higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

NOVEMBER EXAMINATION

INDUSTRIAL ELECTRONICS N1

23 NOVEMBER 2016

This marking guideline consists of 6 pages.

QUESTION 1

1.1

1.1.1	D	
1.1.2	M	
1.1.3	K	
1.1.4	L	
1.1.5	A	
1.1.6	F	
1.1.7	B	
1.1.8	C	
1.1.9	E	
1.1.10	J	

(10 × 1) (10)

1.2
- Need maintenance
- Takes time to recharge
- More expensive
- Must be kept upright

(Any 2 × 1) (2)

1.3
- Saw tooth wave
- Square wave
- Sine wave

(3)

1.4

$$Is = \frac{Vp \times Ip}{Vs}$$

$$Is = \frac{3 \times 36 \times 10^{-3}}{1}$$

$$Is = 0{,}108A$$

$$or = 108mA$$

$$or = 108 \times 10^{-3}\ A$$

(4)

1.5 Hydrometer (1)

[20]

QUESTION 2

2.1 2.1.1

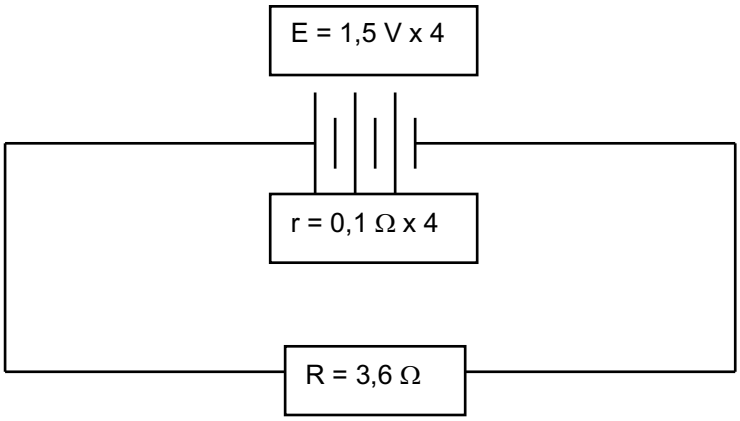


FIGURE 1 (2)

2.1.2 $E_T = E_1 + E_2 + E_3 + E_4$

$E_T = 1{,}5 + 1{,}5 + 1{,}5 + 1{,}5$

$E_T = 6V$ (2)

2.1.3 $r_T = r_1 + r_2 + r_3 + r_4$

$r_T = 0{,}1 + 0{,}1 + 0{,}1 + 0{,}1$

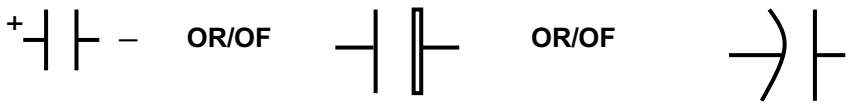
$r_T = 0{,}4\Omega$ (2)

2.1.4 $I = \dfrac{E}{R + r}$

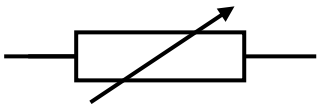
$= \dfrac{(1{,}5 \times 6)}{3{,}6 + (0{,}1 \times 4)}$

$= 2{,}25A$ (4)

2.2 2.2.1

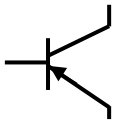


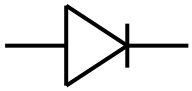
2.2.2



2.2.3

2.2.4



2.2.5 

(5 × 1) (5)

2.3 2.3.1 Henry
2.3.2 Hertz
2.3.3 Per degree celcius
2.3.4 Coulomb
2.3.5 Watt

(5 × 1) (5)
[20]

QUESTION 3

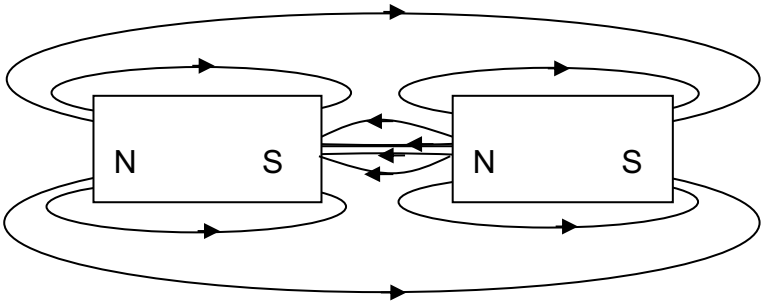
3.1 

FIGURE 2 (5)

3.2 3.2.1

$$A = \frac{\pi d^2}{4}$$

$$A = \frac{\pi \times (3 \times 10^{-3})^2}{4}$$

$$A = 7{,}068 mm^2$$

or

$$A = 7{,}068 \times 10^{-6} m^2$$

(5)

3.2.2

$$R = \frac{\rho L}{A}$$

$$R = \frac{0{,}017 \times 10^{-6} \times 800}{7{,}068 \times 10^{-6}}$$

$$R = 1{,}924 \Omega$$

(3)

3.3 3.3.1

$$\frac{1}{C_T} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$$
$$\frac{1}{C_T} = \frac{1}{1,4} + \frac{1}{2,8} + \frac{1}{5,6}$$
$$\frac{1}{C_T} = \frac{4+2+1}{5,6}$$
$$\frac{1}{C_T} = \frac{7}{5,6}$$
$$\frac{C_T}{1} = \frac{5,6}{7}$$
$$C_T = 0,8\mu F$$

(4)

3.3.2 $Q = C \times V$
$Q = 0,8 \times 10^{-6} \times 240$
$Q = 192\mu C$

(3)
[20]

QUESTION 4

4.1
4.1.1 False
4.1.2 False
4.1.3 False
4.1.4 False
4.1.5 False
4.1.6 True
4.1.7 False
4.1.8 True
4.1.9 True
4.1.10 True

(10 × 1) (10)

4.2
- Burnt windings on the primary and or secondary
- Short circuit of one winding (either secondary or primary)
- Windings shorting with steel core
- Short circuit of windings between primary and secondary (Any 3 × 1) (3)

4.3
- Need not be zeroed
- Automatically switches off
- Can be used at any position
- Will indicate if battery is low (Any relevant answer) (4)

4.4 Hold the fingers of the right hand at right angles to each other. The forefinger represent the direction of the magnetic field, the thumb shows the direction of motion of the conductor and the middle finger shows the direction of current. (3)
[20]

QUESTION 5

5.1
5.1.1 0,6 V
5.1.2 THREE
5.1.3 Positive
5.1.4 Forward
5.1.5 Larger

(5 × 1) (5)

5.2
- High resistance in the forward bias
- Short circuit
- Open circuit
- Low resistance in the reverse bias

(Any 2 × 1) (2)

5.3
- Collector; Base; Emmitter

(3)

5.4 A material with an excess of free electrons. (2)

5.5

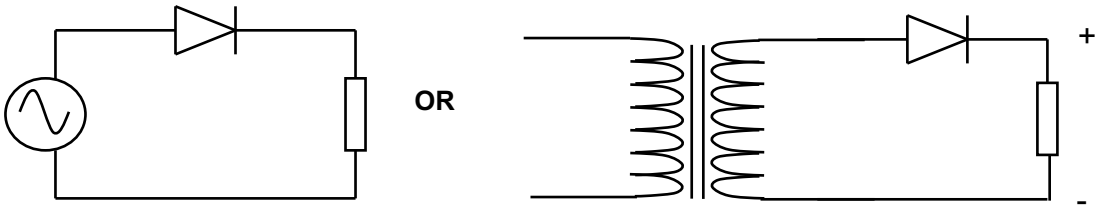


FIGURE 3 (4)

5.6

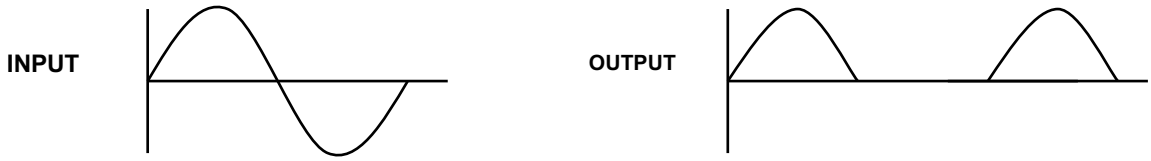


FIGURE 4 (4)

[20]

TOTAL: 100