



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

**NATIONAL CERTIFICATE
APRIL EXAMINATION
ELECTRICAL TRADE THEORY N1
30 MARCH 2016**

This marking guideline consists of 5 pages.

QUESTION 1

- 1.1 True
1.2 True
1.3 True
1.4 True
1.5 False
1.6 True
1.7 False
1.8 True
1.9 False
1.10 True
1.11 True
1.12 False
1.13 True
1.14 True
1.15 True
1.16 True
1.17 True
1.18 True
1.19 True
1.20 False

(20 × 1) [20]

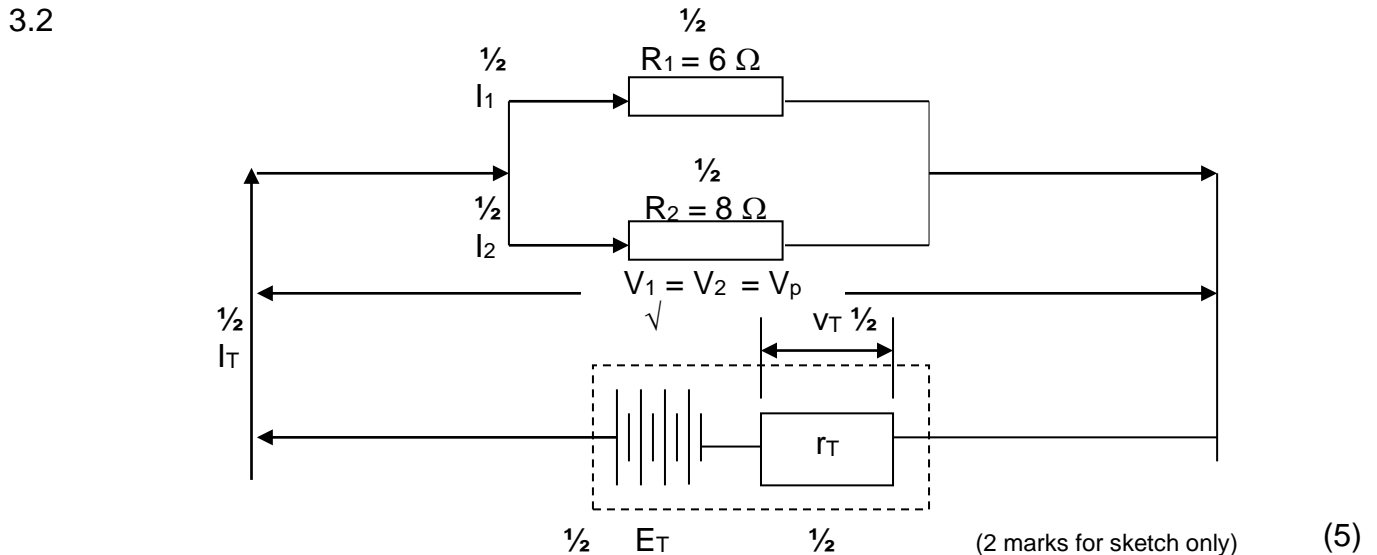
QUESTION 2

- 2.1 A flameproof appliance or enclosure is one that is incapable of igniting, under normal operation or breakdown situations, any flammable substance, for instance gas or a liquid. This enclosure will withstand an explosion of such flammable substances, and will prevent the transmission of flames to any flammable material, gas or liquid. (4)
- 2.2
- Tripping over loose objects on floors
 - Slipping on greasy or oily floors
 - Bumping against badly placed material
 - Occurrence of fires
- (4)
- 2.3
- Oxygen
 - Fuel
 - Heat
- (3)

[11]

QUESTION 3

3.1 The current flowing in an electrical circuit is directly proportional to the applied voltage across the circuit, and inversely proportional to the resistance, at a constant temperature. (5)



3.2.1 $E_T = 4 \times 1,5$
 $= 6 \text{ V}$ (1)

3.2.2 $r_T = 4 \times 0,4$
 $= 1,6 \Omega$ (1)

3.2.3 $R_T = r_T + R_p$

where $R_p = \frac{R_1 \times R_2}{R_1 + R_2}$
 $= \frac{6 \times 8}{6 + 8}$
 $= 3,429 \Omega$

\therefore
 $R_T = 1,6 + 3,429$
 $= 5,029 \Omega$ (5)

3.2.4 $I_T = E_T \div R_T$
 $= 6 \div 5,029$
 $= 1,193 \text{ A}$ (2)

3.2.5 $V_T = I_T \times r_T$
 $= 1,193 \times 1,6$
 $= 1,909 \text{ V}$ (2)

3.2.6 $V_p = E_T - V_T = V_1 = V_2$ OR $V_p = I_T \times R_p$
 $= 6 - 1,909$
 $= 4,091 \text{ V}$ (2)

$$\begin{aligned}
 3.2.7 \quad I_1 &= V_p \div R_i \\
 &= 4,091 \div 6 \\
 &= 0,682 \text{ A} \longrightarrow
 \end{aligned}$$

$$\begin{aligned}
 I_2 &= V_p \div R_2 \\
 &= 4,091 \div 8 \\
 &= 0,511 \text{ A} \longrightarrow
 \end{aligned}$$

(4)
[27]**QUESTION 4**

4.1

	SYMBOL	MEANING	STANDARD UNIT
Example	Q	Heat energy	Joule
4.1.1	E	EMF	Volt
4.1.2	V	Terminal voltage	Volt
4.1.3	I	Current	Ampere
4.1.4	r	Internal resistance	Volt

(8)

4.2

	QUANTITY	SERIES	PARALLEL
Example	Heat energy	Increases	Constant
4.2.1	EMF	Increases	Constant
4.2.2	Internal resistance	Increases	Decreases
4.3.3	Current capacity	Constant	Increases

(6)
[14]

QUESTION 5

- 5.1
- High dielectric strength
 - Durability
 - Non-hygroscopic
 - Mechanical strength
 - Chemical ability to resist natural elements
- (Any 4 × 1) (4)

- 5.2
- Relatively cheap
 - Lighter and easier to handle
 - Easier to end off and join
 - Smaller bending radius
 - Flexible
 - Lower fire risk
 - Easier to colour
- (Any 2 × 1) (2)

- 5.3
- It means to be electrically connected to the general mass of the earth so as to ensure an immediate discharge of electrical energy without danger.
- (5)
[11]

QUESTION 6

- 6.1
- More expensive
 - Heavier
 - Difficult to work with
 - Difficult to end off
 - Difficult to join
- (Any 3 × 1) (3)
- 6.2
- Must be earthed
 - May not be used as an earth continuity conductor
 - Only approved glands and terminations may be used
 - May be used for final connection to a fixed or stationary appliance – not for a portable appliance
 - May not be used in hazardous locations
- (Any 3 × 1) (3)
- 6.3 Its purpose is to detect an earth fault current and to automatically disconnect an installation or circuit from the supply when the current exceeds a specified or predetermined value. (3)
- [9]**

QUESTION 7

- 7.1
- Power factor improvement
 - Phase displacement in starting single-phase induction motors
- (Any 1) (1)
- 7.2 A diode is an electronic component designed to allow an electrical current to flow in only one direction through a circuit. (3)
- 7.3 $Q_T = C_T V_T$
- $$\begin{aligned}
 C_T &= C_1 + C_2 \\
 &= 10 + 20 \\
 &= 30 \mu\text{F} \longrightarrow
 \end{aligned}$$
- ∴
- $$\begin{aligned}
 Q_T &= 30 \times 100 \\
 &= 3\,000 \mu\text{C} \longrightarrow
 \end{aligned}$$
- (4)
[8]

TOTAL: 100