higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NON-NATIONAL CERTIFICATE

INSTALLATION RULES
(First paper)

(11040412)

21 November 2023 (X-paper)
09:00–12:00

Drawing instruments and nonprogrammable calculators may be used.

This question paper consists of 5 pages and an addendum.

030Q1E2321

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NON-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. The answers need not be word perfect in all aspects according to the relevant publication/s but they must show that candidates fully understand the context of the relevant question.
5. Candidates must pass both Paper 1 and Paper 2 with 50% to be able to obtain a pass.
6. For accreditation purposes, all candidates must meet the requirements prescribed by the Department of Labour.
7. No condonations will be considered.
8. Necessary tables are supplied.
9. Use only a black or blue pen.
10. Write neatly and legibly.

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QUESTION 1: OCCUPATIONAL HEALTH AND SAFETY ACT NO.85 OF 1993 AND REG. ELECTRICAL INSTALLATION REGULATIONS

1.1 Briefly explain the duties of an approved inspection authority for electrical installations. (3)

1.2 Who may apply to be registered as a registered person? (4)

1.3 Briefly explain exceptions regarding the issuing of a certificate of compliance for connection of electricity supply to an installation. (3)

[10]

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

2.1 Fully describe the scope for this standard. (5)

2.2 Briefly explain the requirements regarding earthing of the neutral of a low-voltage system. (4)

2.3 What is the earthing arrangement for a TN-C system? (1)

[10]

QUESTION 3: SANS 10198-1: DEFINITIONS AND STATUTORY REQUIREMENTS

Define the following terms.

3.1 Close overcurrent protection (1)

3.2 Earth fault (1)

3.3 Earth leakage protection device (2)

3.4 Fault current (1)

3.5 Fully restrained system (1)

3.6 Sustained current rating (1)

3.7 Unrestrained system (1)

3.8 Voltage drop (2)

[10]

QUESTION 4: SANS 10142-1: SCOPE

Name TEN aspects that covered by this standard. **[10]**

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QUESTION 5: SANS 10142-1: SPECIAL INSTALLATIONS OR LOCATIONS: BATHROOMS, SHOWERS AND SPAS

Briefly explain protection for safety in bathrooms with regard to the following.

5.1 Protection by extra low voltage (SELV) (2)

5.2 Protection against electric shock (4)

5.3 Supplementary equipotential bonding (4)

[10]

QUESTION 6: SANS 10142-1: SPECIAL INSTALLATIONS OR LOCATIONS: CONSTRUCTION AND DEMOLITION SITES

Complete the following sentences by filling in the missing word or words. Write only the word or words next to the question number (6.1–6.10) in the ANSWER BOOK.

6.1 Assemblies, fixed equipment and other equipment installed shall have a degree of protection of at least … . (1)

6.2 Wiring shall be arranged in such a way that no strain be placed on the … of the conductors unless they are specifically designed for this purpose. (1)

6.3 To avoid damage, cables should not be run across … . (1)

6.4 Armoured cables or cables protected against mechanical damage shall be used where ever there is a … of mechanical damage. (1)

6.5 All electric motors shall be provided with the means of … of all poles and such means shall be adjacent to the motor. (1)

6.6 Luminaires mounted below … from the floor level or otherwise accessible to accidental contact shall be firmly and adequately fixed, and so sited or … as to prevent risk of injury to persons or ignition of material. (2)

6.7 The number of … and circuits required shall be determined by the size of the site and the … (2)

6.8 The metalwork shall be protected against corrosion and the ... expected under site conditions. (1)

[10]

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QUESTION 7: SANS 10142-1: SPECIAL INSTALLATIONS OR LOCATIONS: ALTERNATIVE SUPPLIES

7.1 What are the main requirements where an alternative supply is installed in an electrical installation? (4)

7.2 Briefly explain requirements regarding overcurrent protection in alternative supplies. (6)
[10]

QUESTION 8: SANS 10142-1: ANNEX C: ESTIMATED AND CONNECTED LOADS

8.1 Briefly explain how an estimated load can be assessed for a residential type of an installation. (2)

8.2 A flat of 208 m² is supplied by a single-phase supply protected by a 60 A MCB. The installation consists of the following appliances: a 4-plate electric and gas stove with 2 × 2 000 W electric plates and a 4 000 W oven, 8 x lights for bedrooms and kitchen and 20 × 5 W downlights in lounge, bathrooms and passage, a 150 L 2 kW geyser and a 500 W under-basin boiler.

Use this information to calculate the following:

8.2.1 Total estimated load of the installation in amperes (6)

8.2.2 The remaining load that can be added to the installation in kilowatts (2)
[10]

QUESTION 9: SANS 10142-1: ANNEX F: CONDUIT SIZE REQUIRED FOR SINGLE-CORE CABLES

9.1 Calculate the number of 1,5 mm² single core cables that can be installed in a 20 mm conduit that already contains 2 × 4 mm² and 2 × 2,5 mm² single-core cables. (4)

9.2 Determine the size of two conduits of the same size that can be used to accommodate the following single-core cables: 10 × 2,5 mm², 3 × 6mm², 4 × 10 mm² and 2 × 16 mm². (6)
[10]

QUESTION 10: SANS 10142-1: ANNEX J: ELECTRICITY SUPPLY SYSTEMS

With the aid of a neat, labelled diagram, explain how neutral loop testing can be performed on a single-phase domestic installation. **[10]**

TOTAL: 100

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Table 6.23 — Values of *C* for conductor nominal cross-sectional area

1	2
Nominal cross-sectional area of conductor mm²	**Value of *C***
1 1,5 2,5	8 10 14
4 6 10	17 22 30
16 25 35	42 65 84
50 70	118 152

Table 6.24 — Values of *K* for conduit diameter

1	2
Value of *K*	**Conduit diameter** mm
90 144	20 25
240 398 640	32 40 50

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