8

education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATURAL SCIENCE MARKING GUIDELINES

April 2011

INDUSTRIAL ELECTRONICS N1
8080641

April 2011

INDUSTRIëLE ELEKTRONIKA N1

QUESTION 1

1.1 Like poles ~~attract~~ repel each other and unlike poles ~~repel~~ attract each other. (2)

1.2 The voltage induced in the conductor is directly proportional to the rate at which the conductor cuts the magnetic lines of force. (3)

1.3 The collection of hydrogen around the positive carbon electrode (2)

1.4 When the current is passed through a coil of wire, an electromagnet is created. (1)

1.5
- Not ideally suited for heavy loads.
- Not rechargeable
- Have a relatively short span
- Becomes polarised when connected to a load. (2)

[ANY TWO / ENIGE TWEE]

1.6

1.6.1

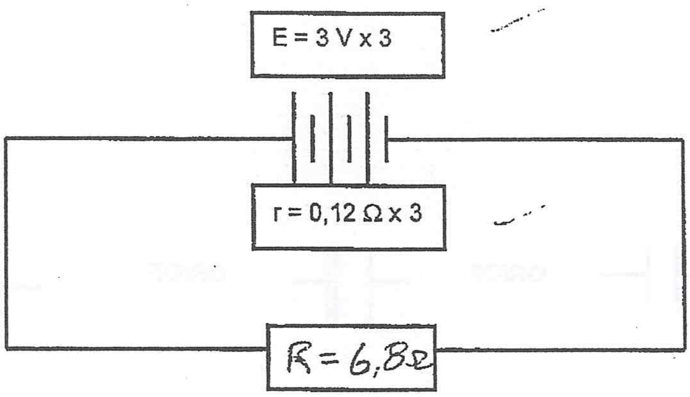


FIGURE 1

1.6.2 (2)

$$I = \frac{E}{R + r}$$

$$= \frac{(3 \times 3)}{6{,}8 + (0{,}12 \times 3)}$$

$= 1{,}257$ A (4)

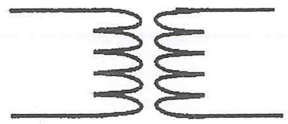
1.7
- Square wave
- Saw tooth wave
- Sine wave (2)

[ANY TWO / ENIGE TWEE]

1.8
- 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 i.e. they never cross one another
- They are parallel
- They are invisible and pass through all materials
- They always enter or leave a magnetic material at right angles (2)

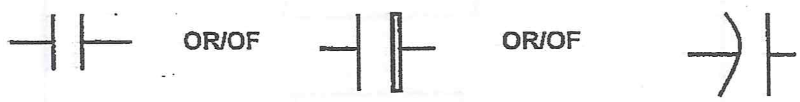
[ANY TWO / ENIGE TWEE]

1.9.1



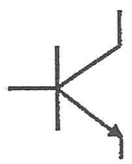
(1)

1.9.2



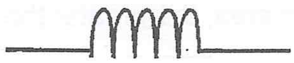
(1)

1.9.3



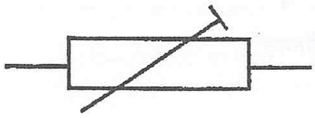
(1)

1.9.4



(1)

1.9.5



(1)
[25]

QUESTION 2

2.1.1

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

(4)

2.1.2

$$Q=C\times V$$
$$Q=0{,}8\times10^{-6}\times240$$
$$Q=192\mu C$$

(3)

2.2 2.2.1 The longer the distance between the capacitors, the smaller the capacitance (or vice versa). (2)

2.2.2 The larger the surface area, the greater the capacitance (or vice versa). (2)

2.2.3 The poor the dielectric, the lower the capacitance (or vice versa). (2)

2.3 2.3.1

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

$$A = \frac{\pi \times (3\times10^{-3})^2}{4}$$

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

or

$$A = 7{,}068\times10^{-6}m^2$$

(5)

2.3.2

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

$$R = \frac{0{,}017\times10^{-6}\times800}{7{,}068\times10^{-6}}$$

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

(3)

2.4

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

$$Is = \frac{3\times36\times10^{-3}}{1}$$

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

$$or = 108mA$$

$$or = 108\times10^{-3}A$$

(3)
[25]

QUESTION 3:

3.1.1

$$R_T = R_1 + R_2 + R_3$$
$$R_T = 5 + 10 + 15$$
$$R_T = 30\Omega$$

(3)

3.1.2

$$I_T = \frac{V_T}{R_T}$$
$$I = \frac{220}{30}$$
$$I = 7{,}333A$$

(3)

3.1.3

$$V = I \times R$$
$$V = 7{,}333 \times 5$$
$$V = 36{,}67V$$

(3)

3.1.4

$$P = I^2 \times R$$
$$P = 7{,}333^2 \times 10$$
$$P = \sout{53{,}78W} \quad 537{,}7\ W$$

(3)

3.1.5 Green; Black; Silver (3)

3.2
- 3.2.1 The temperature (1)
- 3.2.2 The length (1)
- 3.2.3 The type of the material (1)
- 3.2.4 The cross-sectional area (1)

3.3
- 3.3.1 Burnt windings on the primary and or secondary (1)
- 3.3.2 Windings shorting with steel core (1)
- 3.3.3 Short circuit of windings between primary and secondary (1)
- 3.3.4 Short circuit of one winding (either secondary or primary) (1)

3.4
- 3.4.1 A capacitor tends to block direct current (1)
- 3.4.2 The direct current will pass in one direction only. (1)

[25]

QUESTION 4

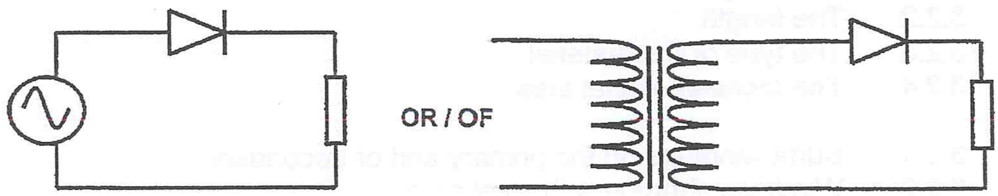
4.1	4.1.1	Forward	(1)
	4.1.2	Four	(1)
	4.1.3	Positive	(1)
	4.1.4	Low	(1)
	4.1.5	0,2 V or 0,3V	(1)
	4.1.6	Amplifier / Electronic switch	(1)
	4.1.7	One	(1)
	4.1.8	Dielectric	(1)
	4.1.9	Self induction	(1)
	4.1.10.	Galvanometer	(1)

4.2 The holes will diffuse into the N-type semi-conductor while some of the valence electrons will diffuse into the P- type semi-conductor \ Die holtes sal in die N-tipe halfgeleier diffundeer toe sommige van die valensie-elektrone in die P-tipe halfgeleier diffundeer (4)

4.3 4.3.1 When impurity atoms are intentionally added to the intrinsic or pure semi-conductor material, the semi-conductor is said to be doped. \ Waneer 'n onsuiwer atoom moetsvillig by 'n suiwer atoom gevoeg word, word gesê dat die materiaal gedope is. (3)

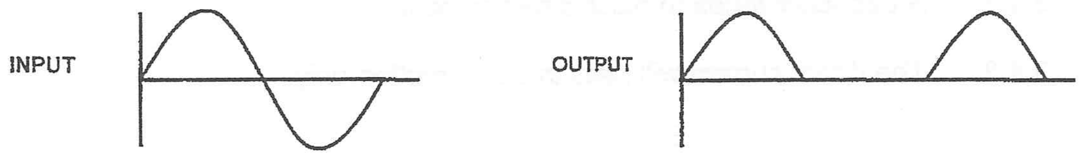
4.3.2 Electrons in the outermost shell (highest energy level) of the atom \ Elektrone in die buitenste skil (hoogste energievlak) van die atoom. (2)

4.4



(3)

4.5



(2)
[25]

TOTAL:100