higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

FAULT FINDING AND PROTECTIVE DEVICES N4

(8080104)

14 April 2020 (X-paper)
09:00–12:00

This question paper consists of 4 pages.

245Q1A2014

Copyright reserved

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. All sketches must be large, neat and fully labelled.
5. Write neatly and legibly.

Copyright reserved

QUESTION 1

1.1 Explain the term *preventative maintenance*. (4)

1.2 Name and explain the steps in the method of collecting facts, keeping in mind the nine-point plan in aid of fault finding. (3 × 2) (6)

1.3 Make a sketch of the following symbols:

1.3.1 Disconnected junction

1.3.2 Mechanical, pneumatic or hydraulic connection

1.3.3 Lever operated

1.3.4 Breaker contact

1.3.5 Link

1.3.6 Indicating lamp

(6 × 1) (6)
[16]

QUESTION 2

2.1 Make a neat, fully labelled drawing of the operation of a direct-on-line starter with start and stop push buttons for a three-phase squirrel-cage induction motor. (6)

2.2 Name the TWO rules that a person should know if he/she wants to become more effective in fault-finding techniques. (2)

2.3 Name TWO types of overload protection. (2)

2.4 For what purpose is insulating material used? (3)
[13]

QUESTION 3

3.1 Explain the operation of the voltage tester. (5)

3.2 Draw a simplified block diagram of an oscilloscope. (5)

3.3 Explain why ammeters are low-resistance instruments. (3)

3.4 What is the purpose of air gaps in steel cores? (2)

3.5 Draw an NPN transistor showing the correct DC biasing. (4)
[19]

Copyright reserved

QUESTION 4

4.1 Draw a full-wave bridge rectifier circuit, showing the input and output wave-form. (6)

4.2 Explain how to test a diode to determine if it is faulty or not. (6)

4.3 Draw the characteristic curve of a silicon diode. (5)

4.4 Make a sketch of a diode to show the method that is used to compensate for the Zener diode temperature coefficient effect during manufacturing. (3)

4.5 Name THREE elementary amplifier circuits. (3)
[23]

QUESTION 5

5.1 How will you know if the circuit of a Wheatstone bridge is balanced or not? (2)

5.2 According to SANS Code 0142, what is the maximum percentage volt drop on cables? (2)

5.3 Name SEVEN types of resistors. (7)

5.4 State FOUR factors that can increase the failure rate of equipment. (4)
[15]

QUESTION 6

6.1 What can be derived from the following: (A + B) (A + C). (5)

6.2 Draw the logic network of an exclusive OR gate $\bar{A}$ B+A$\bar{B}$. (5)

6.3 Draw the electrical circuit and symbol of an OR gate. (4)
[14]

TOTAL: 100

Copyright reserved