higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

ELECTRICAL TRADE THEORY N1

(11041861)

7 April 2020 (X-paper)
09:00–12:00

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

122Q1A2007

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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.

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QUESTION 1

1.1 What is a *flame-proof circuit breaker*? (3)

1.2 Give FOUR causes of fire. (4)

1.3 Describe the use of and care for a cable knife. (4)
[11]

QUESTION 2

2.1 Distinguish between *electromotive force* and *potential difference*. (4)

2.2 A resistor of 8 ohms is connected in series with a combination of resistors of 12 ohms and 24 ohms in parallel. The total combination is connected across a 100 volts supply.

Calculate each of the following:

2.2.1 Resistance of the circuit (3)

2.2.2 Total current flow in the circuit (3)

2.2.3 Voltage across the 8 ohms resistor (3)

2.2.4 Voltage across the parallel combination (3)

2.2.5 Current flow in the 12 ohms and 24 ohms resistors (4)
[20]

QUESTION 3

3.1 Define *flux density*. (2)

3.2 What is the function of the breather in a transformer? (2)

3.3 A single-phase step-down transformer is rated at 100 KVA and has a turn's ratio of 10:1.

Calculate each of the following, ignoring losses:

3.3.1 Secondary voltage if the primary voltage is 2600 V (2)

3.3.2 Secondary current if the primary current is 30 A (2)

3.3.3 Maximum allowable secondary and primary currents if the supply voltage is 2600 V (4)
[12]

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QUESTION 4

4.1 List FOUR disadvantages of a lead-acid cell. (4)

4.2 Explain *relative density*. (2)

4.3 What does *average value* mean with regard to alternating current? (4)

4.4 Compare *moving-iron* and *moving-coil* instruments in table format. (10)
[20]

QUESTION 5

5.1 Choose a description from COLUMN B that matches a term in COLUMN A. Write only the letter (A–E) next to the question number (5.1.1–5.1.5) in the ANSWER BOOK.

COLUMN A		COLUMN B	
5.1.1	Mica	A	used to waterproof porous materials
5.1.2	Glazed	B	no longer used because it is a health hazard
5.1.3	Varnished	C	insulation that deteriorates when exposed to the elements
5.1.4	Asbestos	D	insulation that can withstand heat
5.1.5	Plastic	E	to prevent dirt from building up on the surface of porcelain

(5 × 2) (10)

5.2 List THREE disadvantages of cross-linked polyethylene cables (XLPE). (3)
[13]

QUESTION 6

6.1 State the purpose of a circuit breaker. (3)

6.2 Name THREE types of elements found in ovens. (3)

6.3 What does SANS 10142 stipulate with regard to the control of geysers? (6)
[12]

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QUESTION 7

7.1 The Code of Practice stipulates that all electrical installations must be tested to ascertain that the installation is safe and functioning properly.

List FIVE tests that must be carried out in an installation. (5)

7.2 What is the main purpose of capacitors used in alternating current circuits? (2)

7.3 Two capacitors of 60 micro-farads and 100 micro-farads respectively are connected in series across 50 V DC.



Calculate the total capacitance: (5)
[12]

TOTAL: 100

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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

$R_t = R_O (1 + \alpha t)$

TRANSFORMERS

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

$$S = VI$$

$$P = VICOS_o$$

Efficiency = P_{OUT} / P_{IN}

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

$$f = np$$

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

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