



**higher education  
& training**

Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

# **MARKING GUIDELINE**

**NATIONAL CERTIFICATE**

**NOVEMBER EXAMINATION**

**ELECTRICAL TRADE THEORY N1**

**11 NOVEMBER 2014**

**This marking guideline consists of 6 pages.**

**QUESTION 1**

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

(20 × 1) [20]

**QUESTION 2**

- 2.1
  - Loose connections
  - Cracked or broken insulation
  - Switches in bad order
  - Joints in flexible cords

(4)
- 2.2
  - Danger
  - Fire protection equipment
  - Stop buttons
  - Emergency stop controls

(4)
- 2.3
  - Organic materials e.g. wood, paper, coal, tobacco and grass
  - Flammable liquids and greases, e.g. alcohol, benzine, oil, paraffin and petrol
  - Fires occurring in the presence of live electrical installations
  - Fires involving metals

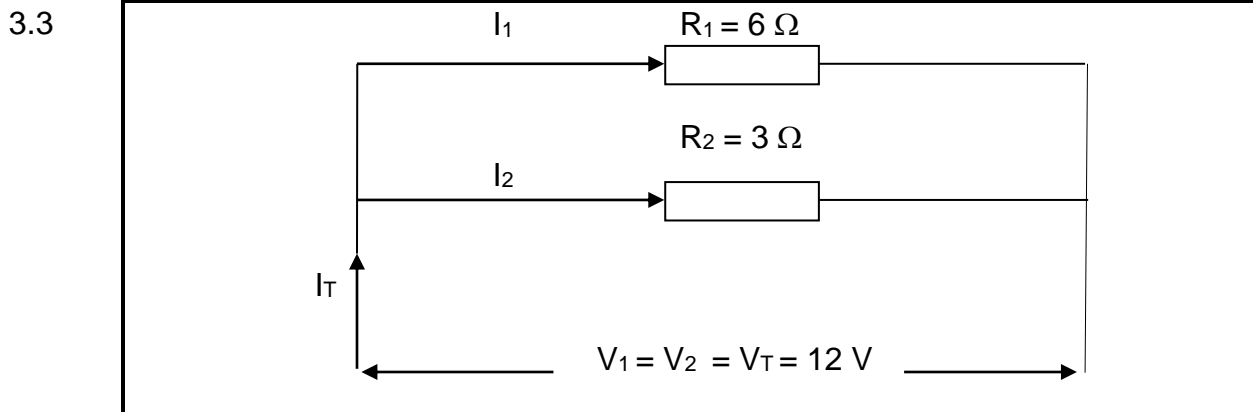
(4)  
[12]

**QUESTION 3**

- 3.1  $Q = I^2 R t$   
 $Q$  = Heat energy generated in Joules (J)  
 $I$  = Current flowing in Amperes (A)  
 $R$  = Resistance of the circuit in Ohms ( $\Omega$ )  
 $t$  = time taken to generate heat in seconds (s) (4)

- 3.2 3.2.1  $Q = I^2 R t$ ✓  
 $I^2 = Q \div (R \times t)$ ✓  
 $= 3,6 \times 10^6 \div (1 \times 10^3 \times 1 \times 60 \times 60)$ ✓  
 $I^2 = 1$ ✓  
 Now  $I = 1$  Ampere✓ (5)

- 3.2.2  $P = Q \div t$ ✓  
 $= (3,6 \times 10^6) \div (1 \times 60 \times 60)$ ✓  
 $= 1\ 000$  W  
 $= 1$  kW✓ (3)

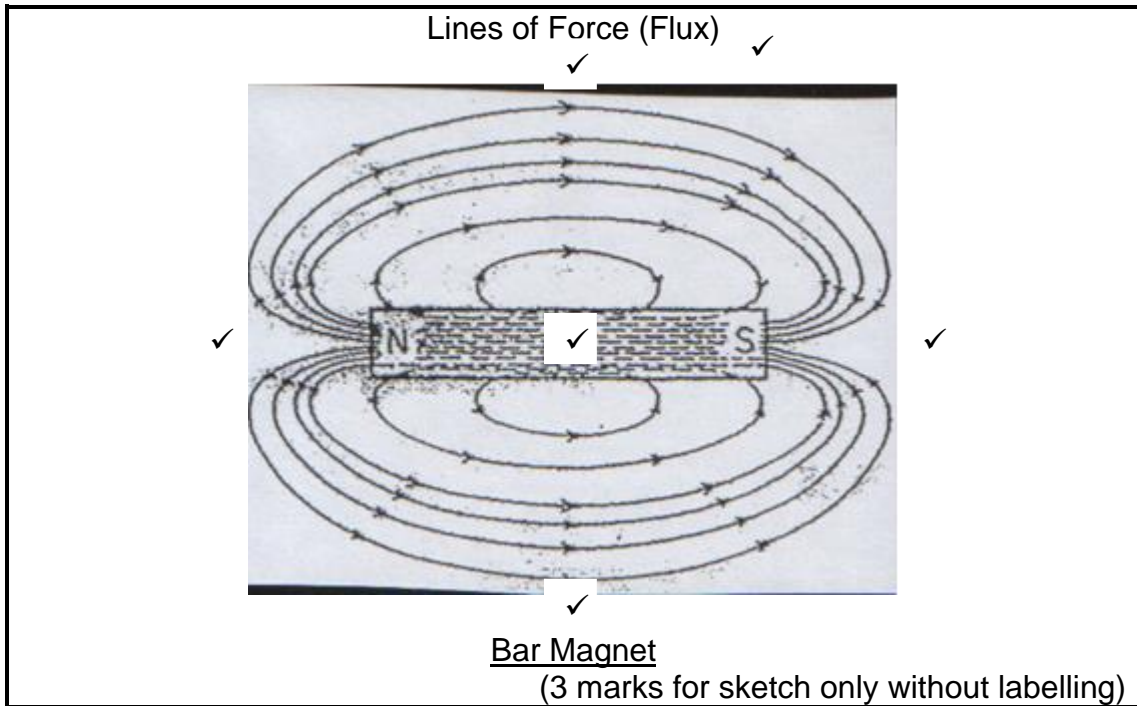


- 3.3.1  $1 \div R_p = 1 \div R_1 + 1 \div R_2$ ✓  
 $= (1 \div 6) + (1 \div 3)$   
 $= (1+2) \div 6$   
 $= (1 \div 2) \Omega^{-1}$ ✓  
 $\therefore$   
 $R_p = R_T = 2 \Omega$ ✓ (3)

- 3.3.2  $I_T = V_T \div R_T$ ✓  
 $= 12 \div 2$   
 $= 6$  A✓ (2)  
**[17]**

**QUESTION 4**

4.1



4.2 Primary windings  
Secondary windings (2)

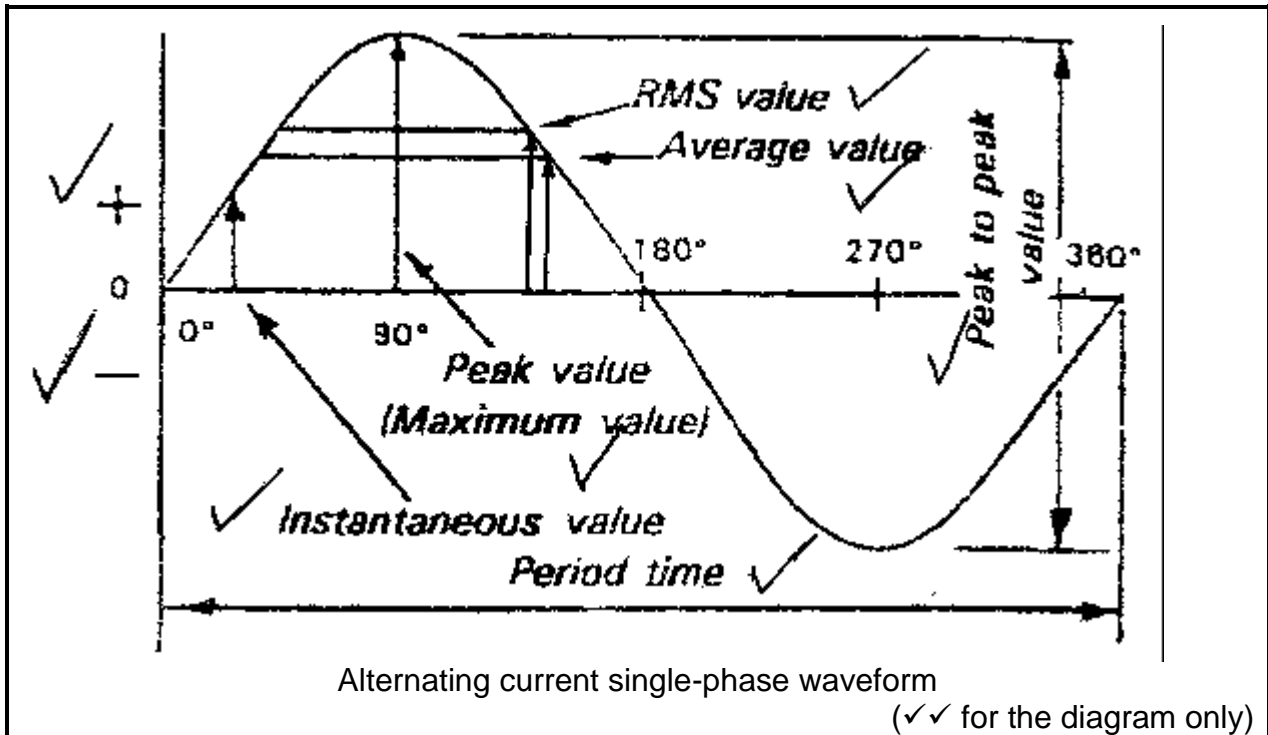
4.3 4.3.1 turns ratio =  $N_1:N_2$  ✓  
= 250:50  
= 5:1 ✓ (2)

4.3.2  $V_1 \div V_2 = N_1 \div N_2$   
 $V_2 = (N_2 \div N_1) V_1$  ✓  
=  $(50 \div 250)(220)$   
= 44 V ✓ (2)

4.3.3  $N_1 \div N_2 = I_2 \div I_1$   
 $I_2 = (N_1 \div N_2) I_1$  ✓  
=  $(250 \div 50)(10)$   
= 50 A ✓ (2)

**[14]**

## QUESTION 5



## QUESTION 6

- 6.1 The purpose of earthing is to guard every electrical installation, machine, appliance or apparatus against the effects of leakage currents, static charges and lightning discharges. (4)
- 6.2
- Disconnect the bridge-piece on the terminals of the motor
  - Test the resistance of each coil
- (2)
- 6.3
- All single-phase switching devices, fuses and circuit-breakers
  - The phase terminals in all single-phase socket outlets
  - The centre contact of each Edison Screw lamp-holder
- (3)  
[9]

**QUESTION 7**

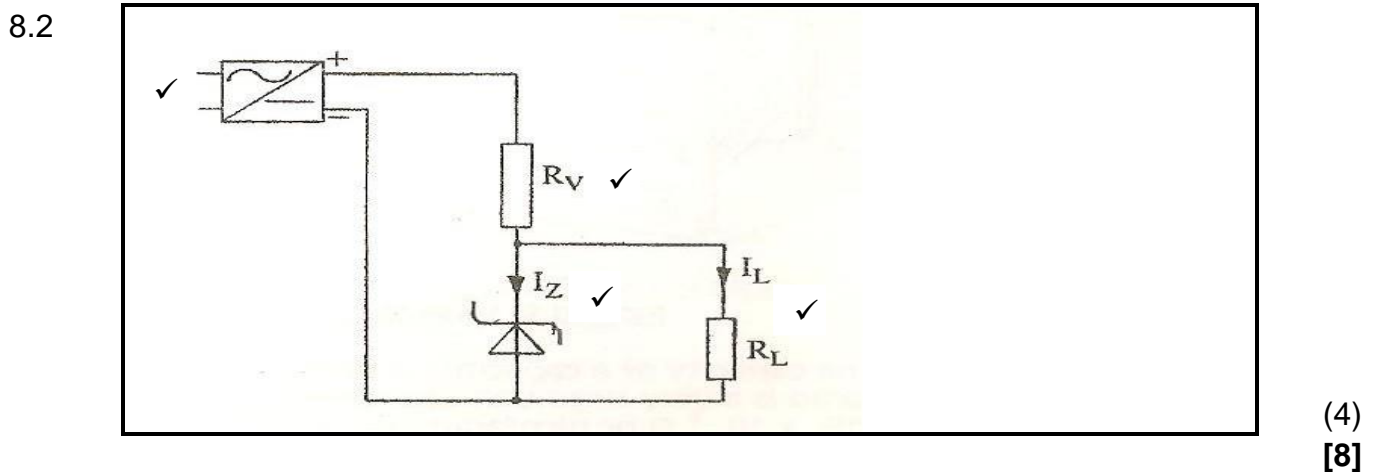
7.1

$$\begin{aligned} \frac{1}{C_T} &= \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} \\ &= \frac{1}{2} + \frac{1}{5} + \frac{1}{10} \\ &= (5 + 2 + 1) / 10 \\ &= \frac{8}{10} \\ \therefore C_T &= \frac{10}{8} \\ &= 1,25 \mu\text{F} \end{aligned} \quad (5)$$

7.2 Red = 2  
Violet = 7  
Brown = x10  
No fourth colour band  $\equiv$  20% tolerance  
 $\therefore R = 270 \Omega \pm 20\%$  (5)  
**[10]**

**QUESTION 8**

- 8.1
- Store electrical energy
  - Introduce capacitance into a circuit
  - Block the flow of direct current
  - Permit the flow alternating current to a degree dependent on the capacitance and the frequency
- (4)

**TOTAL: 100**