

**higher education  
& training**

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

**MARKING GUIDELINES**

**NATIONAL CERTIFICATE**

**APRIL EXAMINATION**

**INDUSTRIAL ELECTRONICS N1**

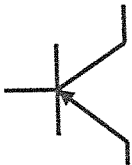

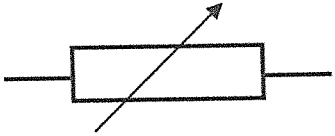
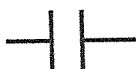

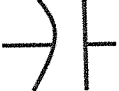
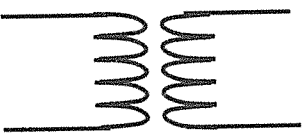
**28 MARCH 2013**

**This marking guideline consists of 6 pages**

**QUESTION 1**

1.1	1.1.1	Self-induction		
	1.1.2	Two		
	1.1.3	Four		
	1.1.4	Series		
	1.1.5	Excess		
	1.1.6	Two		
	1.1.7	One		
	1.1.8	Ionisation		
	1.1.9	High		
	1.1.10	Equal	(10 × 1)	(10)
1.2	1.2.1	repel		
	1.2.2	cycles		
	1.2.3	north to south		
	1.2.4	galvanometer		
	1.2.5	hydrometer		
	1.2.6	electric current		
	1.2.7	negative		
	1.2.8	6 volts		
	1.2.9	three		
	1.2.10	forward	(10 × 1)	(10) [20]

**QUESTION 2**

- 2.1 2.1.1  (1)
- 2.1.2  (1)
- 2.1.3  (1)
- 2.1.4  OF  OF  (1)
- 2.1.5  (1)
- 2.2
  - Sawtooth wave
  - Sine wave
  - Square wave (3)
- 2.3
  - Rechargeable
  - Can be used repeatedly
  - Long service life
  - Provide more current (Any 3 × 1) (3)
- 2.4
  - The temperature of the material
  - Cross-sectional area of the material
  - The length of the material
  - The type of the material (Any 3 × 1) (3)
- 2.5 A conductor has an excess of free electrons and an insulator has a deficiency of free electrons. (2)
- 2.6 Hold the conductor with the left hand; with the thumb pointing in the direction of electron current flow, the fingers will point in the direction of the field. (3)

2.7 The collection of hydrogen around the positive carbon electrode (1)  
[20]

**QUESTION 3**

3.1 3.1.1  $R_T = R_1 + R_2 + R_3$   
 $R_T = 1,2 + 3,2 + 4,8$   
 $R_T = 9,2\Omega$  (3)

3.1.2  $I_T = \frac{V}{R}$   
 $I_T = \frac{36}{9,2}$   
 $I_T = 3,91A$  (3)

3.1.3  $V_1 = I_T \times R_1$   
 $V_1 = 3,91$   
 $V = 4,7V$  (3)

3.1.4  $P = I^2 R$   
 $P = 3,91^2 \times 3,2$   
 $P = 49W$  (3)

- 3.1.5
- Yellow
  - Grey
  - Gold
  - Gold
- (4)

3.2  $V_S = \frac{V_p \times N_s}{N_p}$   
 $V_S = \frac{220 \times 1}{11}$   
 $V_S = 20V$  (4)  
[20]

## QUESTION 4

- 4.1 4.1.1  $A = \frac{\pi d^2}{4}$   
 $A = \frac{\pi \times (44 \times 10^{-3})^2}{4}$   
 $A = 0,000012566 \text{ mm}^2$   
*or*  
 $A = 12,567 \times 10^{-6} \text{ m}^2$  (4)
- 4.1.2  $R = \frac{\rho L}{A}$   
 $R = \frac{0,017 \times 10^{-6} \times 66}{12,567 \times 10^{-6}}$   
 $R = 0,089 \Omega$  (3)
- 4.2 4.2.1  $C_T = C_1 + C_2$   
 $C_T = 6 + 8$   
 $C_T = 14 \mu\text{F}$  (3)
- 4.2.2  $Q = C \times V$   
 $Q = 14 \times 10^{-6} \times 12$   
 $Q = 168 \mu\text{C}$  (3)
- 4.3  $R_T = R_0(1 + \alpha_0 t)$   
 $R_T = 56(1 + 0,0043 \times 22)$   
 $R_T = 61,298 \Omega$  (3)
- 4.4
  - Open circuit
  - Short circuit
  - Windings grounded with the core (Any 2 × 1) (2)
- 4.5
  - Iron core coil
  - Air core coil (2)

**[20]**

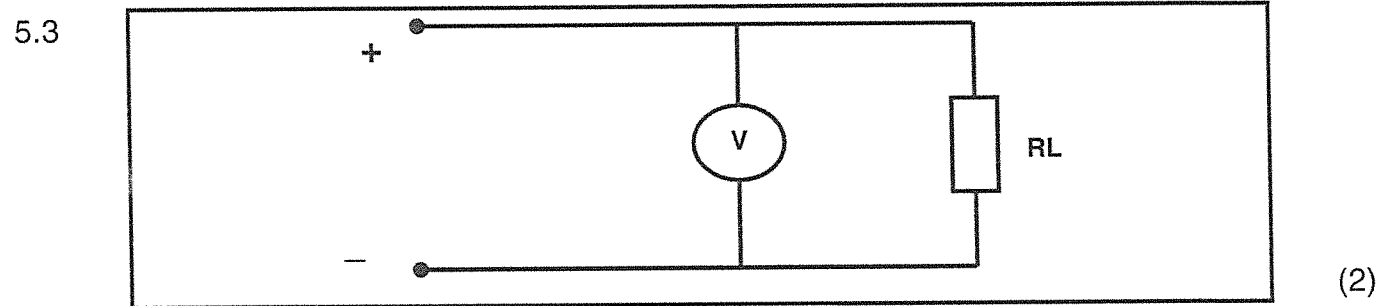
**QUESTION 5**

5.1 The region that is formed when the N-type material and the P-type material are joined together. (1)

5.2

- Need not be zeroed
- Automatically switches off
- Can be used at any position
- Will indicate if battery is low

(Any 4 × 1) (4)



**FIGURE 1**

5.4 When two valence electrons between two atoms link together. (2)

5.5 Electrons in the outermost shell (highest energy level) of the atom. (2)

5.6

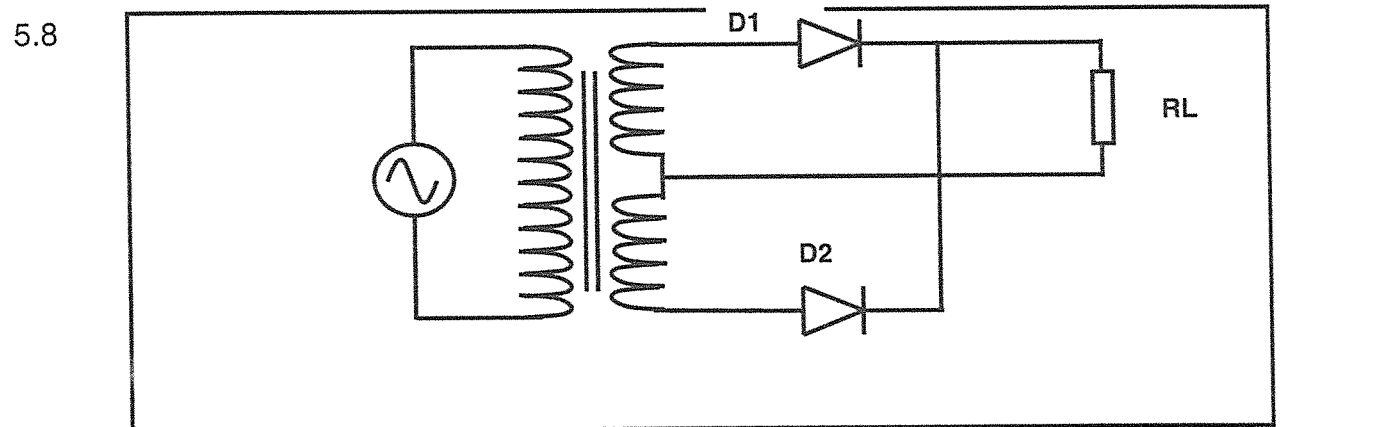
- As an electronic switch
- As an amplifier

(2)

5.7

- High resistance in the forward bias
- Short circuit
- Open circuit
- Low resistance in the reverse bias

(Any 2 × 1) (2)



**FIGURE 2**

(5)  
[20]

**TOTAL: 100**