higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T430**(E)**(N19)T

NOVEMBER EXAMINATION

NATIONAL CERTIFICATE

ELECTRICAL TRADE THEORY N1

(11041861)

19 November 2015 (X-Paper)
9:00–12:00

This question paper consists of 5 pages and 1 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 according to the numbering system used in this question paper.
4. Write neatly and legibly.

QUESTION 1

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

1.2 State FIVE aspects with regard to good housekeeping in the workshop. (5)

1.3 Bad quality work is often blamed on incorrect/improper tools being used.

Is the above-mentioned statement TRUE or FALSE? Give TWO reasons to support your answer. (3)

[13]

QUESTION 2

2.1 Define Ohm's Law. (4)

2.2 THREE similar resistors of 3 Ω each are connected in parallel. This combination is connected across a battery with a voltage of 6 V.

2.2.1 Draw a neat fully labelled diagram of the circuit mentioned above. (4)

Calculate the following:

2.2.2 The total resistance of the circuit (4)

2.2.3 The current flow through each resistor (7)

2.2.4 The total current flowing through the circuit (2)

2.2.5 The power used by the circuit (2)

2.2.6 The energy required by the circuit in ONE HOUR (4)

[27]

QUESTION 3

3.1 Make a neat, fully labelled sketch of a current-carrying conductor showing the magnetic lines of force and their relative direction. (6)

3.2 State THREE ways in which the magnetic flux of a solenoid can be strengthened. (3)

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 the following:

3.3.1 The current flowing through the secondary coil

3.3.2 The number of turns on the primary coil

(2 x 2) (4)

[13]

QUESTION 4

4.1 Compare, by making use of a suitable TABLE, FIVE aspects with regard to the advantages and disadvantages of primary cells and secondary cells (lead-acid). (10)

4.2 What material is used to make generator brushes? (1)

4.3 What instrument is used to measure the relative density of the electrolyte in a lead-acid cell? (1)

[12]

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 Root-mean-square (RMS) value (6)

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

[13]

QUESTION 6

6.1 Define an *insulator.* (3)

6.2 Give FIVE examples of insulators which are generally used in the electrical industry. (5)

6.3 What do you understand by the term *earthed*? (5)
[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

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

$$R_T = R_1 + R_2 + R_3 + ...$$

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

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

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

$$R_T = R + r$$

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

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

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

$$C_T = C_1 + C_2 + C_3 + ...$$

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

FREQUENCY

$$f = np$$

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