higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

ELECTRICAL SYSTEMS AND CONSTRUCTION
NQF LEVEL 3

(12041033)

10 March 2020 (X-paper)
09:00–12:00

This question paper consists of 5 pages.

385Q1S2010

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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. Start each question on a new page.
5. Use only a black or blue pen.
6. Write neatly and legibly.

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QUESTION 1

1.1 Name TWO persons responsible for the safety, safe use and maintenance of an electrical installation. (2)

1.2 Complete the following sentence by writing the missing word or words next to the question number (1.2.1–1.2.2) in the ANSWER BOOK.

Excessive temperature refers to temperature that is greater than (1.2.1) … in metallic parts and greater than (1.2.2) … in non-metallic parts. (2 × 1) (2)

1.3 Explain the term *IP rating*. (3)

1.4 Draw a neat, labelled diagram of a single-phase distribution board consisting of the following circuits:

- Socket outlet circuit
- Light circuit
- Stove circuit
- Geyser circuit
- Bell circuit

NOTE: A 63 A earth-leakage unit with overload protection must be used as the main switch. (10)

1.5 List THREE provisions to consider when planning a wireway. (3)

1.6 Give THREE advantages of metal conduit. (3)

1.7 Briefly explain the construction of surfix cables. (2)
[25]

QUESTION 2

2.1 Name the instrument used to measure electrical energy delivered to consumers. (1)

2.2 Define the term *point of outlet*. (2)

2.3 Name FOUR instruments used to test an electrical installation. (4)

2.4 List SIX tests that can be carried out on an installation according to section 4 of the test report. (6)

2.5 Give TWO requirements for an earth-leakage unit to be used as a main switch in a domestic installation. (2)

2.6 Explain how to use an ELCB tester to determine the correct operation of an earth-leakage relay. (4)

2.7 Draw a neat, labelled diagram to show how a polarity test is done on an Edison screw lamp holder. (6)
[25]

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QUESTION 3

3.1 When does the hazard of multiple supply sources usually occur? (2)

3.2 Briefly explain the term *interlock switch*. (2)

3.3 Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (3.3.1–3.3.10) in the ANSWER BOOK.

3.3.1 An effective way to test if a fuse is blown is to use an ohmmeter.

3.3.2 A capacitor-start-capacitor-run motor is a brushless machine.

3.3.3 One of the reasons for conducting a polarity test is to check if the neutral conductor is connected through a switch.

3.3.4 The last step in the fault-finding process is to find the cause of the problem.

3.3.5 Diagrams are useful in the fault-finding process only if they can be interpreted correctly.

3.3.6 Safe operating procedures should not be written for tasks that are performed infrequently.

3.3.7 Metallic ladders pose an electrical hazard and should not be used for electrical work.

3.3.8 No voltage on the secondary winding of a transformer may indicate an open circuit in the primary winding.

3.3.9 Signs of water leaks in kettles may be the result of a damaged lipped seal.

3.3.10 Maintenance procedures can be divided into two main types, namely preventative maintenance procedures and corrective maintenance procedures.

(10 × 1) (10)

3.4 State the testing method that reduces the average number of measurements during the fault-finding process. (1)

[15]

QUESTION 4

4.1 Give TWO items that can be found on a work permit. (2)

4.2 Describe TN-C-S earthing systems. (3)

4.3 Give ONE reason for earthing the neutral of a low-voltage system. (2)

4.4 State THREE activities or tasks to perform when restoring the supply to a low-voltage network. (3)

[10]

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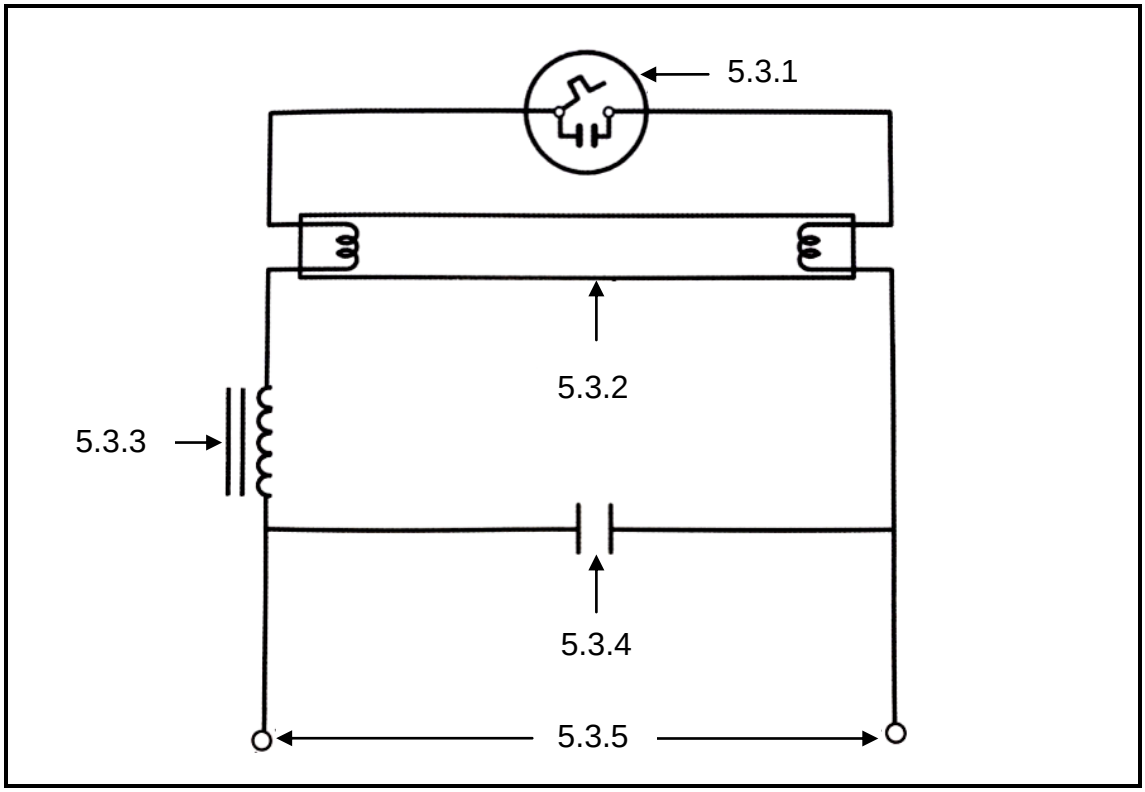
QUESTION 5

5.1 Name ONE type of lamp that is constructed with a quartz-glass envelope. (1)

5.2 Give ONE guideline to safely install low-voltage lamps. (2)

5.3



Label the parts of the circuit diagram by writing only the answer next to the question number (5.3.1–5.3.5) in the ANSWER BOOK. (5 × 1) (5)

5.4 List FIVE tests that can be done on lighting systems. (5)

5.5 Define the term *power factor*. (2)

[15]

QUESTION 6

6.1 Give TWO factors that affect the performance of photovoltaic modules. (2)

6.2 Draw a neat, labelled diagram showing how a blocking diode can be used to prevent a battery from discharging. (3)

6.3 Name the FIVE parts of a solar water heater. (5)

[10]

TOTAL: 100

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