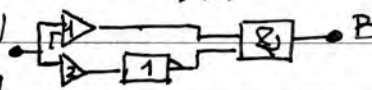


C.E. Havo - 2^e tijdvak - 18 juni 1996

Opgave 1 - Windmolen

1. Geveligheid = $\frac{4,6 - 1,1}{15 - 5} = 0,35 \text{ Vs/m}$
2. $V_{\text{ref},1} = 0,4 \text{ V}$, $V_{\text{ref},2} = 4,6 \text{ V}$
3. $\frac{3,70}{6,00} \times 256 = 157,9 \rightarrow 10011101$



Opgave 2 - Elektromotor

4. $F_L \uparrow$, $I \rightarrow B$
5. $F_L = N \cdot B \cdot I \cdot l \rightarrow I = \frac{F_L}{N \cdot B \cdot l} = \frac{1,6}{50 \cdot 0,25 \cdot 0,036} = 3,6 \text{ A}$
6. Door draaien van spoel verand. magn. flux $\rightarrow V_{\text{ind}} \rightarrow I_{\text{ind}}$

Opgave 3 - Uraan

7. ${}_{92}^{235}\text{U} + {}_0^1\text{n} \rightarrow {}_{38}^{90}\text{Sr} + {}_{54}^{144}\text{Xe} + 2 {}_0^1\text{n}$
8. $U = -\Delta m \cdot c^2 = 0,10\% \cdot 2,6 \cdot 10^{-5} \cdot (3,00 \cdot 10^8)^2 = 2,34 \cdot 10^9 \text{ J} \rightarrow \eta = \frac{7,4 \cdot 10^8}{2,34 \cdot 10^9} = 0,32 = 32\%$
9. $U = (365 \cdot 24 \cdot 3600) \cdot (5,0 \cdot 12) \cdot (4,18 \text{ MeV} \cdot 1,60 \cdot 10^{-19} \cdot 10^6 \text{ J/MeV}) = 1,265 \cdot 10^{13} \text{ J} \rightarrow D = \frac{U}{m} = \frac{1,265 \cdot 10^{13}}{0,200} = 6,3 \text{ mGy}$

Opgave 4 - Kwiklamp

10. $\frac{P_1}{T_1} = \frac{P_2}{T_2} \rightarrow P_2 = P_1 \cdot \frac{T_2}{T_1} = 82 \cdot \frac{273+60}{273+20} = 93 \text{ Pa}$
11. $\Delta U = h \cdot \frac{c}{\lambda} = 6,626 \cdot 10^{-34} \cdot \frac{3,00 \cdot 10^8}{436 \cdot 10^{-9}} = 4,56 \cdot 10^{-19} \text{ J} = \frac{4,56 \cdot 10^{-19}}{1,60 \cdot 10^{-19}} \text{ eV} = 2,85 \text{ eV}$ \downarrow 7,73 eV, 4,89 eV
12. $d \cdot \sin \alpha = k \lambda$: Voor bepaalde λ geldt: grotere afstand \rightarrow grotere $(\Delta) \alpha \rightarrow$ kleinere d .
13. $\frac{1}{2} m v^2 = 1,673 \cdot 10^{-18} \rightarrow v^2 = \frac{2 \cdot 1,673 \cdot 10^{-18}}{9,109 \cdot 10^{-31}} = 3,673 \cdot 10^{12} \rightarrow v = 1,917 \cdot 10^6 \text{ m/s}$

Opgave 5 - Geluidsbeelden

14. $1T \hat{=} \frac{9,2 \text{ cm}}{2} \hat{=} 4,6 \cdot 500 \mu\text{s} = 2,3 \text{ ms} \rightarrow f = \frac{1}{T} = \frac{1}{2,3 \text{ ms}} = 0,43 \text{ kHz}$
15. $\frac{1}{4} \lambda = l + 2,0 = 24,0 + 2,0 = 26,0 \text{ cm}$ - Bij f_1 : $\frac{3}{4} \lambda = 3 \cdot 26,0 = 78 \text{ cm} \rightarrow l' = 78,0 - 2,0 = 76,0 \text{ cm}$
16. Amplitude van A is kleiner dan die van B \rightarrow A verder weg van stemwerk
17. $\Delta \varphi = \frac{1}{2} \rightarrow 51,0 \text{ cm} = \frac{1}{2} \lambda \rightarrow v = f \cdot \lambda = 330 \cdot 2 \cdot 0,510 = 337 \text{ m/s}$

Opgave 6 - Naar 25 kV

18. $R = \rho \cdot \frac{l}{A} \rightarrow A = \frac{\rho \cdot l}{R} = \frac{17 \cdot 10^{-9}}{0,068} \cdot 2,0 \cdot 10^3 = 5,0 \cdot 10^{-4} \text{ m}^2 = 5,0 \text{ cm}^2$
19. $V_{\text{bovenl.}} = I \cdot R = 4,00 \cdot 10^3 \cdot 0,068 = 272 \text{ V} \rightarrow V_{\text{motor}} = 1500 - 272 = 1,23 \text{ kV}$
20. $Q = mc \Delta T \rightarrow \Delta T = \frac{Q}{mc} = \frac{24 \cdot 10^6}{9,0 \cdot 10^3 \cdot 0,387 \cdot 10^3} = 6,9^\circ\text{C}$
21. $P_{\text{motor}} = V \cdot I = \text{constant} \rightarrow$ bij grotere V kleinere $I \rightarrow$ i.v.m. $P = I^2 R$ in bovenl. minder warmte ontw.
22. $F = \frac{P}{v} = \frac{0,75 \cdot 8,0 \cdot 10^6}{250 \cdot 10^3 / 3,6} = 86 \text{ N} \rightarrow F_{\text{rol}} = F - F_{\text{lucht}} = 86 - 13 = 73 \text{ N}$

Opgave 7 - Gewichtsheffer

23. $\Delta U_z = mgh \rightarrow h = \frac{2,40 \cdot 10^3}{140 \cdot 9,81} = 1,75 \text{ m}$
24. $\bar{P} = \Delta U_z / \Delta t = \frac{2,40 \cdot 10^3}{0,59} = 4,1 \text{ kW}$
25. $\frac{1}{2} m v^2 = \frac{1}{2} m v_{\text{hor}}^2 + U_z = \frac{1}{2} \cdot 140 \cdot 1,2^2 + 2,40 \cdot 10^3 = 2500,8 \rightarrow v^2 = \frac{2500,8}{\frac{1}{2} \cdot 140} = 35,73 \rightarrow v = 6,0 \text{ m/s}$
26. $F = m \Delta v / \Delta t \rightarrow \Delta t = m \Delta v / F = 140 \cdot 1,2 / 400 = 0,42 \text{ s}$

