



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

FAULT FINDING AND PROTECTIVE DEVICES N4

(8080104)

**10 August 2021 (X-paper)
09:00–12:00**

Drawing instruments may be used.

This question paper consists of 4 pages.

253Q1G2110

**DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA**

**NATIONAL CERTIFICATE
FAULT FINDING AND PROTECTIVE DEVICES N4
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 The fault-finder is concerned with corrective maintenance.
What should the fault-finder's objective be? (2)
- 1.2 Explain why the fault-finder's reasoning and attitude is important. (3)
- 1.3 Describe the basic philosophy concerning fault-finding. (4)
- 1.4 Why was the nine-point plan designed? (3)
- 1.5 With reference to the nine-point plan, explain what the problem with fault-finding is. (3)
- [15]**

QUESTION 2

- 2.1 Name the TWO quantities on which the speed of a three-phase induction motor is depending. (2)
- 2.2 Draw a circuit diagram of a hand-operated autotransformer. (8)
- 2.3 Draw a simple inching circuit. (5)
- [15]**

QUESTION 3

- 3.1 State FOUR factors that can influence dielectric properties. (4)
- 3.2 State THREE uses of a CRO with reference to fault-finding. (3)
- 3.3 Name SIX non-polarised capacitors. (6)
- 3.4 How can an eddy current be reduced in a steel core? (2)
- 3.5 Draw a simplified block diagram of an oscilloscope. (6)
- [21]**

QUESTION 4

- 4.1 Draw a full-wave bridge rectifier circuit, showing the input and output wave forms. (6)
- 4.2 Explain the term *thermal runaway*. (4)
- 4.3 Why is the impedance important in Zener diodes? (3)
- 4.4 Describe what can happen if the sweep is not triggered correctly. (4)
- 4.5 Explain the purpose of air gaps in steel cores. (2)

[19]**QUESTION 5**

- 5.1 Draw a diagram to illustrate how a controls the amount of power drawn from an AC source by the load. (8)
- 5.2 Downtime analysis can provide valuable information on the causes of a breakdown.
What does this highlight? (3)
- 5.3 Explain the term *derating* with reference to components. (2)

[13]**QUESTION 6**

- 6.1 Draw the truth table circuit of the following expression:
 $(A + B)(A + C) = A + BC$ (7)
- 6.2 Simplify the expression:
 $\overline{xy + xyz} \cdot (\overline{xyz} + \overline{xyz})$ (7)
- 6.3 Complete the following laws and identities of Boolean algebra:
- 6.3.1 $A + 1 =$
- 6.3.2 $A + A =$
- 6.3.3 $A \times 0 =$

(3 × 1) (3)

[17]**TOTAL: 100**