higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T680**(E)**(A3)T

NATIONAL CERTIFICATE

FAULT FINDING AND PROTECTIVE DEVICES N6

(8080126)

3 April 2019 (X-Paper)
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This question paper consists of 5 pages.

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

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QUESTION 1

1.1 Copy the following table in the ANSWER BOOK and compare nickel-cadmium cells with ventilated lead-acid cells with regard to the points below.

	NICKEL-CADMIUM CELLS	LEAD-ACID CELLS
1.1.1		
1.1.2		
Etc.		

1.1.1 Cost

1.1.2 Voltage

1.1.3 State of charge

1.1.4 Voltage reliability

1.1.5 Installation

1.1.6 Commissioning

1.1.7 Maintenance

1.1.8 Storage

1.1.9 Reliability

1.1.10 Discharge

1.1.11 Overcharging

1.1.12 Current

1.1.13 Alternating current

1.1.14 Memory

(14 × 1) (14)

1.2 Name FOUR tests that can be carried out on a lead-acid cell. (4)
[18]

QUESTION 2

2.1 Draw and explain the operation of a simple electromagnetic relay. (9)

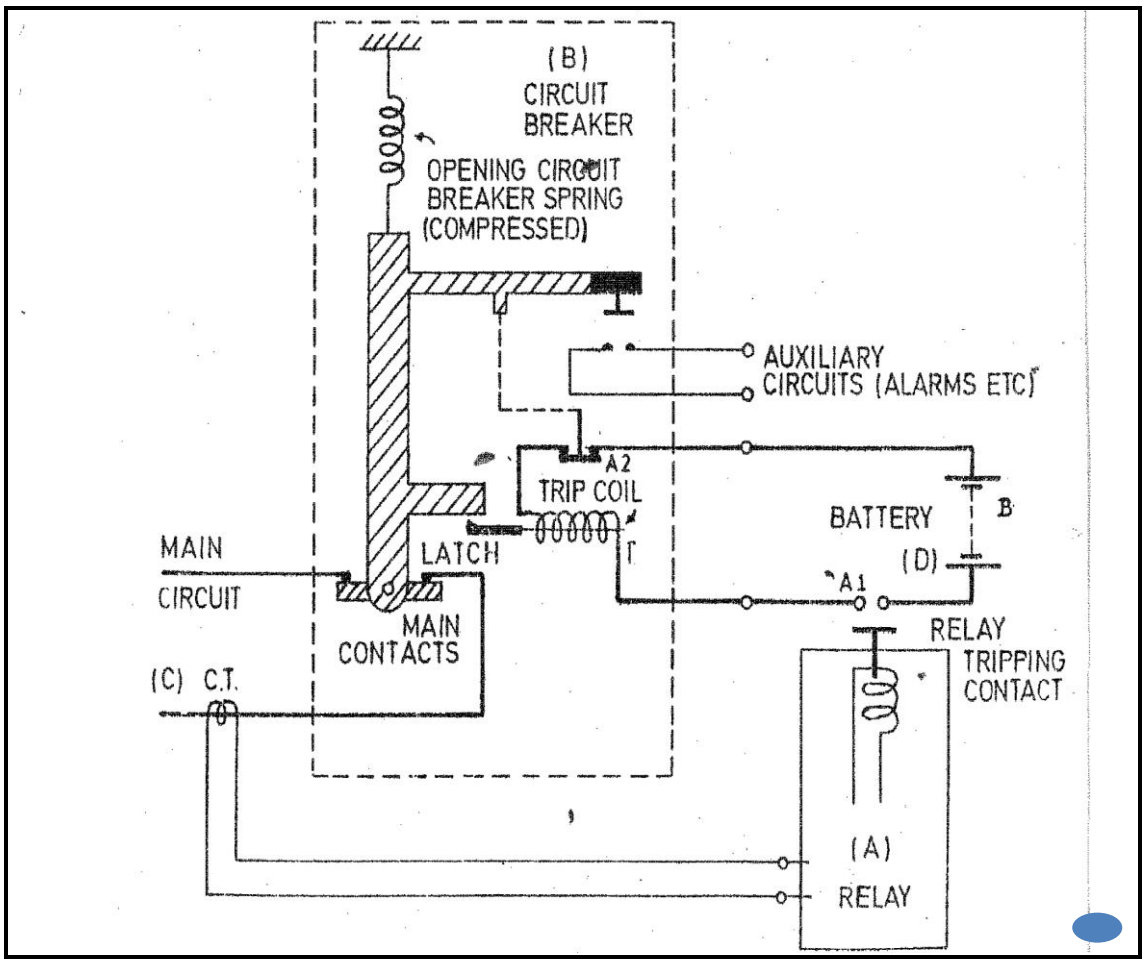
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2.2 In graded time-protection, discrimination is being achieved between through and section faults by means of graded time setting.

State and describe THREE disadvantages of this system. (3 × 2) (6)
[15]

QUESTION 3

3.1 Study the diagram below and answer the questions.



Fully explain the operation of the relay circuit-breaker system with regard to:

3.1.1 Relay (3)

3.1.2 Circuit breaker (3)

3.1.3 Current transformer (2)

3.1.4 Battery (3)

3.2 Name SIX types of tests to be carried out on metal-enclosed switchgear. (6)
[17]

QUESTION 4

4.1 State SIX requirements for transformers to operate in parallel. (6)

4.2 Give THREE reasons that could cause the Buchholtz relay to operate. (3)

4.3 Make a sketch and explain how you would carry out a crackle test to check if there is water in a transformer. (5)

4.4 At which setting would you set a top-oil thermometer to set off an alarm or to trip? (2)

[16]

QUESTION 5

5.1 State SIX causes of faults due to external damage to cables. (6)

5.2 State FIVE limitations that the Murray loop-test method has compared to other methods of locating cable faults. (5)

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

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

[21]

QUESTION 6

6.1 In digital trouble-shooting the basic essentials and procedures are very important.

State 10 of these principles. (10)

6.2 Name TWO ways to switch off an SCR. (2)

6.3 What is a *logic pulser*? (1)

[13]

TOTAL: 100

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