POSSIBLE ANSWERS FOR:

FUNCTIONAL PHYSICAL SCIENCE SG
(First Paper: Physics)

QUESTION 1
MULTIPLE CHOICE QUESTIONS

1.1	B	1.2	A	1.3	D	1.4	A
1.5	C	1.6	A	1.7	D	1.8	A
1.9	C	1.10	B	1.11	D	1.12	C
1.13	B	1.14	B	1.15	D		

15x3=[45]

QUESTION 2
MAGNETIC EFFECT OF AN ELECTRICAL CURRENT

2.1 Upwards ✓✓ **(2)**

2.2 Increase the current in the conductor ✓
Increase the magnetic field ✓ **(4)**

2.3 Electrical motor. ✓✓
Galvanometer ✓✓ **(4)**
[10]

QUESTION 3
MAGNETIC INDUCTION

3.1.1 Brush ✓ **(1)**

3.1.2 Slip ring ✓ **(1)**

3.2 Q to P ✓✓ **(2)**

3.3 Replace slip rings with a commutator ✓✓ **(2)**

3.4 Use a stronger magnet. ✓✓
Moves the coil faster **(4)**
[10]

QUESTION 4
TRANSFORMERS

4.1 $V_p = 220\ V$ $I_p = 0,1\ A$
$V_s = 12\ V$ $I_s = ?$

$$V_sI_s = V_pI_p$$
$$(12)(I_s) = (220)(0,1)$$
$$I_s = \frac{(220)(0,1)}{12}$$
$$= 1,83\ A$$

(4)

4.2 Step down transformer (2)

4.3 $$R = \frac{V}{I}$$
$$= \frac{12}{1,83}$$
$$= 6,56\ \Omega$$

(4)

4.4 $N_p = 360$ $V_p = 220\ V$
$N_s = ?$ $V_s = 12\ V$

$$\frac{N_s}{N_p} = \frac{V_s}{V_p}$$
$$\frac{N_s}{360} = \frac{220}{12}$$
$$N_s = \frac{220 \times 360}{12}$$
$$= 6\,600$$

(4)
[14]

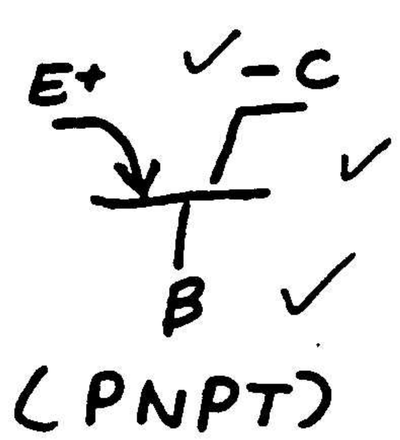
QUESTION 5
ELECTRONICS

5.1 Alternating current – The magnitude and the direction of the current changes periodically.
Direct current- The magnitude and the direction of the current remains (4)

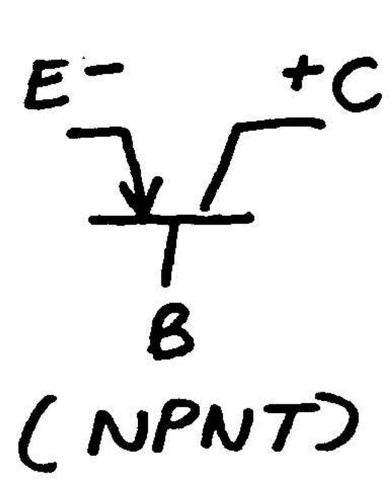
5.2.1 Diode (2)

5.2.2 Changes alternating current to direct current. (2)

5.3



OR



Sketch (1)
Labels (3)

(4)
[12]

QUESTION 6
THE LAW OF OHM

6.1 $\frac{1}{Rp} = \frac{1}{R1} + \frac{1}{R2}$ ✓

$= \frac{1}{60} + \frac{1}{10}$ ✓

$= \frac{7}{60}$

$Rp = \frac{60}{7}$

$= 8,57\ \Omega\ (8,6\ \Omega)$ ✓

$Rt = Rp + R_3$

$= 8,57 + 1$

$= 9,57\ \Omega\ (9,6\ \Omega)$ ✓✓ (5)

6.2 $I = \frac{V}{R}$ ✓

$= \frac{120}{9,57}$ ✓

$= 12,54\ A\ (12,5\ A)$ ✓✓ (4)

6.3 $Vp = IRp$ ✓

$= (12,54)\ (8,57)$

$= 107,47\ V\ (107,5\ V)$ ✓

$I = \frac{Vp}{R}$ ✓

$= \frac{107,47}{60}$ ✓ $\left(I = \frac{V}{R} = \frac{120}{(1+60)} = 1,97A\right)$ (4)

$= 1,79\ A\ (1,8A)$ ✓✓ (5)

6.4 A shorter time ✓✓ (2)

6.5 $W = I^2Rt$ ✓

The current through the element ✓ increases because the **total** ✓✓ current now moves through the element

$I = \frac{V}{R} = \frac{120}{11} = 10,9\ A$ (4)

[20]

QUESTION 7
ELECTRONS IN THE ATOM

7.1 As the potential difference increases, the cathode becomes increasingly more positive with respect to the anode so that less electrons reach the anode. If the potential difference exceeds a certain value, no more electrons will reach the anode and the current the through μA- metre is zero. (3)

The anode (collector) is negative wrt to cathode (emmitter) (1)
As the anode potential becomes more and more negative wrt the cathode, (1)
the emitted electrons are deflected from the anode, until no é reach the anode and no current is measured (1)

7.2 It gives an indication of the kinetic energy of the photo-electrons. (2)

7.3 No. An increase in intensity will liberated more photo-electrons, but the electrons will still not posses sufficient Ek to move from the cathode to the anode. (4)

7.4 Yes. The Ek of the liberated photo-electrons is increased due to more energy which is transferred to the photo-electrons. Electrons can therefore again reach the anode. (4)
[13]

QUESTION 8
WAVES

8.1.1 $f = \frac{v}{\lambda} = \frac{0,8}{0,02} = 40\,Hz$ (4)

8.1.2 $T = \frac{1}{f} = \frac{1}{40} = 0,025\,s$ (2)

8.1.3.1 $f = 40\,Hz$ (2)

8.1.3.2 $\lambda = \frac{v}{f} = \frac{0,5}{40} = 0,0125\,m$ (4)

8.2.1 Light (2)

8.2.2 Light (2)

8.2.3 Light (2)
[18]

QUESTION 9
LIGHT, COLOUR AND SPECTRA

9.1 Dispersion (2)

9.2 Continuous (2)

9.3. Violet (2)

9.4. Violet (2)
[8]

TOTAL: 150

END

MOONTLIKE ANTWOORDE VIR:

FUNKSIONELE NATUUR- EN SKEIKUNDE SG
(Eerste Vraestel: Fisika)

VRAAG 1
MEERVOUDIGE KEUSE-VRAE

1.1	B	1.2	A	1.3	D	1.4	A
1.5	C	1.6	A	1.7	D	1.8	A
1.9	C	1.10	B	1.11	D	1.12	C
1.13	B	1.14	B	1.15	D		

15x3=[45]

VRAAG 2
MAGNETIESE UITWERKING VAN 'N ELEKTRIESE STROOM

2.1 Opwaarts ✓✓ **(2)**

2.2 Verhoog die stroomsterkte in die geleier. ✓✓
Gebruik 'n sterker magneet. ✓✓ **(4)**

2.3 Elektriese motor. ✓✓ **(4)**
Galvanometer ✓✓ **[10]**

VRAAG 3
MAGNETIESE INDUKSIE

3.1.1 Borsel ✓ **(1)**

3.1.2 Sleepring ✓ **(1)**

3.2 Q na P ✓✓ **(2)**

3.3 Vervang die sleepringe met 'n kommutator / halfringe. ✓✓ **(2)**

3.4 Gebruik 'n sterker magneet. ✓✓
Beweeg die spoel vinniger. ✓✓ **(4)**
[10]

VRAAG 4
TRANSFORMATORS

4.1 Vp = 220 V Ip = 0,1 A
Vs = 12 V Is = ?

$$VsIs = VpIp$$
$$(12)(Is) = (220)(0,1)$$
$$Is = \frac{(220)(0,1)}{12}$$
$$= 1,83 \text{ A}$$

(4)

4.2 Spanningverlagingstransformator (2)

4.3 $$R = \frac{V}{I}$$
$$= \frac{12}{1,83}$$
$$= 6,56\ \Omega$$

(4)

4.4 Np = 360 Vp = 220 V
Ns = ? Vs = 12 V

$$\frac{Ns}{Np} = \frac{Vs}{Vp}$$
$$\frac{Ns}{360} = \frac{220}{12}$$
$$Ns = \frac{220 \times 360}{12}$$
$$= 6\,600$$

(4)
[14]

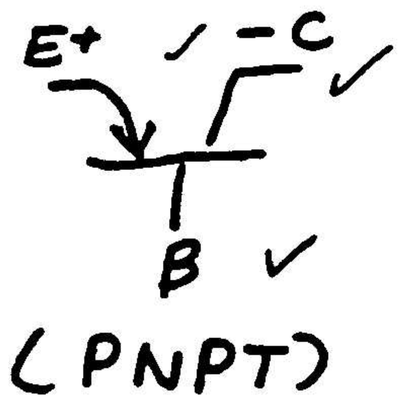
VRAAG 5
ELEKTRONIKA

5.1 Wisselstroom – Die grootte en rigting van die stroom verander periodiek.
Gelykstroom – Die grootte en die rigting van die stroom bly konstant. (4)

5.2.1 Diode (2)

5.2.2 Verander wisselstroom na gelykstroom. (2)
[8]

5.3



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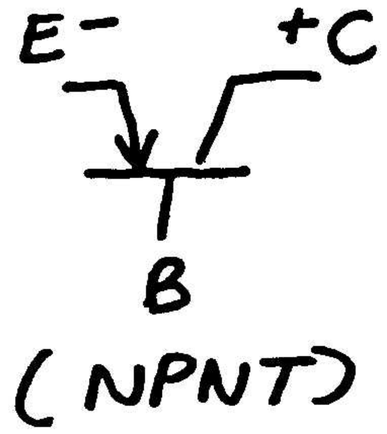

skets (1)
byskrifte (3)

(4)
[12]

VRAAG 6
OHM SE WET

6.1 $\frac{1}{Rp} = \frac{1}{R1} + \frac{1}{R2}$ ✓

$= \frac{1}{60} + \frac{1}{10}$ ✓

$= \frac{7}{60}$

$Rp = \frac{60}{7}$

$= 8,57\ \Omega\ (8,6\ \Omega)$ ✓

$Rt = Rp + R3$

$= 8,57 + 1$

$= 9,57\ \Omega\ (9,6\ \Omega)$ ✓✓ (5)

6.2 $I = \frac{V}{R}$ ✓

$= \frac{120}{9,57}$ ✓

$= 12,54\ A\ (12,5\ A)$ ✓✓ (4)

6.3 $Vp = IRp$ ✓

$= (12,54)(8,57)$

$= 107,47\ V\ (107,5\ V)$ ✓

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

$= \frac{107,47}{60}$ ✓ $\left(I = \frac{V}{R} = \frac{120}{(1+60)} = 1,97A\right)$ (4)

$= 1,79\ A\ (1,8A)$ ✓✓ (5)

6.4 'n Korter tyd. ✓✓ (2)

6.5 $W = I^2Rt$

Die stroom deur die element neem toe, want die **totale** stroom beweeg deur die element

$I = \frac{V}{R} = \frac{120}{11} = 10,9\ A$ (4)

[20]

Die totale stroom wat deur die ammeter beweeg word met 1.97 verminder. Dit beteken dat die stroom in die stroombaan nou 12 A en nie 14 A is nie (1). Die volt daling in die ammeter 12 V minder as die totale 120 V (1).

VRAAG 7
ELEKTRONE IN DIE ATOOM

7.1 Soos die potensiaalverskil toeneem, word die katode toenemend positief t.o.v. die anode sodat al hoe minder elektrone die anode bereik. Indien die potensiaalverskil 'n sekere waarde oorskry, sal daar nie meer elektrone wees wat die anode bereik nie en dan is die stroom deur die μA-meter nul. (3)

7.2 Dit gee 'n aanduiding van die kinetiese energie van die foto-elektrone. (2)

7.3 Nee. 'n Toename in intensiteit sal meer foto-elektrone vrystel, maar die elektrone sal steeds nie oor genoeg Ek besit om van die katode na die anode te beweeg nie. (4)

7.4 Ja. Die Ek van die vrygestelde foto-elektrone is verhoog omdat meer energie aan die foto-elektrone oorgedra is. Elektrone kan nou weer die anode bereik. (4)
[13]

VRAAG 8
GOLWE

8.1.1 $f = \frac{v}{\lambda} = \frac{0,8}{0,02} = 40\ Hz$ (4)

8.1.2 $T = \frac{1}{f} = \frac{1}{40} = 0,025\ s$ (2)

8.1.3.1 $f = 40\ Hz$ (2)

8.1.3.2 $\lambda = \frac{v}{f} = \frac{0,5}{40} = 0,0125\ m$ (4)

8.2.1 Lig (2)

8.2.2 Lig (2)

8.2.3 Lig (2)
[18]

VRAAG 9
LIG, KLEUR EN SPEKTRA

9.1 Dispersie (2)

9.2 Kontinue spektrum (2)

9.3 Violet (2)

9.4 Violet (2)
[8]

TOTAAL: 150

EINDE