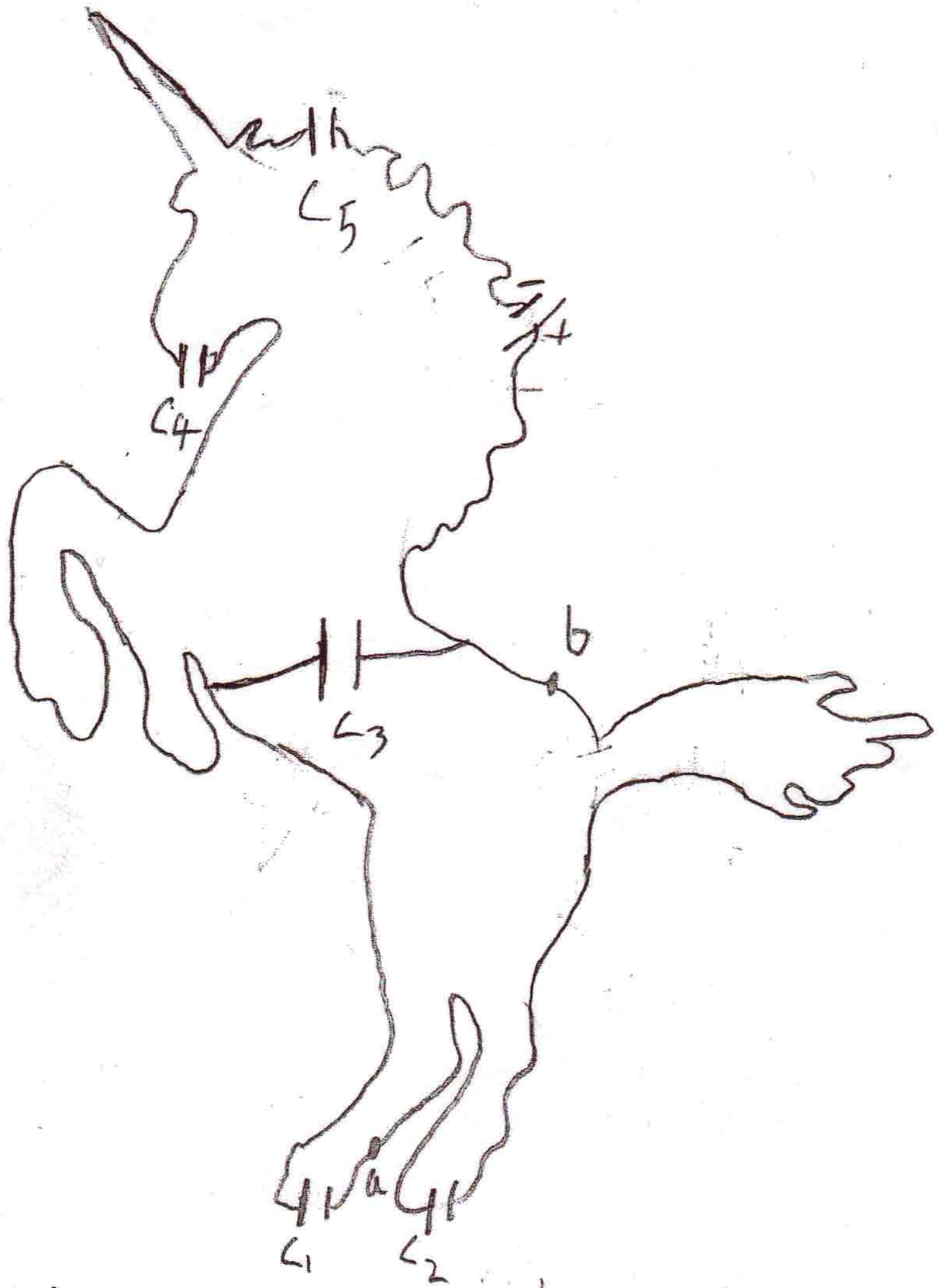
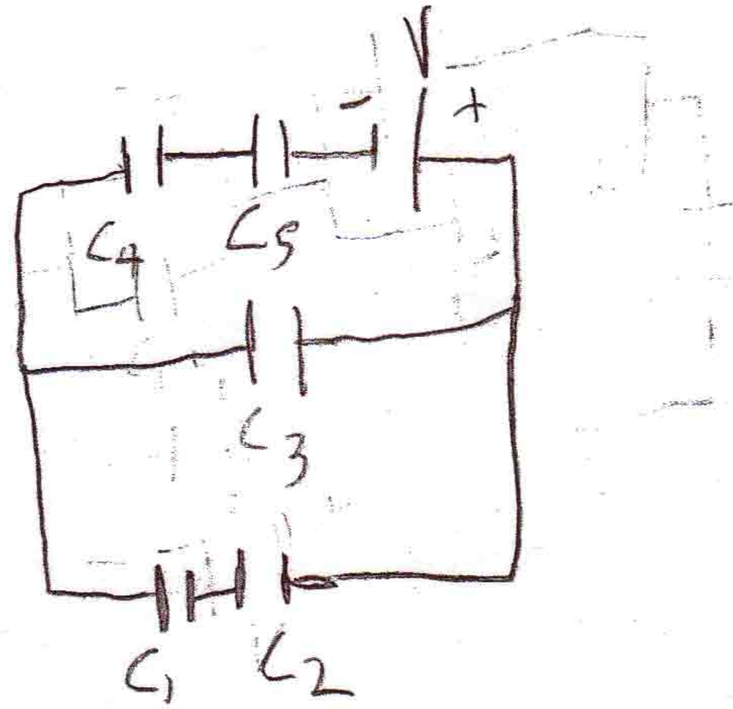




$C_1 = 6\ mF$

$C_2 = 4\ mF$

$C_3 = 7\ mF$

$C_4 = 4\ mF$

$C_5 = 2\ mF$

$V = 12\ V$

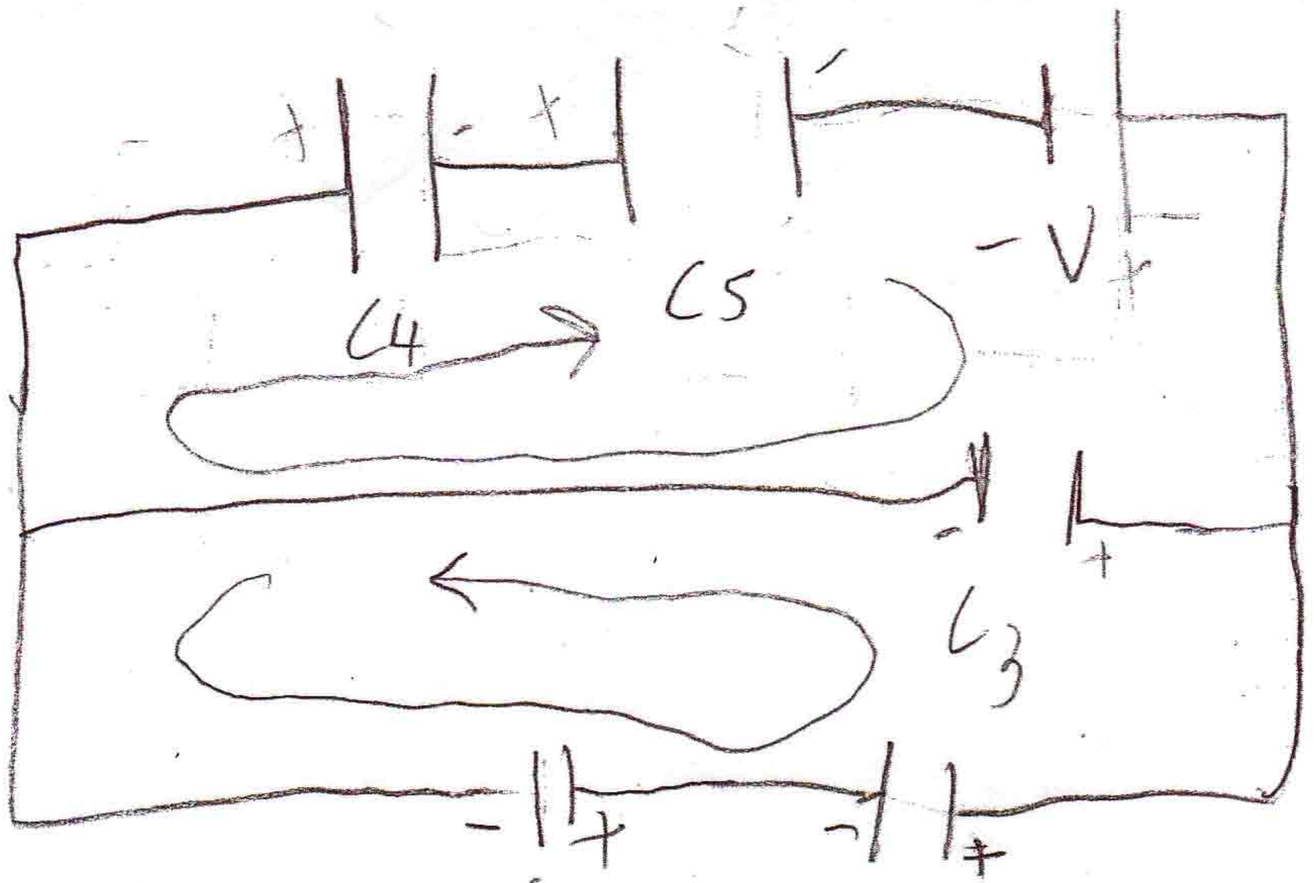
A)

$$\frac{1}{C_{12}} = \frac{1}{C_1} + \frac{1}{C_2} = \frac{1}{6} + \frac{1}{4} = 2.4$$

$$C_{123} = C_{12} + C_3 = 9.4$$

$$\frac{1}{C_t} = \frac{1}{C_{123}} + \frac{1}{C_4} + \frac{1}{C_5} = \boxed{1.17\ mF}$$

B)



$q_1 = 3.75\,\mu F$ $V_1 = .625\,V$

$q_2 = 3.75\,\mu F$ $V_2 = .845\,V$

$q_3 = 10.29\,\mu F$ $V_3 = 1.47\,V$

$q_4 = 14.04\,\mu F$ $V_4 = 3.51\,V$

$q_5 = 14.04\,\mu F$ $V_5 = 7.02\,V$

$q_t = 14.04\,\mu F$ $V_t = 12\,V$

$q = q_2 + q_3$

$q_2 = q_1$

$q_1 + q_3 = q_4$

$q_4 = q_5$

$q_5 = q$

$q = (12)(1.17\,\mu F)$

$q = 14.04\,\mu C = q_4 = q_5$

$V_4 = \frac{14.04\,\mu F}{4\,\mu F} = 3.51\,V$

$V_5 = \frac{14.04\,\mu F}{2\,\mu F} = 7.02\,V$

$V - V_3 - V_4 - V_5 = 0$

$12 = V_3 + 3.51 + 7.02$

$V_3 = 1.47\,V$

$q_3 = (1.47)(7\,\mu F) = 10.29$

C2

$V - V_3 - V_4 - V_5 = 0$

$V_1 + V_2 - V_3 = 0$

$q_1 = V_1 C_1$

$q_2 = V_2 C_2$

$q_3 = V_3 C_3$

$q_4 = V_4 C_4$

$q_5 = V_5 C_5$

$q = VC$

$q_2 = q_1 = q = q_3$

$q_2 = q_1 = 3.75\,\mu F$

$V_1 = \frac{3.75\,\mu F}{6\,\mu C} = .625$

$V_1 + V_2 - V_3 = 0$

$V_2 = V_3 - V_1$

$V_2 = .845$

c) $V_{ab} = V_2 = .845V$

d) Total energy if seperation is $L_5 = 10 \times 10^{-6}$ m

Find the electric field

$$U_{tot} = \frac{1}{2} C_{eq} V^2 = \frac{1}{2}(1.17\mu F)(12)^2 = \boxed{84.24\mu F}$$

$$E_5 = \frac{V_5}{d_5} = \frac{7.02}{10 \times 10^{-6}} = 702000$$