higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T880**(E)**(J26)T

NON-NATIONAL CERTIFICATE: ENGINEERING CERTIFICATE OF COMPETENCY

INSTALLATION RULES

(First Paper)

(11040412)

26 July 2019 (X-Paper)
09:00–12:00.

This question paper consists of 7 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NON-NATIONAL CERTIFICATE:
ENGINEERING CERTIFICATE OF COMPETENCY
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. ALL answers must comply with the relevant codes and/or requirements of the latest SANS publications and the Occupational Health and Safety Act and Regulations and must show that the candidate fully understands the context of the relevant question.

5. Start each question on a NEW page.

6. The necessary tables are supplied.

7. The candidates must pass PAPER 1 as well as PAPER 2 with 50% each. Both examination papers may be written during the same examination period. Candidates need not pass both examination during the same trimester, but the second examination must be passed within 12 months of the first, otherwise both examinations must be rewritten. If a candidate obtains 75 marks or more out of 100 in any one of the examinations, he/she will be permanently exempted from rewriting that examination and a statement will be issued to this effect. For accreditation purposes ALL candidates must meet the requirements prescribed by the Department of Labour.

8. NO condonations will be considered.

9. Write neatly and legibly.

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QUESTION 1: SANS 10198-1 of 2004: ELECTRIC POWER CABLES NOT EXCEEDING 33 KV: DEFINITIONS AND STATUTORY REQUIREMENTS

1.1 Define the scope for the above standard. (3)

1.2 Fully explain the guidelines of Section 5 of this standard regarding planning and submission of proposals for cable installations. (7)

[10]

QUESTION 2: SANS 10292 OF 2001: EARTHING OF LOW-VOLTAGE DISTRIBUTION SYSTEMS

Define each of the following terms:

2.1 Aerial bundled conductor (ABC)

2.2 Consumer's earth terminal

2.3 Earth

2.4 Earth electrode

2.5 Fault current

2.6 Medium voltage

2.7 Neutral conductor

2.8 Prospective touch voltage

2.9 Separate neutral and earthing cable

2.10 Supply earth terminal

(10 × 1) **[10]**

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QUESTION 3: OCCUPATIONAL HEALTH AND SAFETY ACT 85 OF 1993: CONSTRUCTION REGULATIONS

Complete the following regulations by filling in the missing parts. Write the answer next to the question number (3.1–3.5) in the ANSWER BOOK:

A contractor shall ensure that:

3.1 Before construction commences … (2)

3.2 All parts of electrical installations and machinery are of … (1)

3.3 In working areas where the exact location of … (3)

3.4 All temporary electrical installations are inspected at least … (2)

3.5 The control of all temporary electrical installations on the construction site is … (2)

[10]

QUESTION 4: SANS 10142-1 OF 2017: ANNEXURE G – IP RATINGS

Table J.1 concerns international protection ratings (IP ratings).

Explain the meaning of each IP rating below regarding the protection of persons against access to hazardous parts with and meaning for the protection against water. For example IP33 (3) means tool and (3) means limited spraying. Write the answer next to the question number (4.1–4.5) in the ANSWER BOOK.

4.1 IP 22

4.2 IP 44

4.3 IP X8

4.4 IP 56

4.5 IP 65

(5 × 2) **[10]**

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QUESTION 5: SANS 10142-1 OF 2017: ANNEXURE J – ELECTRICITY SUPPLY SYSTEMS

Draw a neat, labelled diagram of an IT system earthing. **[10]**

QUESTION 6: SANS10142-1 OF 2017: COMPLIANCE

6.1 State the requirements regarding notices, labels and rating plates in terms of the code. (4)

6.2 Give any TWELVE topics regarding notices, labels and rating plates as per TABLE 4.3. (12 × ½) (6)
[10]

QUESTION 7: SANS 10142-1 OF 2017: FUNDAMENTAL REQUIREMENTS

7.1 The characteristics of the selected equipment shall be appropriate to the conditions and parameters on which the design of the installation is based.

Explain each of the following characteristics:

7.1.1 Current (3)

7.1.2 Frequency (2)

7.1.3 Power (2)

7.2 Give THREE methods of protection that can be applied when SELV or PELV systems are used as means of protection. (3)
[10]

QUESTION 8: SANS 10142-1 OF 2017: SPECIAL INSTALLATIONS – SAUNAS

8.1 Give TWO requirements regarding surface-mounted cables in saunas. (2)

8.2 Give the conditions regarding installation of equipment in a sauna for zone 1 to zone 4. (6)

8.3 Explain which methods of protection against direct contact are not permitted. (2)
[10]

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QUESTION 9: SANS 10142-1 OF 2017: SPECIAL INSTALLATIONS – MEDICAL LOCATIONS

9.1 Complete the following paragraph by filling in the missing word or words. Write only the word or words next to the question number (9.1.1–9.1.7) in the ANSWER BOOK.

The classification of medical locations into groups shall be made in agreement with the (9.1.1) …, the health organisation or the body responsible for the safety of the (9.1.2) …, in accordance with the national, regional or (9.1.3) … In order to determine the classification of a certain medical location it is necessary that the medical staff or the responsible body indicates which (9.1.4) … will take place in the location. Based on the intended use the (9.1.5) … for this location shall be determined. Classifications of a medical location shall be related to the type of contact between (9.1.6) … and the patient and to the purpose for which the location will be used. (9.1.7) … shall comply with relevant standards for such medical electrical equipment.

(7 × 1) (7)

9.2 Complete the following statement by writing down the missing parts next to the question number (9.2) in the ANSWER BOOK:

Applied part: part of medical electrical equipment which in normal use … (3)

[10]

QUESTION 10: SANS 10142-1 OF 2017: ALTERNATIVE SUPPLIES (INCLUDING LV GENERATING SETS, PHOTOVOLTAIC INSTALLATIONS, ET CETERA)

10.1 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (10.1.1–10.1.5) in the ANSWER BOOK.

10.1.1 Alternative supplies are limited to low-voltage generating sets and photovoltaic (PV) installations.

10.1.2 Subclause 7.12 covers, but is not limited to, static UPS systems that consist of static inverters with batteries as the standby power source.

10.1.3 Where any form of alternative supply is connected to an electrical installation, a notice to this effect shall be displayed anywhere, but it must be visible.

10.1.4 The means of excitation and commutation shall be appropriate for the intended use of the generating set.

10.1.5 The prospective short-circuit current and prospective earth-fault current shall be assessed for each source of supply or combination of sources, which can operate independently of other sources or combinations.

(5 × 1) (5)

10.2 Where an alternative supply system is intended to operate in parallel with the main supply or where two or more alternate supply systems may operate in parallel, circulating harmonic currents shall be limited so that the thermal rating of conductors is not exceeded.

Give FIVE methods that can be applied to reduce the effects of circulating harmonic currents. (5)

[10]

TOTAL: 100

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