higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

FAULT FINDING AND PROTECTIVE DEVICES N6

(8080126)

27 November 2023 (X-paper)
09:00–12:00

Drawing instruments may be used.

This question paper consists of 4 pages and a diagram sheet.

102Q1E2327

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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. Use only a blue or black pen.
5. Write neatly and legibly.

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QUESTION 1

1.1 Explain the term *floating charge* concerning lead acid cells. (3)

1.2 Name SIXTEEN maintenance checks on a bank of lead acid cells already in use. (16)

[19]

QUESTION 2

2.1 Name FOUR disadvantages of an impedance/time protection relay. (4)

2.2 Define the term *protection relay*. (4)

2.3 Draw a fully labelled diagram of an induction overcurrent relay. (8)

2.4 Calculate the operating current at 20 seconds given the following:

Feeder with normal loading = 300 A
Current transformer ratio = 400/5
Overcurrent relay plug setting set at 100% and saturation time = 2,2 seconds (5)

[21]

QUESTION 3

3.1 Name SIX tests done on metal enclosed switchgears. (6)

3.2 What is the purpose of an interlocking system in switchgears? (3)

3.3 What is a circuit breaker and what is its purpose on an electrical installation? (6)

[15]

QUESTION 4

4.1 Draw a fully labelled sketch of a thermometer bulb in the oil tank of a transformer to measure the temperature of the transformer. (7)

4.2 Under which conditions will the Buchholtz relay trip? (3)

4.3 At what setting would you set a top oil thermometer to make alarm and trip? (2)

4.4 Name SIX tests to be carried out on high-voltage arresters. (6)

[18]

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QUESTION 5

5.1 Name THREE general faults found in a cable. (3)

5.2 Why is it important to do a spike on a cable before cutting it after the fault has been found? (4)

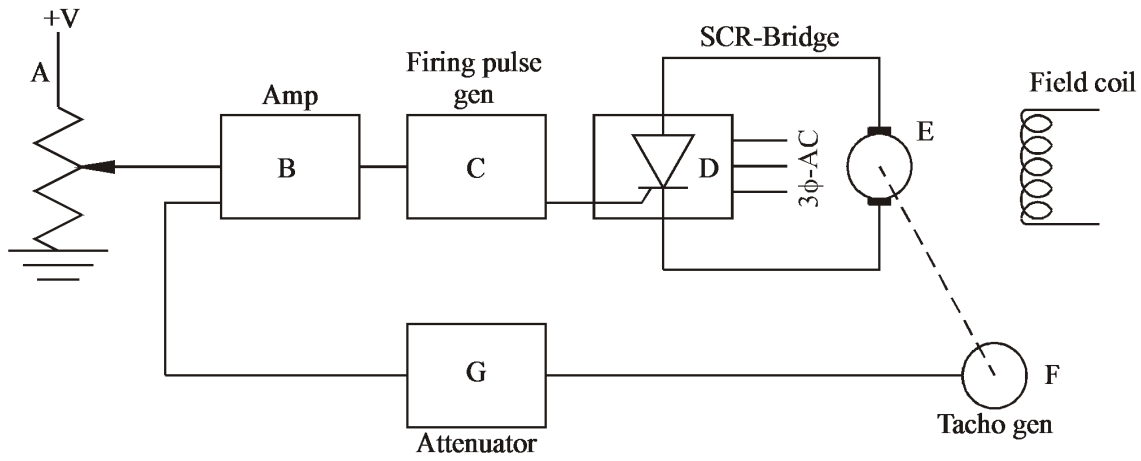
5.3 The three-phase high-tension cable in FIGURE 1 on the DIAGRAM SHEET (attached) has a short to earth on the S-phase. The length of the cable is 2 010 m and the test lead length is 2 m. The fault resistance is 10 Ω.

Use the pulse reflection (echo) cable tracer (T1) and determine the distance of the fault. (6)

[13]

QUESTION 6

6.1 In the diagram below, explain the purpose of each section in the control circuit. Write your answer next to the letter (A–G) in the ANSWER BOOK.



(7)

6.2 Name FIVE requirements for a firing circuit in a DC variable-speed drive. (5)

6.3 What causes erratic triggering in a circuit? (2)

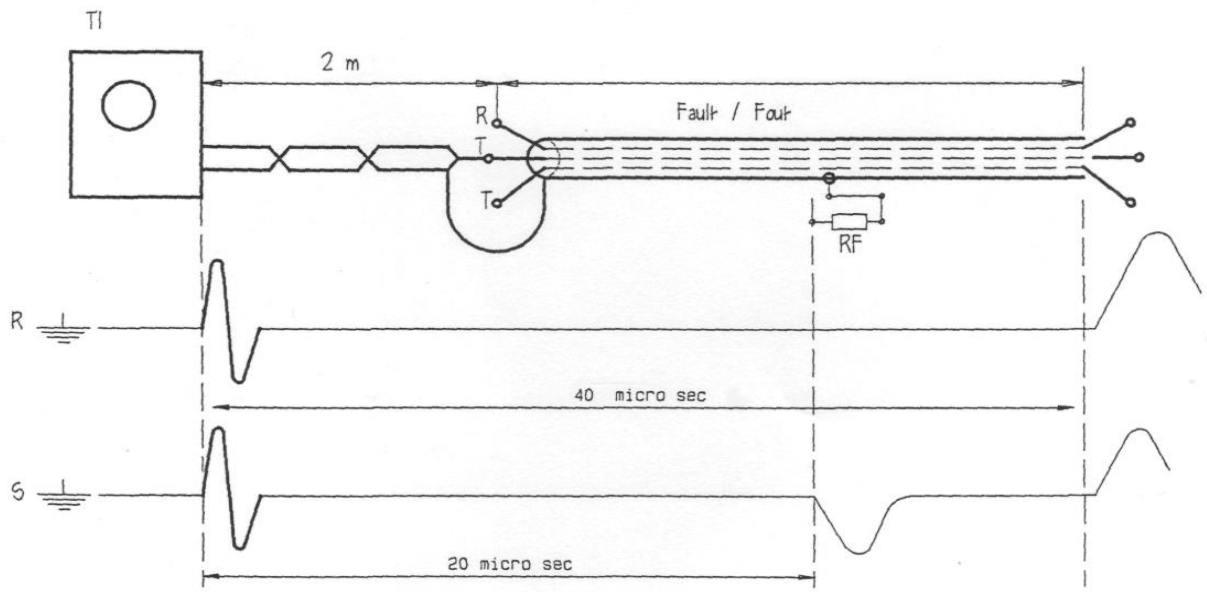
[14]

TOTAL: 100

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DIAGRAM SHEET



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