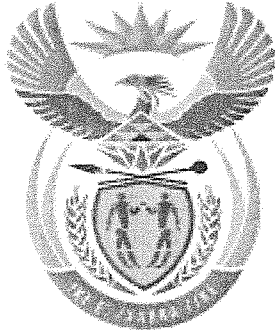
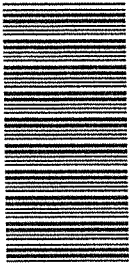


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# higher education & training

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

## **MARKING GUIDELINE**

**NATIONAL CERTIFICATE**

**APRIL EXAMINATION**

**INDUSTRIAL ELECTRONICS N1**

**4 APRIL 2014**

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

**QUESTION 1**

1.1	1.1.1	True			
	1.1.2	True			
	1.1.3	True			
	1.1.4	False			
	1.1.5	False			
	1.1.6	False			
	1.1.7	True			
	1.1.8	True			
	1.1.9	True			
	1.1.10	False			
				(10 x 1)	(10)
1.2	1.2.1	Digital			
	1.2.2	Covalent			
	1.2.3	Electromotive force			
	1.2.4	Transformers			
	1.2.5	Capacitance			
	1.2.6	Junction			
	1.2.7	Valence			
	1.2.8	Farads			
	1.2.9	Three			
	1.2.10	Parallel			
				(10 x 1)	(10) [20]

**QUESTION 2**

2.1	2.1.1	$E_T = E_1 + E_2 + E_3$		
		$E_T = 2 + 2 + 2$		
		$E_T = 6V$		
	2.1.2	$r_T = r_1 + r_2 + r_3$		
		$r_T = 0,2 + 0,2 + 0,2$		
		$r_T = 0,6 \Omega$		
	2.1.3	$I = \frac{E}{R + r_T}$		
		$I = \frac{6}{10 + 0,6}$		
		$I = 0,57A$		

- 2.2 2.2.1  $\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$   
 $\frac{1}{R_p} = \frac{1}{4} + \frac{1}{2} + \frac{1}{8}$   
 $\frac{1}{R_p} = \frac{2+4+1}{8}$   
 $\frac{1}{R_p} = \frac{7}{8}$   
 $R_p = \frac{8}{7}$   
 $R_p = 1,143 \Omega$  (4)
- 2.2.2  $V_2 = 10 V$  (1)
- 2.2.3  $P_1 = \frac{V_1^2}{R_1}$   
 $P_1 = \frac{10^2}{4}$   
 $P_1 = 25 W$  (4)
- 2.3 Red, Brown, Gold (3)  
**[20]**

**QUESTION 3**

- 3.1  $A = \frac{\rho L}{R}$   
 $A = \frac{0,017 \times 10^{-6} \times 100}{50}$   
 $A = 0,34 \times 10^{-6} m^2$  (4)
- 3.2  $R_T = R_0(1 + \alpha t)$   
 $R_T = 0,25(1 + 0,0058 \times 30)$   
 $R_T = 0,294 \Omega$  (3)
- 3.3 3.3.1  $C_T = C_1 + C_2 + C_3$   
 $C_T = 3 + 4 + 9$   
 $C_T = 16 \mu F$  (3)

3.3.2  $Q = C \times V$   
 $Q = 16 \times 20$   
 $Q = 320 \mu C$  (3)

- 3.4
- The number of turns
  - The cross-sectional area of the core upon which it is wound
  - The effective length of the core
  - The permeability of the core; ie the property of the core which makes it to change the magnetic flux in the magnetic field.
- (Any 3 x 1) (3)

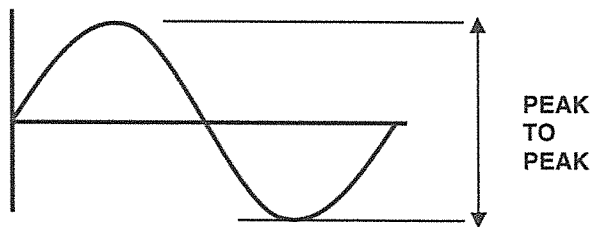
3.5 Hold the conductor with the left hand; with the thumb pointing in the direction of electron current flow, the fingers will point in the direction of the field. (4)  
**[20]**

**QUESTION 4**

4.1 4.1.1  $I_p = \frac{I_s \times N_s}{N_p}$   
 $I_p = \frac{0,8 \times 1}{3}$   
 $I_p = 0,27 A$  (4)

4.1.2  $V_s = \frac{I_p \times V_p}{I_s}$   
 $V_s = \frac{230 \times 0,27}{0,8}$   
 $V_s = 76,6 V$  (4)

4.2



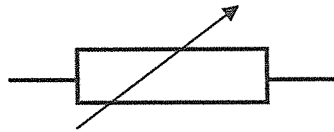
**FIGURE 1** (2)

- 4.3
- 4.3.1 Volts
  - 4.3.2 Hertz
  - 4.3.3 Volts
  - 4.3.4 Henry
  - 4.3.5 Ampere-hour
- (5 x 1) (5)

4.4 4.4.1



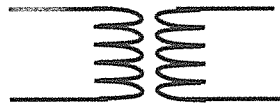
4.4.2



4.4.3



4.4.4



4.4.5



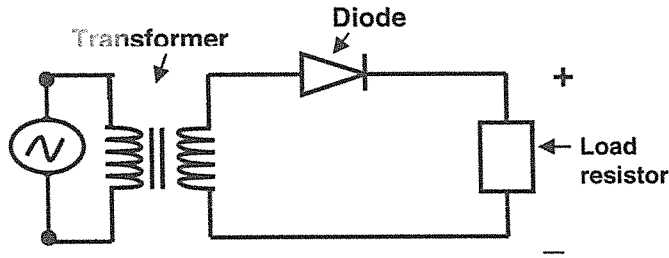
(5 x 1)

(5)  
[20]

**QUESTION 5**

- 5.1
- Automatically switches off
  - Need not be zeroed
  - Indicates if battery is low
  - Can be used in any position
- (4)
- 5.2 0,2 volts (1)
- 5.3
- High resistance in the forward bias
  - Short circuit
  - Open circuit
  - Low resistance in the reverse bias
- (Any 2 x 1) (2)

5.4



Label=3  
Sketch=2

FIGURE 2

(5)

5.5



FIGURE 3

(4)

5.6

The holes will diffuse into the N-type semi-conductor while some of the valence electrons will diffuse into the P-type semi-conductor.

(4)  
[20]

TOTAL: 100