higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NASIENRIGLYN

NASIONALE SERTIFIKAAT

INDUSTRIËLE ELEKTRONIKA N3

27 Julie 2021

Hierdie nasienriglyn bestaan uit 10 bladsye.

Kopiereg voorbehou

AFDELING A

VRAAG 1

1.1 B
1.2 B
1.3 A
1.4 C
1.5 B

(5 × 1) **[5]**

VRAAG 2

2.1 Waar
2.2 Onwaar
2.3 Onwaar
2.4 Waar
2.5 Onwaar

(5 × 1) **[5]**

VRAAG 3

3.1 B
3.2 F
3.3 A
3.4 C
3.5 E

(5 × 1) **[5]**

VRAAG 4

4.1 P-tipe
4.2 Gemeenskaplike emittor
4.3 Drie
4.4 Sero
4.5 Elektrone

(5 × 1) **[5]**

TOTAAL AFDELING A: 20

AFDELING B

VRAAG 5

5.1 $V = I_1.R_1 + I_2.R_4 + I_1.R_5$

$9 = 100I_1 + 33I_2 + 25I_1$ ✓

$9 = 125I_1 + 33I_2$ _____(1) ✓ (2)

5.2 $V = I_1.R_1 + (I_1 - I_2).(R_2 + R_3) + I_1.R_5$

$9 = 100I_1 + 206(I_1 - I_2) + 25I_1$ ✓

$9 = 331I_1 - 206I_2$ _____(2) ✓ (2)

5.3 $(1) \times 206 \Rightarrow 1854 = 25750I_1 + 6798I_2$ _(3) ✓

$(2) \times 33 \Rightarrow 297 = 10923I_1 - 6798I_2$ __(4) ✓

$(3) + (4)$

$1854 = 25750I_1 + 6798I_2$ _(3)

$297 = 10923I_1 - 6798I_2$ __(4)

$2151 = 36673I_1$ ✓

$I_1 = 0,587A$ ✓

I_1 = 0,05865 A of 58 mA (korreksie)

Vervang I_1 in (1)

$9 = 125(0,587) + 33I_2$

$9 = 125(0,587) + 33I_2$

$-64,375 = 33I_2$ ✓

$I_2 = -1,951A$ ✓

I_2 = 0,05056 A of 50 mA (korreksie)

$(I_1 - I_2) = 0,587 - (-1,951)$✓

$(I_1 - I_2) = 2,538A$ ✓

$I_1 - I_2$ = 8 mA (korreksie) (8)

[12]

VRAAG 6

6.1 $X_L = 2\pi fL$

$X_L = 2\pi \times 60 \times 25$ ✓

$\underline{X_L = 9424,778\Omega}$ ✓

X_L = 9,426 ohm aanvaarbaar (gebruik pi=3,142)

$I = \frac{V}{X_L}$

$I = \frac{110}{9424,778}$ ✓

$\underline{I = 11,671mA}$ ✓ (4)

6.2 $X_C = \frac{1}{2\pi fC}$

$X_C = \frac{1}{2\pi \times 60 \times 0,5 \times 10^{-6}}$ ✓

$\underline{X_C = 6305,165\Omega}$ ✓

Xc = 5304,47 ohm

$I = \frac{V}{X_L}$

$I = \frac{110}{6305,165}$ ✓

$\underline{I = 17,446mA}$ ✓

I = 20,74 mA (4)

6.3 $I_R = \frac{V}{R}$

$I_R = \frac{110}{2200}$ ✓

$\underline{I_R = 50mA}$ ✓ (2)

6.4 $I_T = \sqrt{I_R^2 + (I_C - I_L)^2}$ ✓

$I_T = \sqrt{(50 \times 10^{-3})^2 + (17,446 \times 10^{-3} - 11,671 \times 10^{-3})^2}$ ✓

$\underline{I_T = 50,332mA}$ ✓ (3)

6.5 $\Theta = \cos^{-1}\frac{I_R}{I_T}$

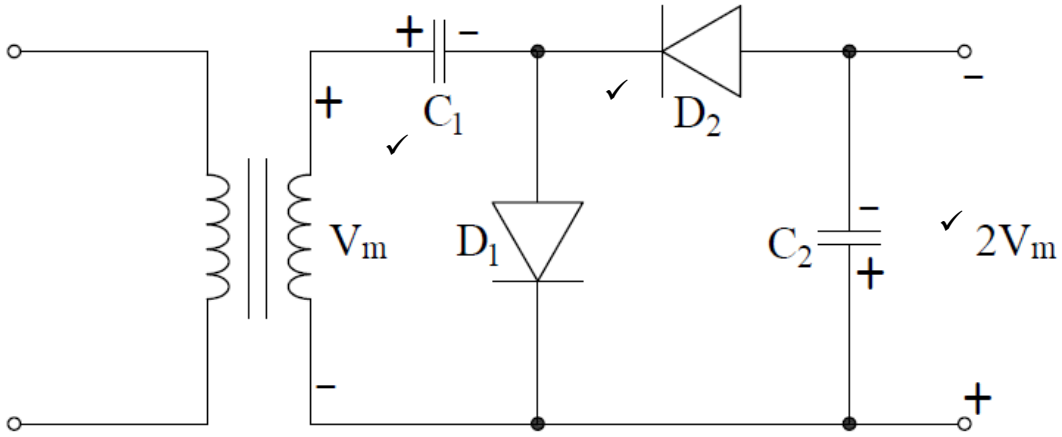
$\Theta = \cos^{-1}\frac{50\times10^{-3}}{50,332\times10^{-3}}$ ✓

$\underline{\Theta = 6,585°}$ ✓

(2)
[15]

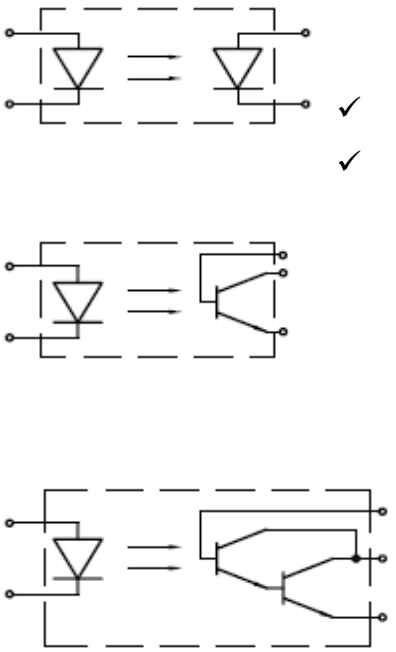
VRAAG 7

7.1



(3)

7.2



(2)
[5]

VRAAG 8

8.1
- 0° faseverskuiwing
- Laestroomwins
- Hoëstroomwins
- Lae-insetimpedansie
- Hoëleweringsimpedansie (Enige 4 × 1) (4)

8.2 8.2.1

$$I_C = \frac{V_{CC}}{R_C}$$

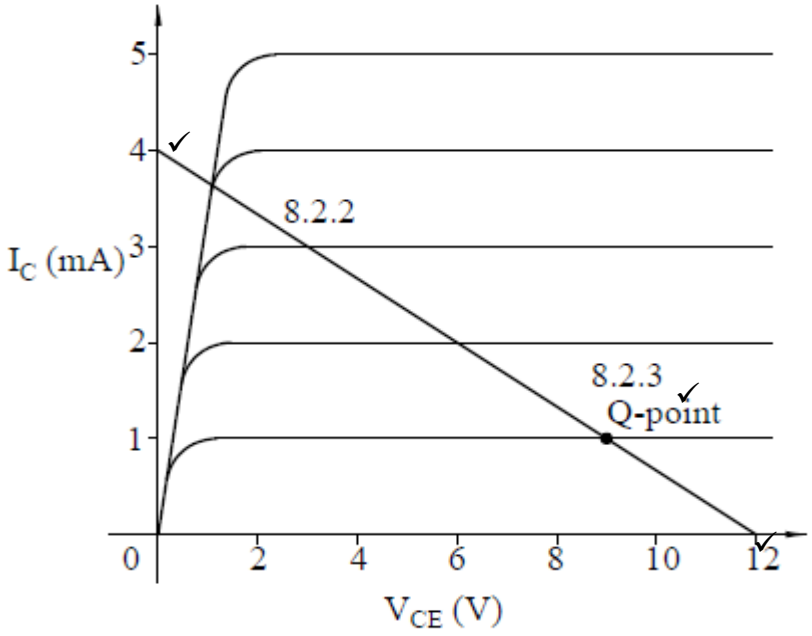
$$I_C = \frac{12}{3000} \checkmark$$

$$\underline{I_C = 4mA} \checkmark$$

(2)

8.2.2

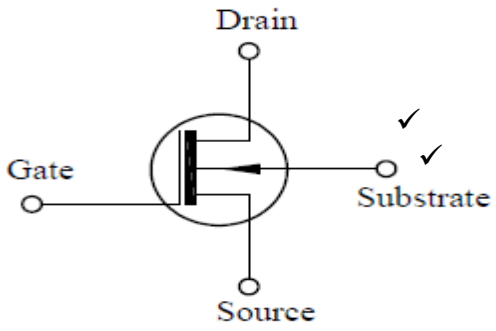
8.2.3



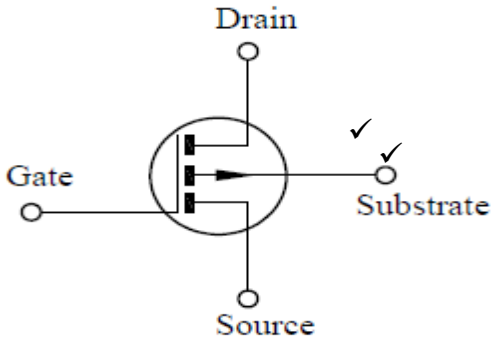
(2)
(1)

8.3
- Verbeter stabiliteit
- Verminder wins
- Verhoog bandwydte
- Verminder vervorming
- Verminder geraas
- Verhoog insetimpedansie
- Verminder leweringsimpedansie (Enige 4 × 1) (4)

8.4 8.4.1



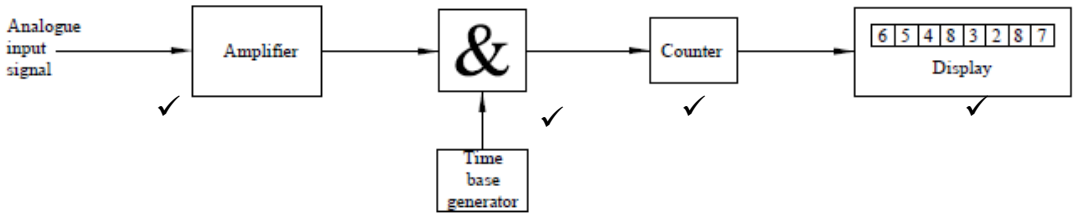
8.4.2



(2 × 2) (4)
[17]

VRAAG 9

9.1



(4)

9.2.
- V_i is 'n analoogwaarde wat gemeet moet word
- Die teller word op nul gestel.
- Die onbekende spanning (V_i) word met 'n intern-opgewekte spanning (V_2) vergelyk.
- $V_i > V_2$ die komparator se lewering is hoog en die EN-hek laat pulse van die pulsgenerator deur.
- Hierdie pulse word deur die teller getel.
- $V_i = V_2$ die kompaktor se lewering word laag.
- Geen pulse word deur die hek gelaat nie.
- Die laaste getal deur die teller word op die skerm vertoon. (Enige 5 × 1) (5)

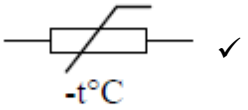
5 punte wat logies vloei om die werking te verduidelik **[9]**

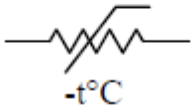
VRAAG 10

10.1
- Druk / krag
- Verplasing
- Posisie (3)

10.2
- Die posisionering van die magneetkern deur 'n eksterne krag verander die geïnduseerde spanning in die twee sekondêre wikkelings van die transformator.
- Die grootte van die verskil is 'n aanduiding van die grootte en rigting van die krag. (2)

10.3





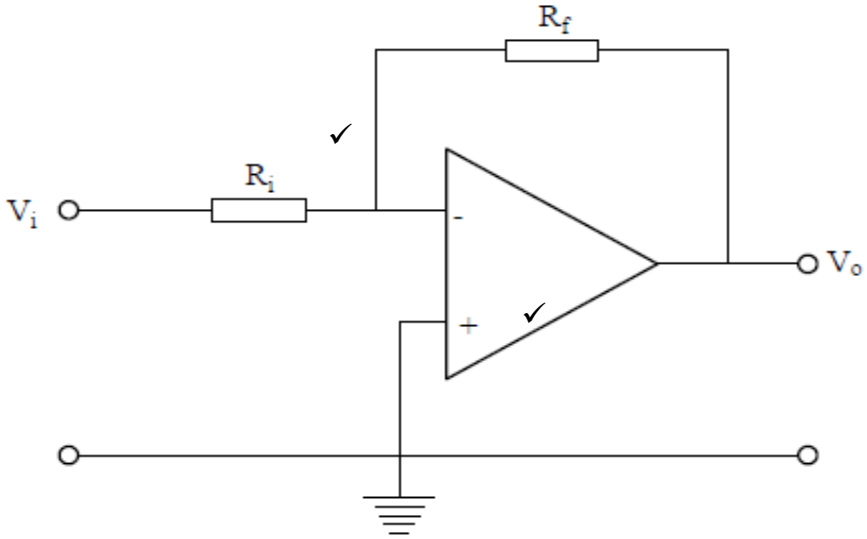
(1)

10.4
- Sonselle
- Ligintensiteitsmeters (2)

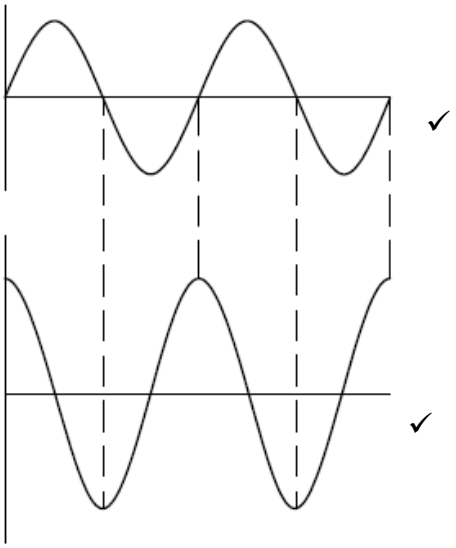
[8]

VRAAG 11

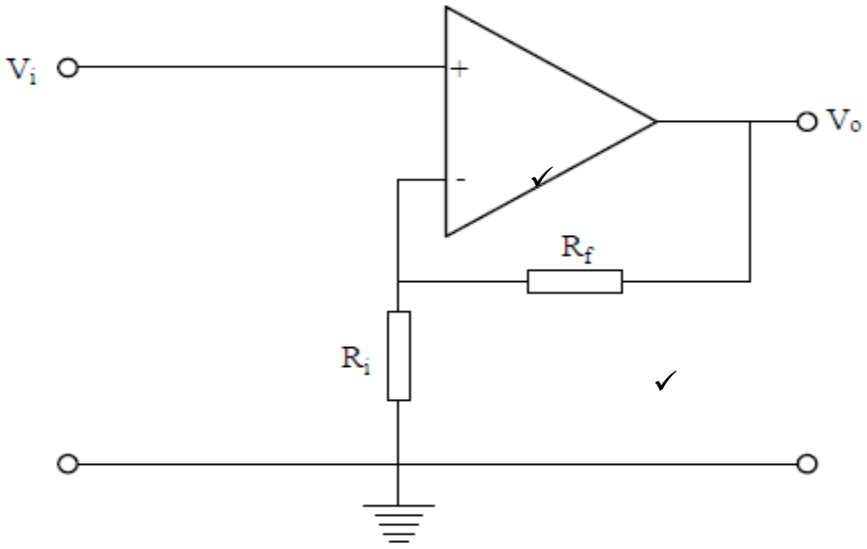
11.1



11.2



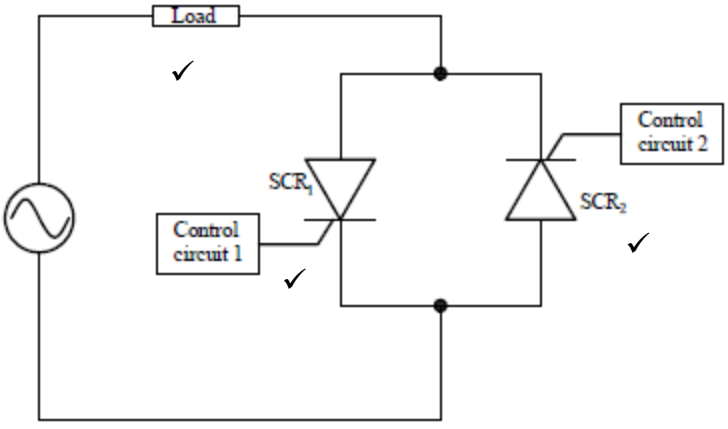
11.3



(3 × 2) **[6]**

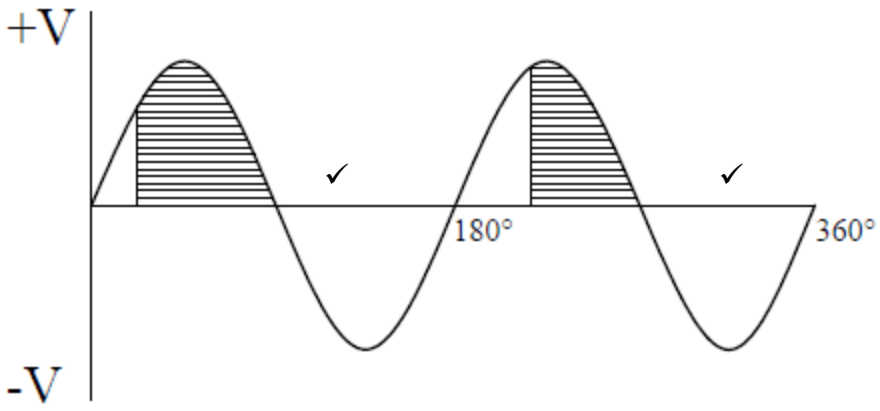
VRAAG 12

12.1



(3)

12.2



(2)

12.3 Gedwonge kommutasie is wanneer die stroom in 'n SBG gedwing word om in die✓ teenoorgestelde rigting te vloei, en lynkommutasie is wanneer die sinusgolf sero van positief na negatief kruis.✓ (2)

12.4
- LC-filters
- Zener-diodes
- TranZorps
- Varistors

(Enige 1 × 1) (1)
[8]

TOTAAL AFDELING B: 80
GROOTTOTAAL: 100

Kopiereg voorbehou