

晶片二甲

4a237019

黃家輝

$$1-6: R = P \frac{\rho}{A} = 1.7 \times 10^{-8} \times \frac{1.1 \times 10^{-3}}{1.5 \times 10^{-6}} = 1.24 \times 10^{-2} \Omega$$

$$1-7: \frac{E-V_1}{3} = \frac{V_1}{6} + \frac{V_1+11}{2} \quad 12-2V_1 = V_1 + 3V_1 + 3V_1 \quad -6V_1 + 11V_1 = -12$$

$$\frac{V_1-V_2}{2} = \frac{V_1-12}{8} + \frac{V_2}{8} \quad 4V_1 - 4V_2 = V_1 - 12 + V_2 \quad 4V_1 = 6V_2 - 12$$

$$-6V_1 + 3V_2 = -12$$

$$4V_1 - 6V_2 = -12$$

$$\textcircled{1} -12V_1 + 18V_2 = -24$$

$$-8V_1 = -56 \therefore V_1 = 7, V_2 = 10 \text{ V}$$

$$1-11: S \text{ 常閉接點} \Rightarrow \text{4.5A 電阻器} \therefore J = 0 \text{ H}$$

$$1-12: 2I_1 - 10I_2 - 10I_3 = 15$$

$$-10I_1 + 70I_2 - I_3 = 10$$

$$-10I_1 - I_2 + 20I_3 = -10$$

$$\therefore G_{11} + G_{21} + G_{31} = 21 + 20 + 20 = 61 \text{ H}$$

$$1-15: V_2(x): \begin{array}{|c|c|c|} \hline 2k & 1k & \\ \hline V_1 & & \\ \hline \end{array} \begin{array}{|c|c|c|} \hline 2k & & \\ \hline V_2 & & \\ \hline \end{array} \begin{array}{|c|c|c|} \hline 2k & & \\ \hline V_1 & & \\ \hline \end{array}$$

$$V_1 \times \frac{2}{2+2} \times \frac{2}{3} = V_1 \times \frac{2}{6} \times \frac{2}{3} = V_1 \times \frac{4}{9} \times \frac{2}{3} = \frac{8}{27} V_1$$

$$V_2(x): \begin{array}{|c|c|c|} \hline 2k & 2k & \\ \hline & & V_2 \\ \hline \end{array} \begin{array}{|c|c|c|} \hline 1k & & \\ \hline & & V_2 \\ \hline \end{array}$$

$$V_2 \times \frac{2}{3} = \frac{1}{2}$$

$$a+b = \frac{3}{4} \text{ H}$$

$$1-18: V \times \frac{2}{12} = 9, V = \frac{6}{2} = \frac{15}{2}, I_p = \frac{9}{8}$$

$$I_2 = \frac{15}{20} = \frac{3}{4}, I = \frac{3}{8} + \frac{3}{8} = \frac{3}{4} = 1 \text{ H}$$

$$1-19: \begin{array}{|c|c|c|} \hline 4 & 2 & 6 \\ \hline 3 & 5 & 4 \\ \hline \end{array} \begin{array}{|c|c|c|} \hline 4 & 5 & 5 \\ \hline 3 & 4 & 5 \\ \hline \end{array}$$

$$4 + \frac{5}{10} = 2 \text{ A H}$$

$$1-20: (6/113) + (6/112) = 2 + 4 = 6, I_1 = 9 \text{ A}$$

$$6:3:1:2, V+21=9, V=3, I_6=3 \text{ A}, I_3=6 \text{ A}, \therefore I=3 \text{ A}$$

1-22: $75 = \frac{100C_1}{C_1+C_2} - 15C_1 = 25C_1, C_1 = \frac{1}{3} C_2 = 11 \mu F \#$

1-23: $Q_T = C_1 V_1 + C_2 V_2 = (C_1 + C_2) V \Rightarrow V = \frac{2 \times 1 + 1 \times 2}{2+1} = \frac{4}{3} \#$

1-27: $\tau = RC = 30 \times 10^{-6} = 3 \times 10^{-5} \#$

$V_C(t) = V_{C0} \times e^{-\frac{t}{\tau}} = 5 \times 10^{-3} e^{-\frac{t}{3 \times 10^{-5}}} \#$

$i_C(t) = -i_C(t) = -C \frac{dV_C(t)}{dt} = -\frac{1.5}{3} \times 10^{-6} \times 5 e^{-\frac{t}{3 \times 10^{-5}}} = \frac{1}{6} e^{-\frac{t}{3 \times 10^{-5}}} \#$

$V_C(t = 3 \times 10^{-5}) = 5 \times e^{-1} = 5 \times e^{-1} \#$

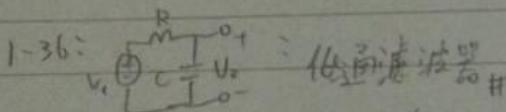
1-32: $\tau = RC = [(0.5/11) + 4] \times 10^3 + 10^6 = 10^6, V_C = 0 \#$

$V_C(t \rightarrow \infty) = 4 \times \frac{10}{15+10} = 16V \#$

$\Rightarrow V_C(t) = (0-16)e^{-\frac{t}{10^6}} + 16 = 16(1 - e^{-\frac{t}{10^6}}) V \#$

1-35: $Z = R // (-jX_C) = \frac{R \times (-jX_C)}{R - jX_C} = \frac{-j2500}{12 - jX_C} = \frac{2500 \angle -90^\circ}{5 \angle -45^\circ} = \frac{500 \angle -45^\circ}{1} \#$

$\Rightarrow I = \frac{V}{Z} = \frac{10 \angle 45^\circ}{500 \angle -45^\circ} = \frac{10 \angle 90^\circ}{500} = 4 \angle 45^\circ \#$



$f_p = \frac{\omega_p}{2\pi} = \frac{1}{2\pi RC} = \frac{10^6}{2\pi \times 220 \times 10^6} = 497.3 \approx 500 Hz \#$

$\downarrow B = -3 \#$

3-1: 若以能帶來論, 在OK時導電帶中的能態則是全空而無自由電子

僅電帶的能態被完全填滿而無空穴, 故無法導電

若以共價鍵來論, 在OK時所有的價電子均被拘束於共價鍵中

而無法挣脱與物外, 故不能導電

3-11: 導物電流是因為電位不均而有電場存在所產生的

極弱電流則是因為載子濃度不均所造成的

霍耳效應, Hall effect 在一半導性材料, 在x軸施加電壓, 在y軸

一電流I在z軸一磁場B, 所以會產生y軸電壓 V_H