



**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]

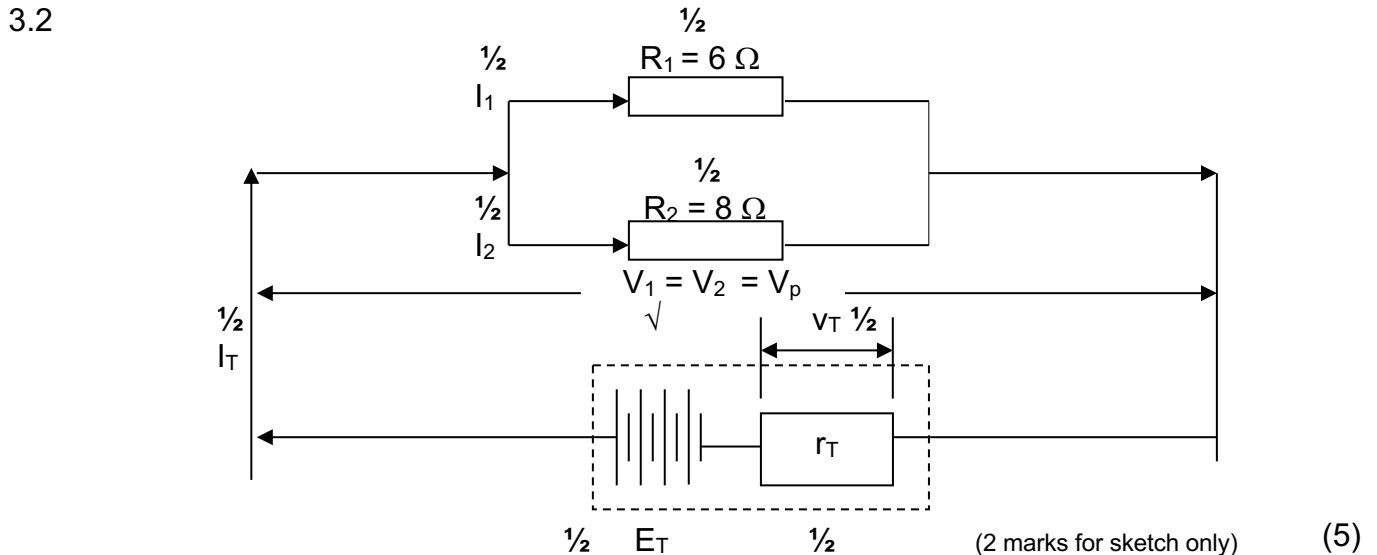
**QUESTION 2**

- 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  $V_p = I_T \times R_p$   
 $= 6 - 1,091$   
 $= 4,091 \text{ V}$  (2)

$$\begin{array}{l}
 3.2.7 \quad I_1 = V_p \div R_i \\
 \quad \quad = 4,091 \div 6 \\
 \quad \quad = 0,682 \text{ A} \longrightarrow
 \end{array}
 \qquad
 \begin{array}{l}
 I_2 = V_p \div R_2 \\
 \quad \quad = 4,091 \div 8 \\
 \quad \quad = 0,511 \text{ A} \longrightarrow
 \end{array}
 \qquad
 \begin{array}{l}
 (4) \\
 [27]
 \end{array}$$

**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  $Q_T = C_T V_T$
- $$C_T = C_1 + C_2$$
- $$= 10 + 20$$
- $$= 30 \mu\text{F}$$
- 
- ∴
- $$Q_T = 30 \times 100$$
- $$= 3\,000 \mu\text{C}$$
- (4)
- [8]**

**TOTAL: 100**