higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NASIENRIGLYN

NASIONALE SERTIFIKAAT

SYFERELEKTRONIKA N5

15 April 2021

Hierdie nasienriglyn bestaan uit 9 bladsye.

Kopiereg voorbehou

VRAAG 1

1.1 $11{,}2_8 = 001\,001{,}010$
$= 1001{,}01_2$✓

$10{,}2_{10} = 1010{,}001_2$✓

$\therefore 11{,}2_8 \times 10{,}2_{10} = 1001{,}01_2 \times 1010{,}001_2$

```
                  1 0 0 1 0 1
                1 0 1 0 0 0 1✓
-------------------------------
                  1 0 0 1 0 1
            1 0 0 1 0 1 0 0 0 0
          1 0 0 1 0 1 0 0 0 0 0 0✓
-------------------------------
          1 0 1 1 1 0 1 1 0 1 0 1
```

$\therefore 11{,}2_8 \times 10{,}2_{10} = 1001{,}01_2 \times 1010{,}001_2$
$= 1011101{,}10101_2$✓
$= 5D{,}A_{16}$✓

(Finale antwoord: 1 × 1 vir korrekte antwoord en 1 × 1 vir korrekte grondtal.
ALBEI MOET GEGEE WORD, m.a.w. TWEE punte of nul.) (6)

1.2

```
0 0 0 1 0 1 1 1 , 1 0 0 1  ──────────────────────→  0 0 0 1 0 1 1 1 , 1 0 0 1
1 0 1 0 0 0 1 0 , 0 0 1 1 ──→ 0 1 0 1 1 1 0 1 , 1 1 0 0+1✓ ──→ 0 1 0 1 1 1 0 1 , 1 1 0 1✓
                                                  Geen oorbring   0 1 1 1 0 1 0 1 , 0 1 1 0
                                                Komplement-antwoord -1 0 0 0 1 0 1 0 , 1 0 0 1✓
                                                                    -1 0 0 0 1 0 1 0 , 1 0 0 1
                                                Voeg '1' by minsbeduidende bis                +1✓
                                                                      1 0 0 0 1 0 1 0 , 1 0 1
```

$10111{,}1001 - 10100010{,}001 = 1\,0\,0\,0\,1\,0\,1\,0\,,1\,0\,11$✓ $= 138{,}628_{10}$✓
$-138{,}625_{10}$

(6)

1.3

$121{,}3_{16} = 001\ 010\ \ 001\ ,\ 011_2$

$= 1010001{,}011_2$ ✓

$24{,}3_{16} = 0010\ 0100,\ 0011_2$

$= 100100,\ 0011_2$

$= 100100{,}001_2$ ✓

$$\begin{array}{r} 1\,0\,\cdot\,0\,0\,1 \\ 100100001\overline{)\,1\,0\,1\,0\,0\,0\,1\,0\,1\,1\,,\,0\,0\,0} \\ 1\,0\,0\,1\,0\,0\,0\,0\,1 \\ \hline 1\,0\,0\,1\,0\,0\,1\,0\,0\,0 \\ 1\,0\,0\,1\,0\,0\,0\,0\,1 \\ \hline 1\,0\,0\,1\,0\,0\,1\,1\,1 \end{array}$$ ✓

$\therefore 1010001{,}011_2 \div 100100{,}001_2 = 10{,}001_2$ ✓ rem $\frac{100100111}{100100001}$

$= 2{,}1_8$ ✓

(Finale antwoord: 1 × 1 vir korrekte antwoord en 1 × 1 vir korrekte grondtal.
ALBEI MOET GEGEE WORD, m.a.w. TWEE punte of nul.) (6)

[18]

VRAAG 2

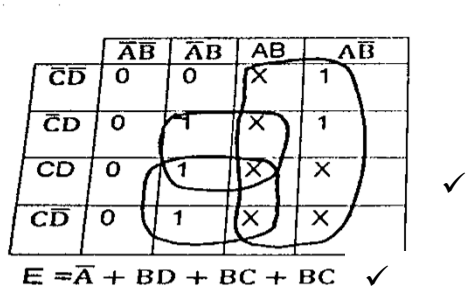
A¤	B¤	C¤	D¤	¤	E¤	F¤	G¤	H¤
0¤	0¤	0¤	0¤	¤	0¤	0¤	1¤	1¤
0¤	0¤	0¤	1¤	¤	0¤	1¤	0¤	0¤
0¤	0¤	1¤	0¤	¤	0¤	1¤	0¤	1¤
0¤	0¤	1¤	1¤	¤	0¤	1¤	1¤	0¤
0¤	1¤	0¤	0¤	¤	0¤	1¤	1¤	1¤
0¤	1¤	0¤	1¤	¤	1¤	0¤	0¤	0¤
0¤	1¤	1¤	0¤	¤	1¤	0¤	0¤	1¤
0¤	1¤	1¤	1¤	¤	1¤	0¤	1¤	0¤
1¤	0¤	0¤	0¤	¤	1¤	0¤	1¤	1¤
1¤	0¤	0¤	1¤	¤	1¤	1¤	0¤	0¤

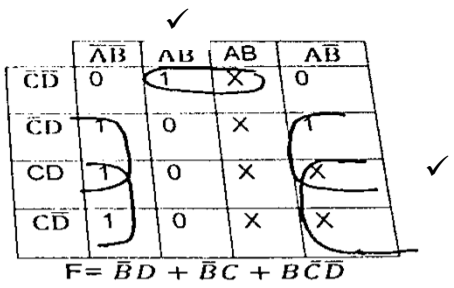
✓ ✓

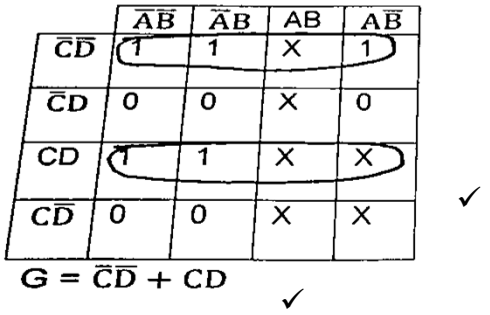
1010
1011
1100
1101
1110
1111

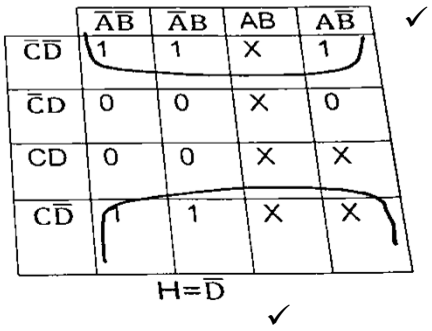
Don't cares (X's) ✓

(3)

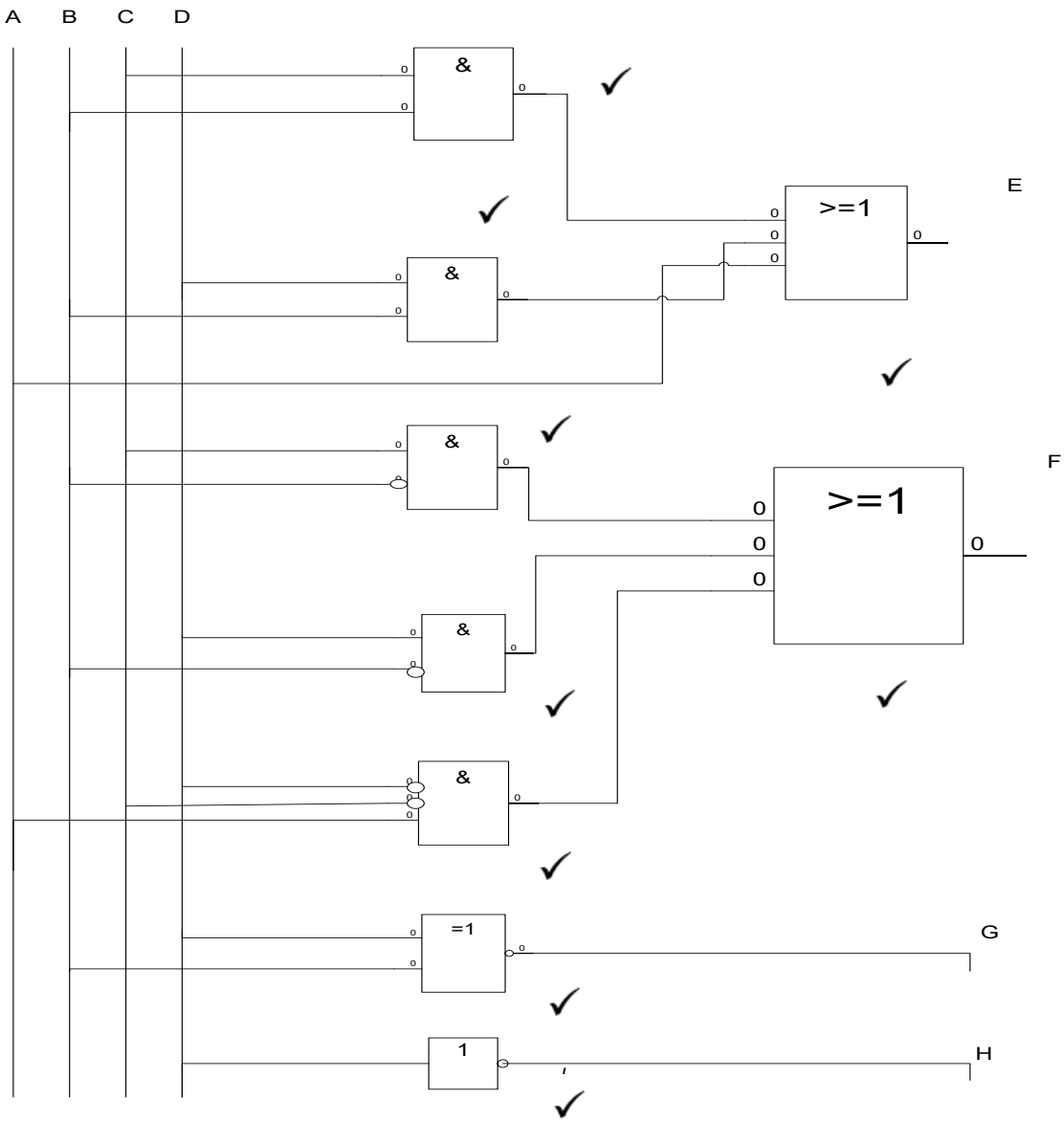

$E = \bar{A} + BD + BC + BC$


$F = \bar{B}D + \bar{B}C + B\bar{C}\bar{D}$


$G = \bar{C}\bar{D} + CD$


$H = \bar{D}$

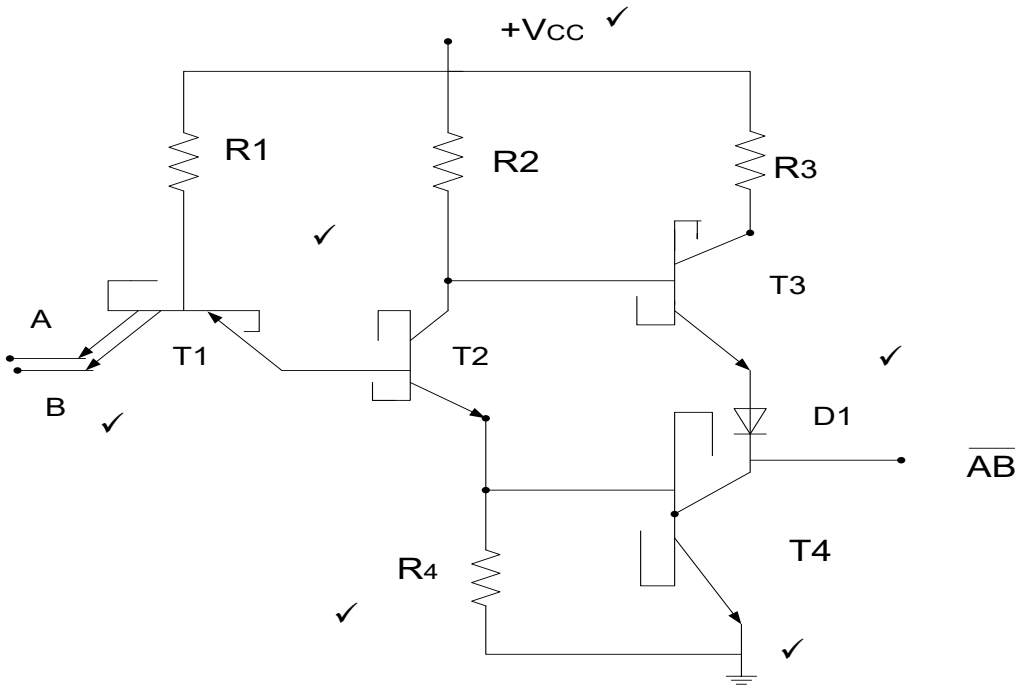
(8)


A
B
C
D
&
>=1
E
F
=1
G
1
H

(9)
[20]

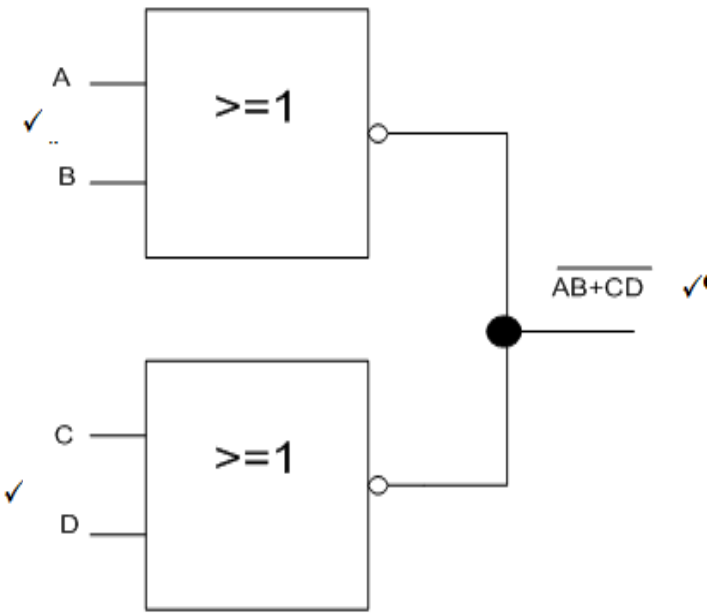
VRAAG 3

3.1



(6)

3.2



(3)

3.3 3.3.1 Dit is die maksimum geïnduseerde spanning wat 'n toestel kan hanteer sonder 'n valse verandering in afvoer.

3.3.2 Dit is die tydverskil tussen wanneer 'n toevoer op 'n hek toegepas word en wanneer dit by die afvoer van die hekke verskyn.

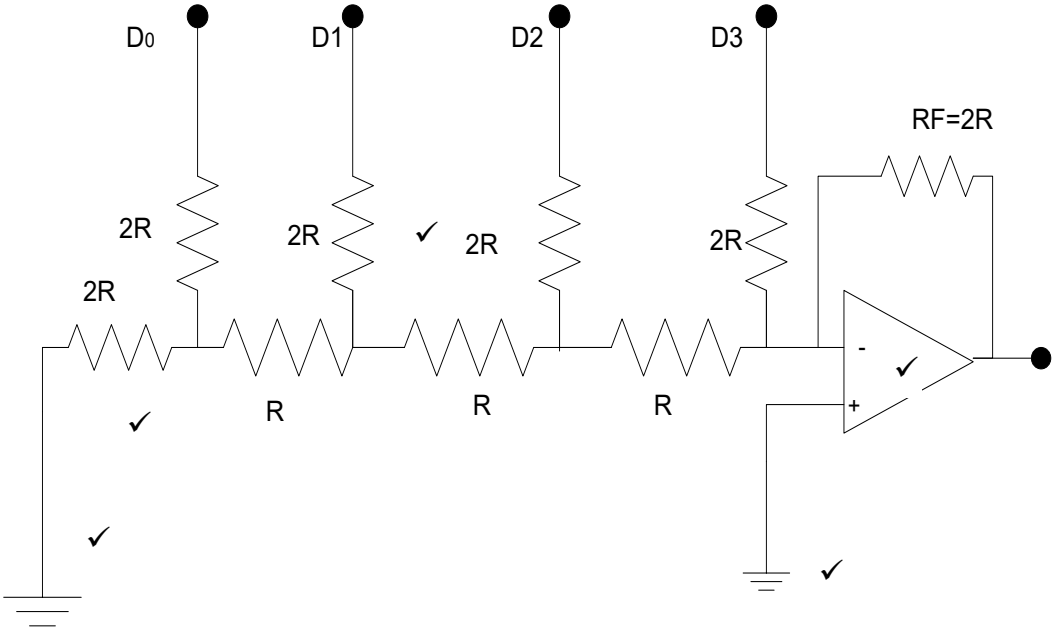
(2 × 2) (4)

[13]

VRAAG 4

4.1 $V_0 = \frac{A \times t \times V_{in}}{RC}$ ✓ = $\frac{1 \times 10^{-3} \times 1 \times 3\,672}{100 \times 10^3 \times 100 \times 10^{-6}}$ ✓ = 0,3672 V✓ (3)

4.2



(LET WEL: 2 × 1 punte vir korrekte kring)
(2 × 1 punte vir enige resistors met korrekte byskrifte)
(1 × 1 punt vir korrekte operasionele versterker) (5)

4.3 'n R/2R-leer-syfer-na-analoog-omsetter benodig slegs twee resistorwaardes. (1)

4.4 $V_0 = \frac{V_1 + 2V_2 + 4V_4 \cdots}{2^n - 1}$ (1)

[10]

VRAAG 5

5.1

5.1.1	E
5.1.2	F
5.1.3	H
5.1.4	B
5.1.5	A
5.1.6	D
5.1.7	I
5.1.8	C

(8 × 1) (8)

5.2 $\log m_{10} = \log_{10} 2^n$✓

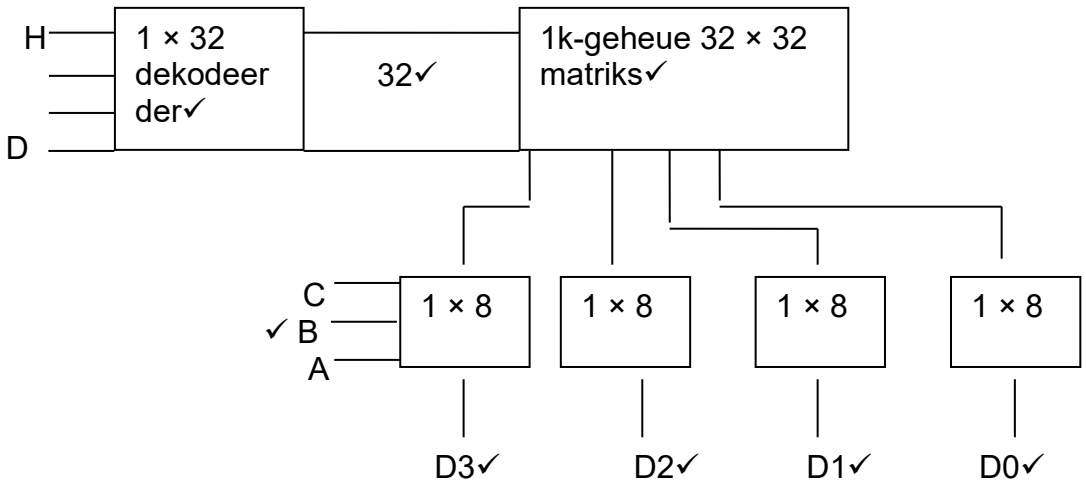
$\therefore \log m = n\log 2$

$\therefore n = \frac{\log m}{\log 2}$✓

$\therefore n = \frac{\log 16384}{\log 2}$✓

$\therefore n = 14$✓ (4)

5.3



(8)
[20]

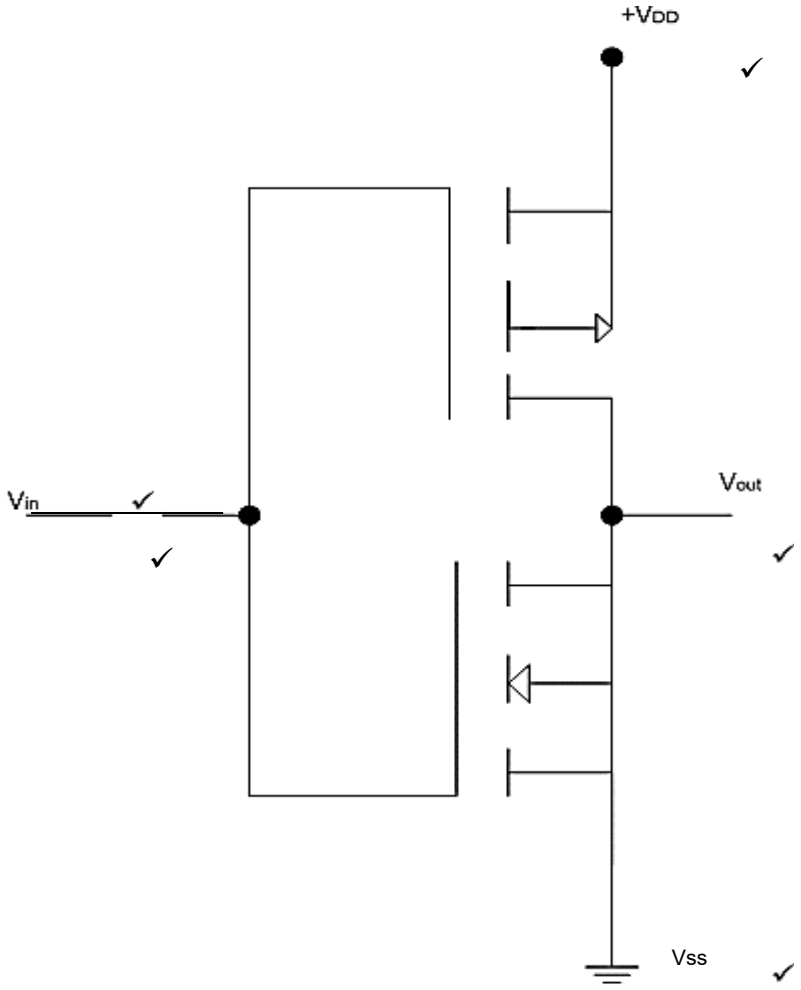
VRAAG 6

6.1
- Rekenaarskerms
- Drukkers
- Projektors
- Luidsprekers
- Speletjiebeheerders (Enige 2 × 1) (2)

6.2
- Sleutelbord
- Muis
- Stafiekode-leser
- Skandeerder
- Mikrofoon
- Raakskerm
- Digitale kamera (Enige 2 × 1) (2)

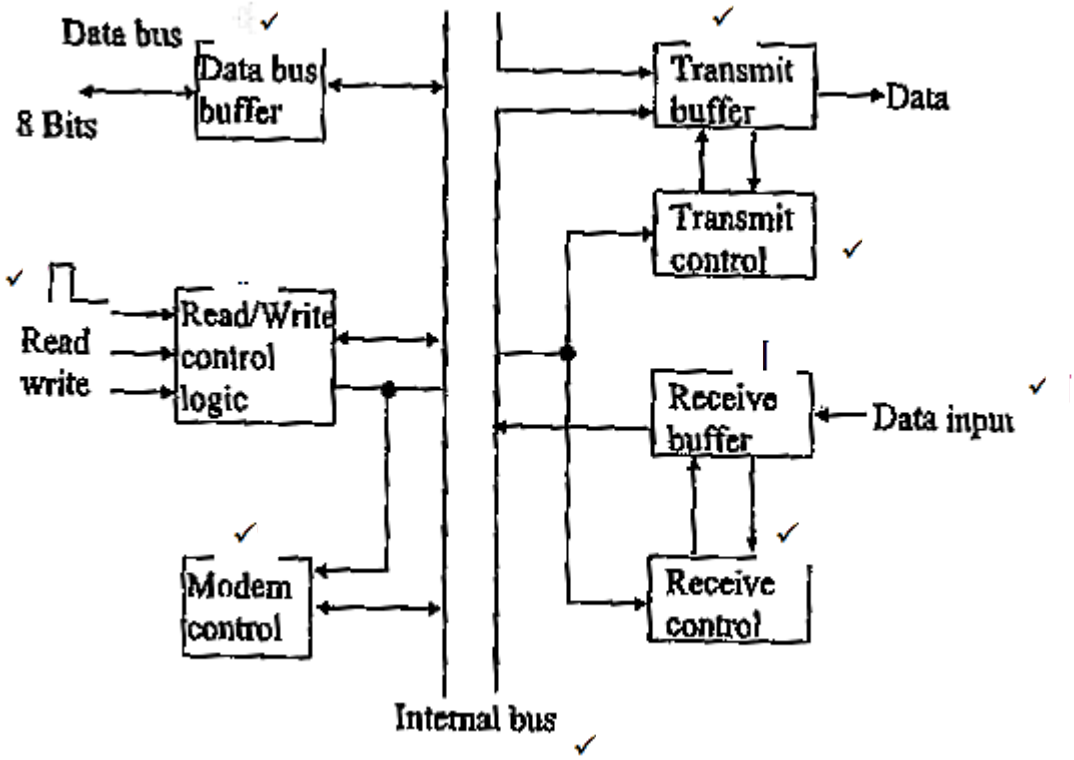
6.3
- Kettingdrukkers
- Dromdrukkers (2)

6.4



(LET WEL: 1 × 3 vir korrektheid van kring.)
(1 × 2 vir enige TWEE korrekte byskrifte.) (5)
[11]

VRAAG 7



[8]

TOTAAL: 100

Kopiereg voorbehou