higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

FAULT FINDING AND PROTECTIVE DEVICES N6

(8080126)

9 April 2021 (X-paper)
09:00–12:00

Drawing instruments may be used.

This question paper consists of 4 pages.

102Q1A2109

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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. Drawings should be large, neat and they may be done in pencil.
5. Only use a black or blue pen.
6. Work neatly.

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QUESTION 1

1.1 State the remedies for the faults on nickel-cadmium cells:

1.1.1 High electrolyte consumption

1.1.2 Battery not fully charged

1.1.3 Partially or completely shorted cells

1.1.4 Surrounding temperature too high

1.1.5 Charger output too low

(5 × 1) (5)

1.2 Draw a series regulator that comprises the controlling device, error amplifier and reference unit. (7)

1.3 Explain the term floating charge concerning lead-acid batteries. (4)
[16]

QUESTION 2

2.1 Define the concepts in terms of protection:

2.1.1 Inverse time delay

2.1.2 Stability

2.1.3 Reliability

(3 × 2) (6)

2.2 Name SEVEN common sources of overvoltage in a power system. (7)

2.3 Draw a simple, labelled diagram of the shaded-pole overcurrent relay. (7)
[20]

QUESTION 3

3.1 Explain the purpose of surge arrestors. (5)

3.2 Name EIGHT tests to be carried out on high-voltage surge arresters. (8)

3.3 Explain how an earth wire can protect an overhead line against lightning. (4)
[17]

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QUESTION 4

4.1 Draw a fully labelled sketch of the Bucholtz relay. (7)

4.2 State SIX of the prominent warning signals that indicate internal problems in the transformer in advance. (6)

4.3 Give THREE reasons why the oil that forms part of the main installation of most transformers tends to deteriorate while in service (3)

[16]

QUESTION 5

5.1 Name FOUR post-installation field checks to be carried out on MV and HV cable systems. (4)

5.2 Name the THREE of the most general faults that can occur in cables. (3)

5.3 Name SIX causes of faults due to external damage of cables. (6)

[13]

QUESTION 6

6.1 Draw a fully labelled block diagram of a logic probe. (10)

6.2 What is a logic pulser? (2)

6.3 What causes erratic triggering? (2)

6.4 Draw a simple sketch to indicate how a logic pulser and probe will be used to test a single gate. (4)

[18]

TOTAL: 100

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