higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

ELECTRICAL TRADE THEORY N1

(11041861)

2 August 2021 (X-paper)
09:00–12:00

Nonprogrammable calculators may be used.

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

128Q1G2102

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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. Only use a black or a blue pen.
5. Write neatly and legibly.

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QUESTION 1

1.1 State any FIVE disadvantages of poor housekeeping. (5)

1.2 List THREE characteristics of a good machine guard. (3)

1.3 Define the term *isolate.* (2)

[10]

QUESTION 2

2.1 What are the FOUR classes of fire? (4)

2.2 Which type of extinguisher must be used on fires involving flammable liquids? (1)

2.3 Discuss the use and care of a hacksaw. (5)

[10]

QUESTION 3

3.1 Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (3.1.1–3.1.4) in the ANSWER BOOK.

3.1.1 Electrical current is the movement of electrons in a specific direction through material.

3.1.2 Potential difference is that force which maintains the potential difference while a current is flowing.

3.1.3 A resistor is the opposition offered to the flow of electrical current.

3.1.4 Power is the rate of doing work.

(4 × 1) (4)

3.2 A light bulb rated at 250 W has a supply voltage of 230 V.

Calculate the following:

3.2.1 The current drawn by the bulb (2)

3.2.2 The resistance of the bulb's element (2)

3.2.3 The energy dissipated in kJ by the bulb in 45 minutes (3)

3.2.4 The cost to operate the bulb if the bulb works for 10 hours per night and 30 nights per month.

Take the cost of energy to be 182 c/kWh. (5)

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3.3 A battery has four identical cells connected in parallel. Each cell has an EMF of 1,5 V and an internal resistance of 1,1 Ω. The battery is connected across a load with a resistance of 5 Ω. ■

Calculate the following:

3.3.1 The total EMF of the battery

3.3.2 The total internal resistance of the battery

3.3.3 The total current flowing through the circuit

3.3.4 The internal voltage drop of the battery

3.3.5 The potential difference of the battery ■

3.3.6 The voltage drop across the load

(6 × 2) (12)

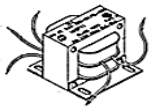
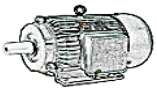
3.4 Define *temperature coefficient of resistance* (2)

[30]

QUESTION 4

4.1 List any FIVE advantages of annealed glass. (5)

4.2 Identify the electrical components in the table below. Write the name of the component and draw the IEC symbol next to the relevant question number (4.2.1–4.2.10) in the ANSWER BOOK. ■

COMPONENT	NAME OF COMPONENT	IEC SYMBOL
	4.2.1	4.2.2
	4.2.3	4.2.4
	4.2.5	4.2.6
	4.2.7	4.2.8
	4.2.9	4.2.10

(10)

[15]

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QUESTION 5

5.1 In which areas in a house should a two-way switching be installed? (3)

5.2 Why should all circuits be wired in parallel? (2)

5.3 Give FOUR advantages of underground cables. (4)

5.4 What are the methods used by supply authorities to supply electrical energy to an electrical installation? (3 × 2) (6)

[15]

QUESTION 6

6.1 How is an insulation resistance test between conductors and earth carried out? (5)

6.2 Define the term *permanent magnet.* (3)

6.3 Name the two poles of magnets. (2)

6.4 Explain what the right-hand grip rule is. (4)

6.5 How can the magnetic field strength of a coil be increased? (1)

6.6 Mention FIVE benefits of using renewable energy. (5)

[20]

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

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

$S=VI$

$P=VICOS_\theta$

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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