higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

APRIL EXAMINATION

INDUSTRIAL ELECTRONICS N1

5 APRIL 2016

This marking guideline consists of 6 pages.

QUESTION 1

1.1
1.1.1 I
1.1.2 M
1.1.3 B
1.1.4 C
1.1.5 J
1.1.6 D
1.1.7 K
1.1.8 G
1.1.9 H
1.1.10 A

(10 × 1) (10)

2.1 1.2.1

$$I = \frac{P}{V_T}$$

$$I = \frac{900 \times 10^{-3}}{1,5 + 1,5}$$

$$I = 0,3A$$

(3)

1.2.2

$$R = \frac{V_T}{I}$$

$$R = \frac{3}{0,3}$$

$$R = 10\Omega$$

(3)

1.3
- Readily available
- Easy to install
- Relatively cheap
- Physically small

(Any appropriate 4 × 1) (4)
[20]

QUESTION 2

2.1
- Outside the magnet they move from the north pole to the south pole.
- Inside the magnet they move from the south pole to the north pole.
- They are continuous and form a complete path.
- They never intersect so they never cross one another.
- They are parallel to one another.
- They are invisible and pass through all materials.
- They always enter or leave a magnetic material at right angles.
- They tend to be elastic. (Any 4 × 1) (4)

2.2 2.2.1

$$R_{TOTALS} = R_1 + R_2 + R_3$$
$$R_{TOTAL} = 200 + 400 + 600$$
$$R_{TOTAL} = 1200\Omega$$

(3)

2.2.2

$$I_T = \frac{V_T}{R_T}$$
$$I_T = \frac{36}{1200}$$
$$I_T = 0{,}03A$$

(3)

2.2.3

$$V_{R1} = I_T \times R_1$$
$$V_{R1} = 0{,}03 \times 200$$
$$V_{R1} = 6\,V$$

(3)

2.2.4

$P = I^2 \times R_T$
$P = 0{,}03^2 \times 1200$
$P = 1{,}08W$

OR

$P = V_T \times I_T$
$P = 36 \times 0{,}03$
$P = 1{,}08W$

OR

$P = \frac{V^2}{R}$
$P = \frac{36^2}{1200}$
$P = 1{,}08W$

(4)

2.3
- Yellow
- Violet
- Orange

(3)
[20]

QUESTION 3

3.1

$$R = \frac{\rho L}{A}$$
$$R = \frac{1{,}728 \times 10^{-6} \times 70}{4 \times 10^{-6}}$$
$$R = 30{,}24\Omega$$

(3)

3.2

$$R_T = R_O(1 + \alpha_O t)$$
$$R_T = 11(1 + 0{,}0042 \times 33)$$
$$R_T = 12{,}52\Omega$$

(3)

3.3 3.3.1

$$\frac{1}{C_T}=\frac{1}{C_1}+\frac{1}{C_2}+\frac{1}{C_3}$$

$$\frac{1}{C_T}=\frac{1}{1,8}+\frac{1}{2,1}+\frac{1}{1,0}$$

$$\frac{1}{C_T}=\frac{21+18+3,78}{37,8}$$

$$\frac{1}{C_T}=\frac{42,78}{37,8}$$

$$\frac{C_T}{1}=\frac{37,8}{42,78}$$

$$C_T=0,88\mu F$$

OR

$$\frac{1}{C_T}=\frac{1}{C_1}+\frac{1}{C_2}+\frac{1}{C_3}$$

$$\frac{1}{C_T}=\frac{1}{1,8}+\frac{1}{2,1}+\frac{1}{1,0}$$

$$\frac{1}{C_T}=0,56+0,476+0,1$$

$$\frac{1}{C_T}=1,136$$

$$\frac{C_T}{1}=\frac{1}{1,136}$$

$$C_T=0,88\mu F$$

(4)

3.3.2

$$Q=C\times V$$

$$Q=0,88\times10^{-6}\times100$$

$$Q=88\mu F$$

(3)

3.4.1

$$Vs=\frac{Vp\times N_S}{N_P}$$

$$Vs=\frac{220\times1}{10}$$

$$Vs=22V$$

(4)

3.4.2

$$Is=\frac{Ip\times N_P}{N_S}$$

$$Is=\frac{2\times10}{1}$$

$$Is=20A$$

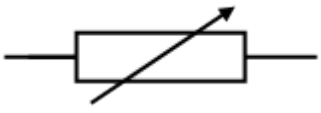
(3)

[20]

QUESTION 4

4.1 4.1.1

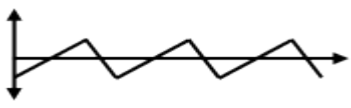
4.1.2



4.1.3

4.1.4

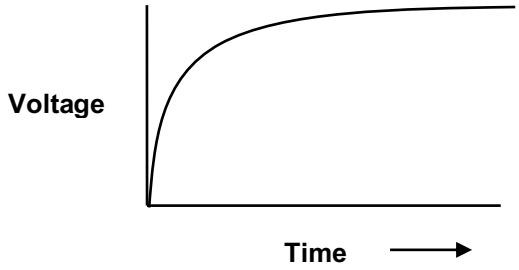
4.1.5



(5 × 1) (5)

4.2 It is the number of cycles completed in one second. (3)

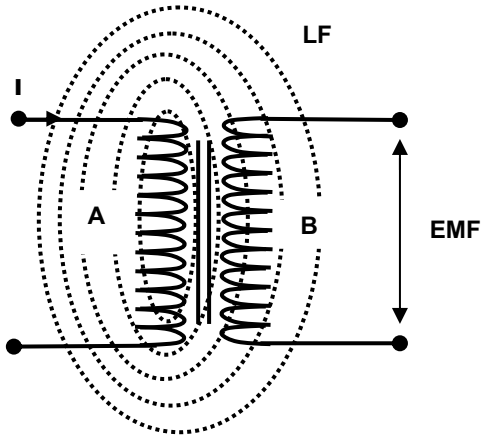
4.3



(3)

4.4 When one cell is drained it acts as a load for the other cells as well, causing them to drain even faster. (2)

4.5



I=CURRENT
A=P/COIL
B=S/COIL
LF=LINES OF FORCE

(7)
[20]

QUESTION 5

5.1.1 False
5.1.2 False
5.1.3 False
5.1.4 True
5.1.5 True
5.1.6 True
5.1.7 False
5.1.8 False
5.1.9 False
5.1.10 True

(10 × 1) (10)

5.2
- Protons
- Neutrons (2)

5.3.1 Centre-tap transformer (2)

5.3.2
- There is no negative cycle on the output waveform.
- D2 is responsible for the faulty condition. (2 × 2) (4)

5.3.3 D2 is not conducting (2)
[20]

TOTAL: 100