higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

FAULT FINDING AND PROTECTIVE DEVICES N6

(8080126)

6 April 2020 (X-paper)
09:00–12:00

This question paper consists of 4 pages.

102Q1A2006

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
FAULT FINDING AND PROTECTIVE DEVICES N6
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 section 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 Explain the term *trickle charge* as it relates to batteries. (2)

1.2 Draw a complete graph of a 2-volt lead-acid cell showing voltage and gravity characteristics, including the constant rate of discharge and recharge. (6)

1.3 Name the type of electrolyte to use when topping up each of the following types of cells:

1.3.1 Lead-acid cells

1.3.2 Alkaline cells

1.3.3 Nickel-cadmium cells

(3 × 1) (3)
[11]

QUESTION 2

2.1 Name EIGHT types of protection relays. (8)

2.2 Name FIVE pieces of equipment in a protection system. (5)

2.3 Draw a simple diagram of an electromagnetic relay. (5)

2.4 Explain, with the aid of a sketch, how to phase in two 11 kV to 380 V transformers by using two 380 V/110 V transformers. (6)
[24]

QUESTION 3

3.1 Name THREE tests done on metal-enclosed switchgear. (3)

3.2 Give SIX advantages of using a gas-blast circuit-breaker (SF6) rather than an air or oil circuit-breaker. (6)

3.3 List FOUR requirements for protection on distribution switchgears. (4)
[13]

QUESTION 4

4.1 Explain how to carry out a crackle test to check if water is present in a transformer. (4)

4.2 List SEVEN conditions for a transformer to operate in parallel. (7)

4.3 Make a fully labelled sketch of a thermometer bulb in an oil tank to measure temperature. (7)
[18]

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QUESTION 5

5.1 Draw the wave shapes for an open circuit and a short circuit. (2)

5.2 Explain, with the aid of a simple sketch, the cyclic flashing method to locate a fault on a cable. (6)

5.3 Give FIVE steps to follow when testing faults in a cable. (5)
[13]

QUESTION 6

6.1 Give TWO ways to switch off an SCR. (2)

6.2 What is the aim of a current feedback loop in a DC drive? (3)

6.3 State the EIGHT basic rules for digital troubleshooting. (8)

6.4 Draw a fully labelled block diagram of logic comparator. (8)
[21]

TOTAL: 100

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