Physics Homework.

1 $Q = CV$

$V_1 = \frac{Q_1}{C_1} = \frac{8.3 \times 10^{-6}}{5.6 \times 10^{-6}}$

$V_1 = 1.482\ V$

2. $W_2 = 4.3 \times 10^{-6}$

But, $W = \frac{1}{2} C_2 V_2^2 = 4.3 \times 10^{-6}$

$V_2 = 2.48\ V$

3. $Q_2 + Q_3 = Q_1$

$C_2V_2 + C_3V_3 = C_1V_1$

$V_3 = \frac{Q}{C} = \frac{4.828}{1.4}$

$V_3 = 3.45\ V$

4. $Q_2 + Q_3 = Q_1$

$Q_3 = Q_1 - Q_2 = (8.3 - 3.472) \times 10^{-6}$

$Q_3 = 4.828 \times 10^{-6} C$

5. For series Connection.

Equivalent Capacitance, C_T

$$C_T = \frac{1}{\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \frac{1}{C_4} + \frac{1}{C_5}}$$

$$= \frac{1}{\frac{1}{0.7} + \frac{1}{1.9} + \frac{1}{3.8} + \frac{1}{6.4} + \frac{1}{6.4}}$$

$= 0.395 \times 10^{-6} F$

6 $V = 7V$

$C = 3.8 \times 10^{-6} F$

Charge $Q = CV$

$= 7 \times 3.8 \times 10^{-6}$

$= 26.6 \times 10^{-6} C$

7 $C = 3.8 \times 10^{-6} F$

Given $Q = 26.6 \times 10^{-6}$

then $V = \frac{Q}{C} = \frac{26.6 \times 10^{-6}}{3.8 \times 10^{-6}}$

$= 7\ V$

8 Energy $= \frac{1}{2} CV^2$

$= \frac{1}{2} 3.8 \times 10^{-6} \times 7^2$

$= 93.1 \times 10^{-6} J$

9. Capacitors in Parallel:

Equivalent Capacitance $C_T =$

$C_T = C_1 + C_2 + C_3 \cdots C_n$

$= (0.7 + 1.9 + 3.8 + 6.4 + 6.4) \times 10^{-6}$

$= 19.2 \times 10^{-6} F$

10 $C = 3.8 \times 10^{-6} F$.

$V = 7 V$.

$Q = CV$

$= (3.8 \times 7) \times 10^{-6} C$

$= 26.6 \times 10^{-6} C$.

11. P.D $= V$

$V = \frac{Q}{C} = \frac{26.6 \times 10^{-6} C}{4.0 \times 10^{-6} F}$

$= 6.65 V$

12. $E = W = \frac{1}{2} CV^2$

$C = 19.2 \times 10^{-6} F$

$V = 6.65 V$

$= \frac{1}{2} 19.2 \times 10^{-6} \times 6.65^2$

$= 424.5 \times 10^{-6} J$

13. $R_E = R_1 + R_2$

$= (7 + 11.4) \quad = 18.4 \Omega$

14. $R_E^{-1} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{7} + \frac{1}{11.4}$

$R_E = \frac{1}{0.23}$

$= 4.34 \Omega$

15 $R_E = \frac{1}{R_1 + R_2} + \frac{1}{\frac{1}{R_1} + \frac{1}{R_2}}$

$= 4.34 + 4.34$

$= 8.67 \Omega$

16. $R_E = R_1 + R_2 = 18.4 \Omega$

$V = 4.6 V$.

Current $I = \frac{V}{R} = \frac{4.6}{18.4}$

$= 0.25 A$

17 $P_{watt} = \frac{V^2}{R_E} = \frac{4.6^2}{18.4}$

$= 1.15 W$.

18 $P_{R_1} = \frac{V^2}{R_1} = \frac{4.6^2}{7}$

$= 3.02 W$

19. $P_{R_2} = \frac{V^2}{R_2} = \frac{4.6^2}{11.4}$

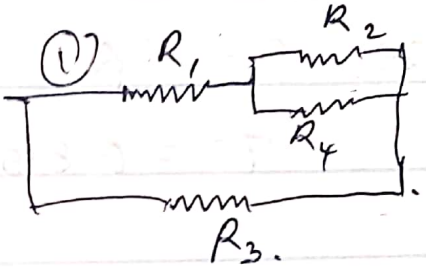
$= 1.86 W$

20. $I = \frac{V}{R}$

$I_{R_1} = \frac{R_1}{R_1 + R_3} I_s \qquad I = \frac{4V}{2\Omega} = 2A$

21. $R_{Tot} \Rightarrow$

$\frac{1}{R_{Tot}} = \frac{1}{R_3} + \frac{1}{R_1 + R_4}$



① $\left(\frac{1}{R_2} + \frac{1}{R_4}\right)^{-1} + R_1 +$

$= 3.43 + 2 = 5.43\Omega$

$= R_3 = 12\Omega$

$\frac{1}{R_{Tot}} = \frac{1}{5.43} + \frac{1}{12}$

$= 3.74\ \Omega$

22. $I = \frac{V}{R} = \frac{4}{3.74} = 1.07A$

$= 1.07\ A$

23. $I_{R_2} = \frac{R_2}{R_1 + R_3} I$

$= 0.459\ A.$

24. $P = \frac{V^2}{R} = IV$

$$I = \frac{P}{V} = \frac{75\,W}{92\,V} = 0.815\ A$$

25. $P = I^2 R$

$$75 = 0.815^2 R$$

$$R = 112.9\ \Omega$$

26. $R = \frac{R_1}{2} = \frac{112.9}{2} = 56.45\ \Omega$.

$V = 92\,V$.

$$P = \frac{V^2}{R} = \frac{92^2}{56.45} = 149.9\ W$$

$\simeq 150\ W$

27. The higher the Power, the lower the resistance.

28. $I_1 = \frac{e_1}{R_1} = \frac{8V}{110\,\Omega} = 0.0727\ A$

29. $I_3 = I_1 + I_2$

$$I_2 = \frac{5}{80} = 0.0625$$

$$I_3 = 0.135\ A$$

30. $Q = CV$

$= 135 \times 10^{-6} \times 9V$

$= 1215 \times 10^{-6} C$

$I = \frac{V}{R} = \frac{9}{55000} = 163.6 \times 10^{-6} A.$

$I = \frac{Q}{T}$

$T = \frac{Q}{I} = \frac{1215 \times 10^{-6}}{163.6 \times 10^{-6}} = \underline{7.43\ s}$ for 9V.

$T = \frac{675}{163.6} = \underline{4.13\ s}$ for 5V

31. $V_c = \frac{Q}{C} = 9V$

32 $Q = CV = 135 \times 10^{-6} \times 9$

$= \underline{1215 \times 10^{-6} C.}$

33. $E_c = \frac{1}{2} CV^2 = \frac{1}{2} (135 \times 10^{-6}) \times 9^2$

$= \underline{54.67 \times 10^{-4} J}$

34. $T = 3.2\ \mu Sec.$

$= 3.2 \times 10^{-6} S$ $\quad P_B = \left(\frac{Q}{t}\right) V = \frac{1215 \times 10^{-6}}{3.2 \times 10^{-6}} \times 9$

$= \underline{3417.19\ W}$