higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

ELECTROTECHNOLOGY
NQF LEVEL 3

(12040423)

12 November 2019 (X-Paper)
09:00–12:00

This question paper consists of 5 pages.

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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. Write neatly and legibly.

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QUESTION 1

1.1 To fully understand DC machines, we need to consider the design of the machine. FIGURE1 shows the basic construction of a DC machine without the names of the parts.

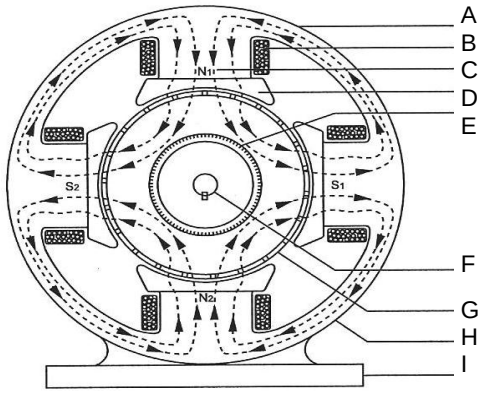


FIGURE 1

1.1.1 Identify the parts of the DC motor in FIGURE 1. Write only the name of the correct part next to the letter (A–I) in your ANSWER BOOK. (9)

1.1.2 List TWO functions of DC machines. (2)

1.1.3 Explain the difference between the TWO applications in QUESTION 1.1.2. (2)

1.2 Draw a fully labelled sketch of a flange coupling. (7)

[20]

QUESTION 2

2.1 Explain what is meant by *shock current.* (2)

2.2 SANS 10142 states that an electrical installation should provide protection.

Identify FIVE conditions against which an electrical installation should provide protection. (5)

2.3 Draw a fully labelled diagram of an oil dashpot protection device. (9)

2.4 Before any electrical installation should be commissioned, inspection must be carried out.

Give FOUR things/parts that should be inspected and verified. (4)

[20]

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QUESTION 3

3.1 Refer to FIGURE 2 below and identify each component in the circuit. Write only the correct answer next to the letter (a–f) in the ANSWER BOOK. (6)

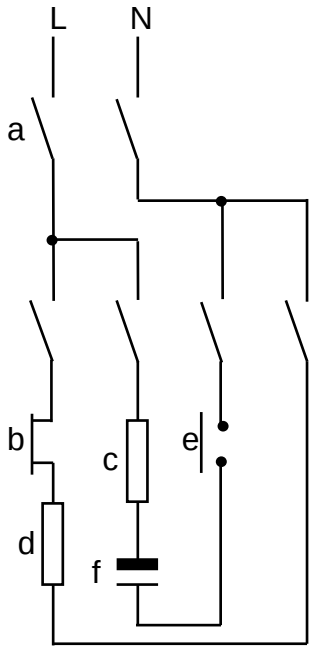


FIGURE 2

3.2 Identify the drive control circuit in QUESTION 3.1 (1)

3.3 Explain SIX items to consider before a new drive is to be installed. (6 × 2) (12)

3.4 Draw a fully labelled forward-reverse control circuit diagram. (11)
[30]

QUESTION 4

4.1 Give FOUR applications of relay logic. (4)

4.2 Draw the symbols for following relay logic elements:

4.2.1 Output coil

4.2.2 Connection

4.2.3 Counter

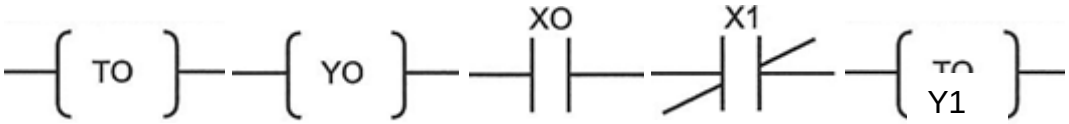
4.2.4 Time-delay

4.2.5 End statement

(5 × 1) (5)

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4.3 Design a relay logic circuit using the components below. The circuit must switch on two lights at the same time and automatically switch off one light after twenty minutes. The second light must not be turned off manually.



(11)
[20]

QUESTION 5

5.1 TABLE 5.1 shows the section/place where commissioning faults occur, possible causes from diagnostic test symptoms and corrective action.

Complete the table by filling in the corrective action. Write only the answer next to the question number (5.1.1–5.1.6) in the ANSWER BOOK.

SECTION WHERE COMMISSIONING FAULT OCCUR	DIAGNOSTIC TEST SYMPTOM AND POSSIBLE CAUSE	CORRECTIVE ACTION
Energy control	MCB tripping, circuit overload	5.1.1
	MCB tripping due to incorrect rating	5.1.2
	Excessive system voltage	5.1.3
Drive	Motor vibrates, misaligned	5.1.4
	Magnetic noise, air gap not uniform	5.1.5
	Motor overheats, grounded coil	5.1.6

TABLE 5.1 (6)

5.2 Name FOUR important aspects that need to be included in a presentable fault report. (4)
[10]

TOTAL: 100

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