used.

2.6 In a TN-S system earthing, when an aerial-bundle conductor is used, the neutral and PE conductors shall be electrically separate.

2.7 Both TN-S and TN-C-S systems may be used for bare open wire LV and MV overhead systems.

2.8 TN-C-S Systems use less conductors than TN-S systems.

2.9 In a TN-C-S service connection, the supply earth terminal shall be created by the supplier at the point of control.

2.10 Galvanized iron or a steel rod may be used as an earth electrode.

(10 × 1) **[10]**

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QUESTION 3: SANS 10142-1: SPECIAL INSTALLATIONS OR LOCATIONS: SAUNAS

Choose a word or words from COLUMN B that matches a description in COLUMN A. write only the letter (A–J) next to the question number. (3.1–3.10) in the ANSWER BOOK.

COLUMN A		COLUMN B	
3.1	Protection against direct contact shall be provided by insulation that can withstand, without breakdown, a voltage of 500 V for 1 min	A	Zone 0 ☆
3.2	Temperature limiting device may be installed, that can disconnect the supply to the heater when the temperature measured exceeds 140 °C.	B	Zone 1
3.3	Surface mounted cables shall not have exposed metal armouring or braiding	C	Zone 2
3.4	The equipment shall withstand a minimum temperature of 125 °C and the insulation of wires shall withstand a minimum temperature of 170 °C. ☆	D	Zone 3
3.5	A luminaire shall only be installed in this area and the light switch shall be outside the enclosure	E	Zone 4
3.6	Only control devices of sauna heaters (thermostat and thermal cut outs) and wiring belonging to those devices shall be installed.	F	insulation resistance
3.7	The measures of protection by means of obstacles, placing equipment out of arms reach, non-conducting locations and earth-free equipotential bonding to provide protection are not permitted	G	wiring systems
3.8	Cables shall comply with SANS 1507 and, if surface mounted, shall not be installed in a non-metallic wireway ☆	H	degree of protection
3.9	Only equipment that belongs to the sauna heater shall be installed	I	protection for safety
3.10	There is no special requirements concerning the heat resistance	J	cable installation ☆

(10 × 1) **[10]**

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QUESTION 4: SANS 10142-1: SPECIAL INSTALLATIONS OR LOCATIONS; TEMPORARY INSTALLATIONS

Briefly discuss or explain the installation or construction requirements for the topics below regarding temporary installations.

4.1 Wiring systems ☆ (5)

4.2 Socket outlets (2)

4.3 Motors (3)

[10]

QUESTION 5: SANS 10142-1: SPECIAL INSTALLATIONS OR LOCATIONS: D.C. INSTALLATIONS

5.1 Fully describe requirements regarding selection of equipment and circuits for DC installations. (5)

5.2 Give TWO requirements regarding the mounting of a disconnecting device for telecommunication equipment. ☆ (2)

5.3 State the differences between earthing practices in telecommunication DC power systems and other earthing standards given in this part of SANS 10142. (3)

[10]

QUESTION 6: SANS 10142-1: SPECIAL INSTALLATIONS OR LOCATIONS: DISTRIBUTION SYSTEMS AS PART OF ELECTRICAL INSTALLATIONS

6.1 What do you understand regarding *distribution systems*? ☆ (3)

6.2 State the types of cables that are allowed for distribution systems. (3)

6.3 What are the requirements regarding voltage drop for distribution systems? (4)

[10]

QUESTION 7: SANS 10142-1: SCOPE

This part of SANS 10142 applies to certain electrical installations including: residential, commercial, public, industrial and prefabricated buildings.

Name TEN other applicable installations. ☆ **[10]**

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QUESTION 8: SANS 10142-1: COMPLIANCE

8.1 Briefly explain requirements regarding notices, labels and rating plates. (4)

8.2 Table 4.2 gives topics and sub-clauses regarding notices, labels and rating plates.

Name SIX topics that deal with socket outlets only as per table. (6)
[10]

QUESTION 9: OCCUPATIONAL HEALTH AND SAFETY ACT NO. 85 OF 1993 AND REGULATIONS: CONSTRUCTION REGULATIONS

As an electrical contractor on a construction site, there are certain measures that you must comply with regarding electrical installations and machinery used on site.

Briefly explain what measures you need to comply with on site as per OHS Act. **[10]**

QUESTION 10: SANS 10142-1: ANNEXURE C: EXAMPLE OF ASSESSING ESTIMATED LOAD FOR RESIDENTIAL TYPE INSTALLATION

10.1 A 188 m² flat with 15 socket outlets and a 5 m x 2,5 m covered veranda with one socket outlet, 12 lighting points, a 150 ℓ 3 kW geyser, 2 kW under floor heating in the lounge and 2 kW under floor heating in the bedroom and a gas stove with 2 × 3 kW oven elements.

10.1.1 What is the total estimated load in Amperes? (7)

10.1.2 What is the size of the main protection device that can be used for the whole installation? (1)

10.2 Why is it important to work out the estimated load for an installation before installation commences? (2)
[10]

TOTAL: 100

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