T580(E)(N19)T
NOVEMBER 2004
NATIONAL CERTIFICATE
ELECTRICAL TRADE THEORY N1
(11041861)
19 November (X-Paper)
09:00 – 12:00

No graph paper is required.
Calculators may be used.

DEPARTMENT OF EDUCATION
REPUBLIC OF SOUTH AFRICA
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NATIONAL CERTIFICATE
ELECTRICAL TRADE THEORY N1
TIME: 3 HOURS
MARKS: 100

Answer ALL the questions.

INSTRUCTIONS

1. Questions relating to the wiring of premises must be in accordance with the SABS Code of Practice.

2. Candidates will be penalised for untidy and illegible work.

3. Read the questions carefully and answer only what has been asked.

4. Questions may be answered in any order, but subsections of questions must NOT be separated.

5. Rule off on completion of each question.

1 mark = 1%

A formula sheet is attached to the question paper.

QUESTIONS

QUESTION 1

1.1 Give FIVE examples of danger zones where applicable flameproof electrical appliances must be used. (5)

1.2 Housekeeping means a place for everything and everything in its place all the times! State SIX aspects with regard to good housekeeping. (6)

1.3 Poor quality work is often blamed on the tools. Is this statement TRUE or FALSE? Why? (3)
QUESTION 2

2.1 Define electromotive force (EMF).

2.2 Name THREE devices that have the ability to develop (generate) an EMF.

2.3 THREE resistors of 10 Ω, 20 Ω and 30 Ω are connected in series across a voltage supply of 60 volts. Draw a fully labelled diagram of the circuit and calculate the following:

2.3.1 The total resistance of the circuit
2.3.2 The total current flowing through the circuit
2.3.3 The voltage drop across each resistor
2.3.4 The total power consumed in the circuit
2.3.5 The energy dissipated in the circuit in 2 minutes

QUESTION 3

3.1 Make a fully labelled, neat sketch of a current-carrying conductor showing the magnetic lines of force and their relative direction.

3.2 State THREE ways in which the magnetic flux of a solenoid can be strengthened.

3.3 A single-phase transformer with a voltage of 6 600 V on the primary draws a current of 5 A from the supply. If the transformer ratio is 25:1 and there are 110 turns on the secondary side, calculate:

3.3.1 The current flowing through the secondary coil
3.3.2 The number of turns on the primary coil

QUESTION 4

4.1 State SIX precautions that must be taken when a lead-acid battery is charged.

4.2 How does the number of the plates in the construction of a lead-acid cell influence the cell?

4.3 What is the basic difference in construction between an AC generator (alternator) and a DC generator?
QUESTION 5

5.1 What happens when the conductors of an alternator move at right angles through a magnetic field? (1)

5.2 Describe the following terms with reference to a sine wave:

5.2.1 Period (1)
5.2.2 RMS value (6)

5.3 Show by means of a fully labelled circuit diagram, how a voltmeter can be connected directly across the supply. (5) [13]

QUESTION 6

6.1 Define a conductor and give THREE examples of conductors generally used in the electrical industry. (6)

6.2 State the purpose of an earth leakage unit with regard to safety. (5)

6.3 State TWO advantages that a miniature circuit breaker (mcb) has over a fuse. (2) [13]

QUESTION 7

7.1 What FOUR tests does the Code of Practice stipulate for all electrical installations to ascertain that they are safe and function properly? (4)

7.2 Three similar capacitors of 240 μF are connected in series. Calculate the total capacitance. (5) [9]

TOTAL: 100
ELECTRICAL TRADE THEORY N1

FORMULA SHEET

**RESISTORS**

\[ R = \frac{V}{I} \]

\[ R_T = R_1 + R_2 + R_3 + \ldots \]

\[ \frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \ldots \]

**POWER**

\[ P = V \times I \]

\[ P = I^2 \times R \]

\[ P = \frac{V^2}{R} \]

**ENERGY**

\[ W = P \times t \]

\[ W = V I \times t \]

\[ W = I^2 R \times t \]

\[ W = \frac{V^2}{R} \times t \]

**CAPACITORS**

\[ C_T = C_1 + C_2 + C_3 + \ldots \]

\[ \frac{1}{C_T} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \ldots \]

**FREQUENCY**

\[ f = np \]

\[ f = \frac{1}{T} \]

**RESISTIVITY**

\[ R = \frac{\rho \times \ell}{a} \]

\[ a = \frac{\pi \times d^2}{4} \]

**TEMPERATURE COEFFICIENT**

\[ R_t = R \circ (1 + \alpha t) \]

**TRANSFORMERS**

\[ \frac{V_1}{V_2} = \frac{N_1}{N_2} = \frac{I_2}{I_1} \]

**CELLS**

\[ E = V + (I \times r) \]

\[ R_T = R + r \]

\[ I = \frac{V}{R} \]

\[ I = \frac{E}{(R + r)} \]