higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NASIENRIGLYN

NASIONALE SERTIFIKAAT

INDUSTRIËLE ELEKTRONIKA N2

29 JULIE 2019

Hierdie nasienriglyn bestaan uit 9 bladsye.

Kopiereg voorbehou

VRAAG 1

1.1 D
1.2 G
1.3 J
1.4 B
1.5 A
1.6 E
1.7 H
1.8 K
1.9 L
1.10 I

(10 × 1) **[10]**

VRAAG 2

2.1 $V_{R3} = I \times R_3$
$V_{R3} = 3 \times 3 = 9\ \text{V}$✓

R_3 en R_4 is parallel geskakel en die spanning is dus dieselfde.

$$I_{R4} = \frac{V}{R_4}$$

$$I_{R4} = \frac{9\ \text{V}}{6}$$✓

$I_{R4} = 1{,}5\ \text{A}$✓ (3)

2.2 $I_{R5} = I_{R3} + I_{R4}$
$I_{R5} = 3 + 1{,}5 = 4{,}5\ \text{A}$✓

$V_{R5} = I \times R_5$
$V_{R5} = 4{,}5 \times 2 = 9\ \text{V}$✓✓ (3)

2.3 Omdat R_6 parallel is aan R_3, R_4 en R_5:

$V_{R6} = V_{R3/4} + V_{R5}$✓

$V_{R6} = 9\ \text{V} + 9\ \text{V} = 18\ \text{V}$✓

$$I_{R6} = \frac{V}{R_6} = \frac{18}{12} = 1{,}5\ \text{A}$$✓ (3)

2.4 Die stroom wat deur R_7 gaan, is

$I_{R7} = I_{R5} + I_{R6}$
$I_{R7} = 4{,}5 + 1{,}5 = 6\ \text{A}$✓

$$R_{P1} = \frac{R_3 \times R_4}{R_3 + R_4} + R_5$$

$$R_{P1} = \frac{3 \times 6}{3 + 6} + 2$$

$R_{P1} = 4\ \Omega$✓

$$R_{P2} = \frac{R_{P1} \times R_6}{R_{P1} + R_6} + R_7$$

$$R_{P2} = \frac{4 \times 12}{4 + 12} + 2$$

$R_{P2} = 5\ \Omega$✓

$V_P = I \times R_{P2}$
$V_P = 6 \times 5 = 30\ \text{V}$✓

R_2 is parallel aan R_3, R_4, R_5, R_6 en R_7 en die spanning is dus dieselfde.✓

$$I_{R2} = \frac{V}{R_2}$$

$I_{R2} = \frac{30}{6} = 5\ \text{A}$✓✓

OF

$I_7 = I_6 + I_5 = 1{,}5 + 4{,}5$✓ $= 6\text{A}$ ✓

$V_7 = R_7 \times I_7 = 2 \times 6$✓ $= 12\text{V}$✓

$V_6 + V_7 = 18 + 12 = 30\text{V}$✓

$V_6 + V_7 = V_2 = 30\text{V}$

$I_2 = V_2/R_2 = 30/6$✓ $= 5\text{A}$✓ (7)

2.5 $I_T = I_{R2} + I_{R6} + I_{R5}$✓
$I_T = 5\ \text{A} + 1{,}5\ \text{A} + 4{,}5\ \text{A}$✓✓
$I_T = 11\ \text{A}$✓ (4)
[20]

VRAAG 3

3.1 3.1.1 $\frac{\pi}{2}\text{ rad} = \frac{\pi}{2} \times \frac{180}{\pi} = 90°$✓✓

3.1.2 $\frac{\pi}{3}\text{ rad} = \frac{\pi}{3} \times \frac{180}{\pi} = 60°$✓✓

(2 × 2) (4)

3.2 3.2.1 Maksimum waarde:

$E_m = 100\text{ V}$✓ (1)

3.2.2 W.g.k.-waarde:

$E_{WGK} = 0{,}707 \times E_m$
$E_{WGK} = 0{,}707 \times 100$✓
$E_{WGK} = 70{,}7\text{ V}$✓ (2)

3.2.3 Gemiddelde waarde:

$E_{GEM} = 0{,}637 \times E_m$
$E_{GEM} = 0{,}637 \times 100$✓
$E_{GEM} = 63{,}7\text{ V}$✓ (2)

3.2.4 Kruinfaktor/topfaktor:

$$\text{Kruinfaktor} = \frac{\text{Maks waarde}}{\text{W. g. k. waarde}}$$

$$\text{Kruinfaktor} = \frac{100}{70{,}7}$$✓

$\text{Kruinfaktor} = 1{,}414$✓ (2)

3.2.5 Vormfaktor:

$$\text{Vormfaktor} = \frac{\text{W. g. k. waarde}}{\text{Gem waarde}}$$

$$\text{Vormfaktor} = \frac{70{,}7}{63{,}7}$$✓

$\text{Vormfaktor} = 1{,}11$✓ (2)

3.2.6 Frekwensie van die wisselspanning:

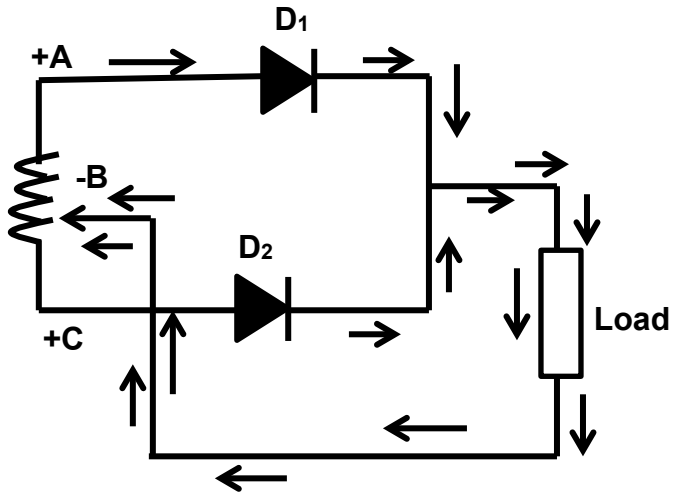
$\omega = 2\pi f$
$314{,}28 = 2\pi f$✓
$f = \frac{314{,}28}{2\pi}$
$f = 50\text{ Hz}$✓ (2)

3.2.7 Oombliklike spanning 2ms na aanskakeling:

$e = 100 \sin 314{,}28\, t$
$e = 100 \sin(314{,}28 \times 2 \times 10^{-3} \times 57{,}3)$✓
$e = 58{,}802$ V✓✓ (3)
[18]

VRAAG 4

4.1

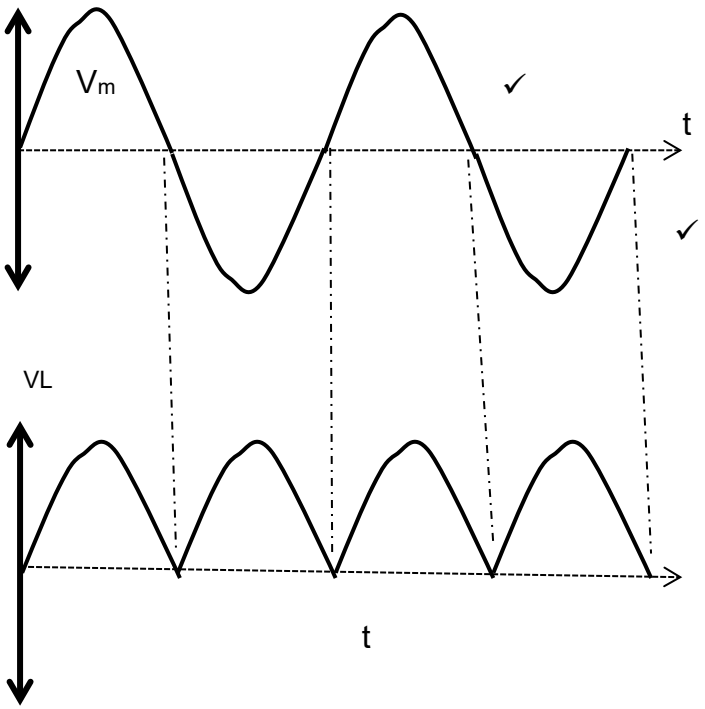


✓✓ vir stroompad

Wanneer punt A positief met betrekking tot punt B is, is diode D_1 in meevoorspanning✓ en dit gelei, en D_2 is in teenvoorspanning.✓

Wanneer punt C positief met betrekking to punt B is, is diode D_2 in meevoorspanning✓ en dit gelei, en diode D_1 is in teenvoorspanning.✓ (6)

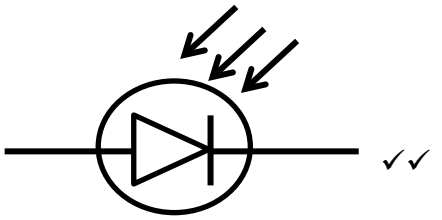
4.2



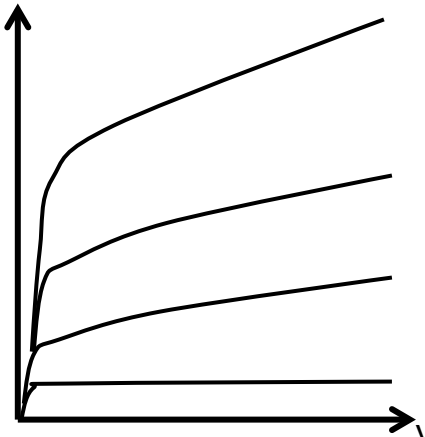
✓✓
(regmerkie vir 1ste en 2de siklus)

(4)

4.3



✓✓



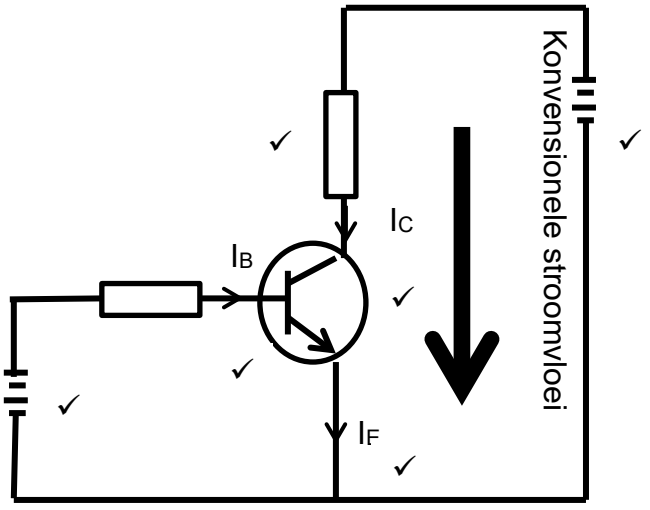
V_R (V)✓✓ (grafiek en byskrif) (4)

[14]

VRAAG 5

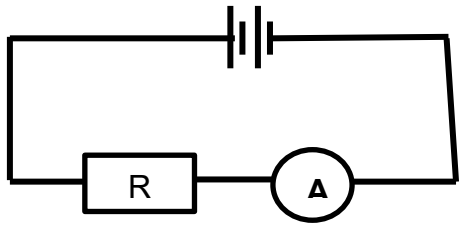
5.1 5.1.1 Die bron van ladingdraers in die transistor
5.1.2 Die kontrole-elektrode/beheerelektrode van die transistor
5.1.3 Die area waar die ladingdraers versamel word (3 × 1) (3)

5.2



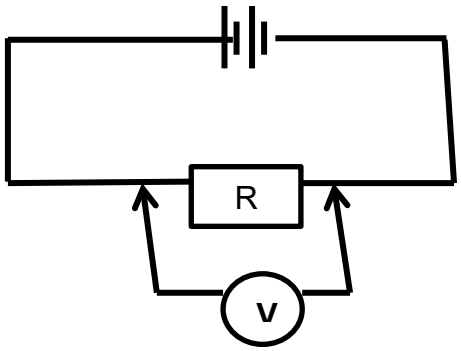
(6)

5.3 5.3.1



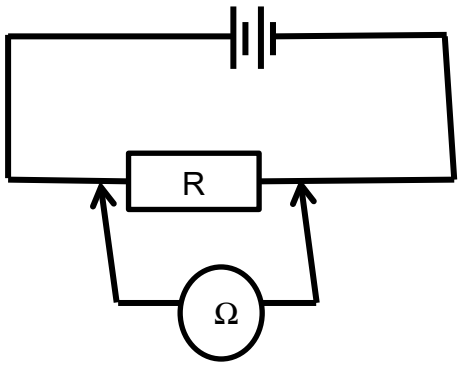
1 punt vir ammeter
1 punt vir serieskakeling

5.3.2



1 punt vir voltmeter
1 punt vir parallelskakeling

5.3.3



1 punt vir ohmmeter
1 punt vir parallelskakeling

(3 × 2) (6)

5.4 'n Meetinstrument is 'n toestel wat gebruik kan word om die waarde of grootte van 'n onbekende hoeveelheid of veranderlike vas te stel. (2)

[17]

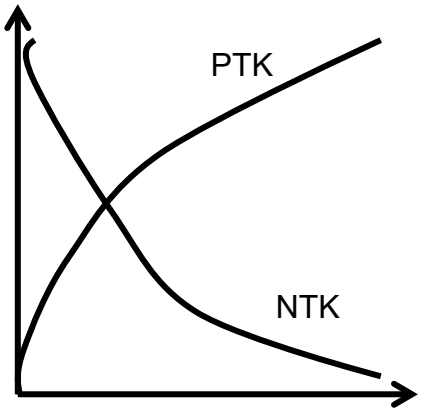
VRAAG 6

6.1
- Negatiewe temperatuurkoëffisiënt
- Positiewe temperatuurkoëffisiënt (2)

6.2



('n Punt elk vir die simbole; 'n punt vir elke grafiek)



Twee afsonderlike grafieke mag gebruik word. (4)

6.3
- Negatiewe temperatuurkoëffisiënt: Wanneer die weerstand afneem,✓ neem die temperatuur toe.✓
- Positiewe temperatuurkoëffisiënt: Wanneer die weerstand toeneem,✓ neem die temperatuur ook toe.✓ (4)

6.4.1 Algehele wins/versterking as 'n produk/verhouding:

$$A_P = \frac{P_2}{P_1} \times \frac{P_3}{P_2} \checkmark$$

$$A_P = \frac{20}{5} \times \frac{100}{20} \checkmark$$

$$A_P = 20 \checkmark$$

6.4.2 Algehele wins/versterking as 'n som in desibels:

$$\mathrm{A_P} = 10\log_{10}\frac{\mathrm{P_2}}{\mathrm{P_1}} + 10\log_{10}\frac{\mathrm{P_3}}{\mathrm{P_2}} \checkmark$$

$$\mathrm{A_P} = 10\log_{10}\frac{20}{5} + 10\log_{10}\frac{100}{20} \checkmark$$

$$\mathrm{A_P} = 10\log 4 + 10\log 5$$

$$\mathrm{A_P} = 6{,}021 + 6{,}989$$

$$\mathrm{A_P} = 13{,}01\ \mathrm{dB} \checkmark$$

(2 × 3) (6)

[16]

VRAAG 7

Sender	Ontvanger
R1 →	**R2✓**
R2 →	**R1✓**
S1 →	**S1✓**
S2 →	**S2✓**
S3 →	**S3✓**

[5]

TOTAAL: 100

Kopiereg voorbehou