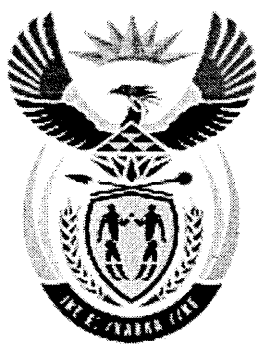


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higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T590(E)(N10)T
NOVEMBER 2011

NATIONAL CERTIFICATE

ELECTRICAL TRADE THEORY N1

(11041861)

10 November (X-Paper)
09:00 – 12:00

This question paper consists of 5 pages and 1-page formula sheet.

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

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
 2. Read ALL the questions carefully.
 3. Number the answers correctly according to the numbering system used in this question paper.
 4. Write neatly and legibly.
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QUESTION 1

Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (1.1 – 1.20) in the ANSWER BOOK.

- 1.1 Conventional electrical current is said to flow from positive to negative.
- 1.2 Water will never conduct electric current.
- 1.3 In an electrical circuit the potential difference is inversely proportional to the resistance in the circuit.
- 1.4 Power is the rate at which work is done.
- 1.5 A commutator is part of an AC generator.
- 1.6 Magnetic flux is the magnetic field around a magnet.
- 1.7 Fleming's Left Hand Rule is used to determine the strength of a magnetic field.
- 1.8 A series circuit is a circuit in which the resistors are placed all in one line, head-to-tail.
- 1.9 The total resistance in a parallel circuit is always less than the smallest resistance of the parallel combination.
- 1.10 A secondary coil in a transformer is connected to the AC power supply.
- 1.11 A voltmeter is used to measure the voltage between two points in a circuit.
- 1.12 Conduits are pipes or passages through which electrical wires pass.
- 1.13 Asbestos is a good conductor of electricity.
- 1.14 A thermostat is a device that controls and maintains temperature in an electrical circuit.
- 1.15 The National Grid is the circuit used to distribute electricity nationally.
- 1.16 Conductive cable sheaths and armouring do not need to be earthed.
- 1.17 $1 \text{ mV} = 0,0001 \text{ V}$.
- 1.18 Semiconductors are materials that are neither good conductors nor good insulators.
- 1.19 An aerial conductor is any conductor that is supported above the ground and

QUESTION 2

- 2.1 Housekeeping means a place for everything and everything in its place all the time. Why is good housekeeping important and desirable?
- 2.2 There are various safety aspects that need to be considered with regard to fire extinguishers and environmental practices. State THREE such safety aspects.
- 2.3 Name any FIVE main causes of fire.
- 2.4 Is the diagonal cutter also known as a side cutter?

QUESTION 3

- 3.1 Given the equation:

$$P = VI$$

Name each symbol and give the standard unit used for the electrical quantity that each symbol represents.

- 3.2 Two resistors of 2Ω and 4Ω respectively are connected in serie across a given supply voltage. The current flowing through the circuit is 3 A.
 - 3.2.1 Draw a neat, fully labelled diagram of the circuit.
 - 3.2.2 Calculate the total resistance of the circuit.
 - 3.2.3 Calculate the supply voltage.
 - 3.2.4 Calculate the voltage drop across each resistor.
 - 3.2.5 What is the total power dissipated in the circuit.
- 3.3 List the FOUR factors that influence the resistance in a conductor.

QUESTION 4

- 4.1 Briefly explain what permanent magnets are.
- 4.2 A single-phase, 220/22 V transformer has 1 000 primary turns. Calculate the following:
 - 4.2.1 The number of secondary turns
 - 4.2.2 The primary current when the secondary draws a current of 30 A
- 4.3 Describe how the direction of the flux, relative to the current, can be determined by means of the *Right Hand Rule*.

QUESTION 5

- 5.1 Differentiate between EMF and potential difference.
- 5.2 What are the FIVE main components of a lead-acid cell?
- 5.3 Name the THREE main mechanisms/systems of analogue instruments.

QUESTION 6

- 6.1 State THREE advantages of using three-phase motors instead of their single-phase counterparts.
- 6.2 Explain what is meant by an earth continuity conductor.
- 6.3 How are the RMS and AVERAGE values of a purely sinusoidal waveform related to the maximum value of that waveform?

QUESTION 7

- 7.1 A resistor found in an electrical circuit is marked from left to right in the following sequence:

Blue, Yellow, Blue and Gold

What is the numerical value of the resistor?
- 7.2 What is the purpose of performing a polarity test?

FORMULA SHEET**RESISTORS**

$$R = \frac{V}{I}$$

$$R_T = R_1 + R_2 + R_3 + \dots$$

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$$

POWER

$$P = V \times I$$

$$P = I^2 \times R$$

$$P = \frac{V^2}{R}$$

ENERGY

$$W = P \times t$$

$$W = VI \times t$$

$$W = I^2 R \times t$$

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

CELLS

$$E = V + (I \times r)$$

$$R_T = R + r$$

$$r = \frac{V}{I}$$

RESISTIVITY

$$R = \frac{\rho \times \ell}{a}$$

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

TEMPERATURE COEFFICIENT

$$R_t = R_o(1 + L_o t)$$

TRANSFORMERS

$$\frac{V_1}{V_2} = \frac{N_1}{N_2} = \frac{I_2}{I_1}$$

CAPACITORS

$$C_T = C_1 + C_2 + C_3 + \dots$$

$$\frac{1}{C_T} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \dots$$

FREQUENCY

$$f = np$$

$$f = \frac{1}{T}$$