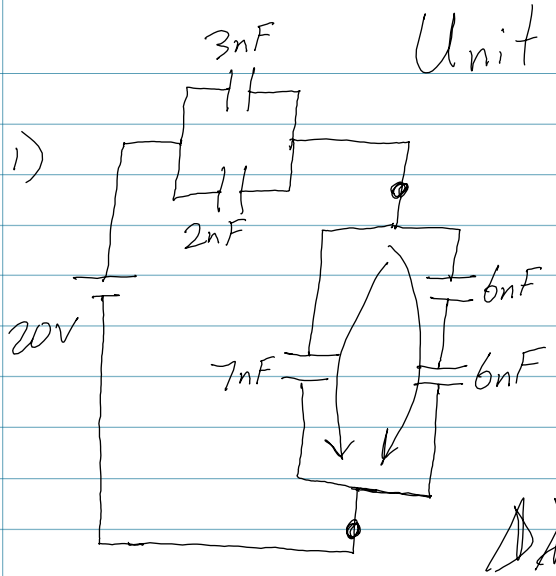
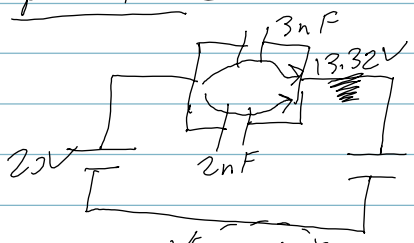
Unit 8

1)

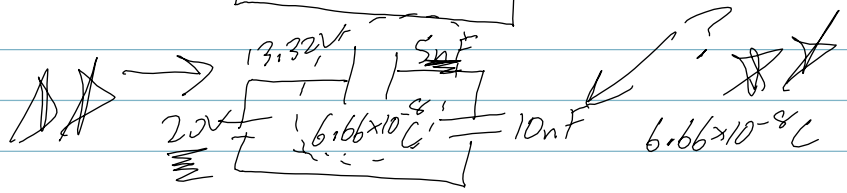


$\frac{1}{C_s} = \frac{1}{C_1} + \frac{1}{C_2} = \frac{1}{6} + \frac{1}{6} = \frac{2}{6}$ $\frac{6}{2} \Rightarrow 3nF$

$C_p = C_1 + C_2 = 7 + 3 = 10nF$

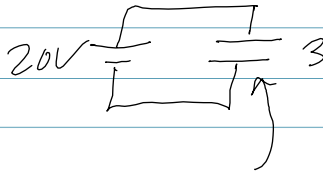


$3 + 2 = 5nF$



① $C_{eq} = ? \Rightarrow$ **3,33nF**

$\frac{1}{5} + \frac{1}{10} = \frac{3}{10}$ $\frac{10}{3} \Rightarrow 3,33nF$



② $Q_2 = ?$ $C = \frac{Q}{V}$ $3,33 \times 10^{-9} = \frac{Q}{20}$ $Q = 6,66 \times 10^{-8}C$

$C = \frac{Q}{V}$ $5 \times 10^{-9} = \frac{6,66 \times 10^{-8}}{V}$ $V = 13,32V$

$C = \frac{Q}{V}$ $2 \times 10^{-9} = \frac{Q}{13,32V}$ **$Q = 2,66 \times 10^{-8}C$**

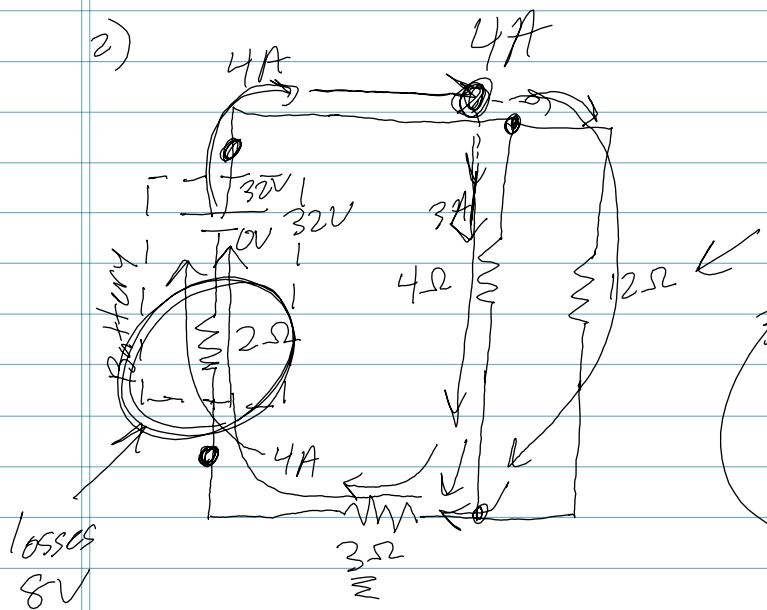
③ $Q_7 = ?$ $20 - 13,32 = 6,68V$ $7 \times 10^{-9} = \frac{Q}{6,68}$

$Q = 4,68 \times 10^{-8}C$

④ **$V_2 = 13,32V$**

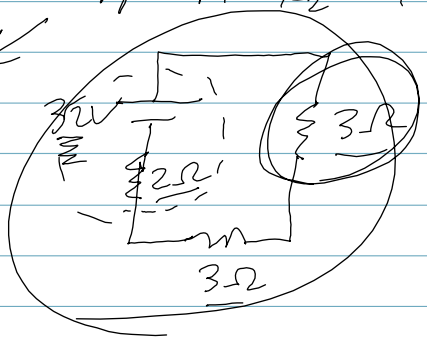
⑤ $U = \frac{1}{2} CV^2 = \frac{1}{2}(7 \times 10^{-9})(6,68)^2 =$ **$1,56 \times 10^{-7}J$**

2)



$I_3 = ?$

$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{4} + \frac{1}{12} = \frac{4}{12}$ $\frac{12}{4} = 3\Omega$



$R_s = R_1 + R_2 + R_3 = 3 + 3 + 2 = 8\Omega$

$I = \frac{V}{R} = \frac{32}{8} = \boxed{4A}$

$V_t = ?$ $I = \frac{V}{R}$ $4 = \frac{V}{2}$ $V = 8V$

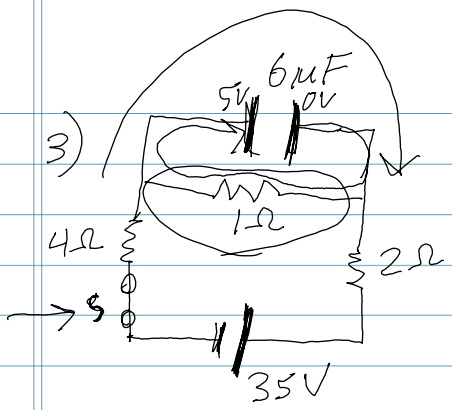
$32 - 8 = \boxed{24V}$

$I_4 = ?$ $4 = \frac{V}{3}$ $V = 12V$

$I = \frac{12}{4} = \boxed{3A}$

$P_{12} = ?$ $P = I^2R$ $P = IV$ $4 - 3 = 1A$ $P = 1^2(12) = 12W$ $P = 1(12) = \boxed{12W}$

3)



$I_{Batt} = ?$ $R_S = R_1 + R_2 + R_3 = 4 + 1 + 2 = 7\Omega = R_{Tot}$

$I = \frac{V}{R} = \frac{35}{7} = \boxed{5A}$

$Q_{6\mu F} = ?$ $I = \frac{V}{R}$ $5 = \frac{V}{1}$ $V = 5V$

$C = \frac{Q}{V}$ $6 \times 10^{-6} = \frac{Q}{5}$ $\boxed{Q = 3 \times 10^{-5} C}$

What happens when the switch "S" is opened?

So, the cap. provides voltage that cause current to flow through the 1Ω res. Over time the voltage on cap. dec. so I through 1Ω res. is also dec.