(1)

$q_1 = 8.3 \times 10^{-6} C$

$C_1 = 5.6 \times 10^{-6} F$

$C_2 = 1.4 \times 10^{-6} F$

Energy stored on C_2 is $U_2 = 4.3 \times 10^{-6} J$

Potential difference C_1

$q_1 = V_1 C_1 \quad V_1 = q_1 / C_1$

$V_1 = \frac{8.3 \times 10^{-6}}{5.6 \times 10^{-6}} = 1.4821 V \simeq 1.48 V$

(2)

$V_2 = \sqrt{q_2 / C_2} = \left(\sqrt{2 \cdot q_2 / 1.4 \times 10^{-6}} \right) = 1.48 V$

$= \sqrt{\frac{(2 \times 4.3 \times 10^{-6})}{1.4 \times 10^{-6}}} = 2.4785 \simeq 2.48 V$

$= 2.48 V$

Since C_2 and C_3 are in parallel.

(3)

$V_3 = V_2 = 2.48 V$

$V_3 = 2.48 V = 2.48 V$

(4)

$q_3 = q_1 - q_2$

$q_2 = C_2 V_2$

$1.4 \times 10^{-6} \times 2.48 = 3.472 \times 10^{-6}$

$q_2 = 3.47 \times 10^{-6}$

$q_3 = 3.3 \times 10^{-6} - 3.47 \times 10^{-6}$

$= 4.83 \times 10^{-6} C$

$= 4.83 \times 10^{-6} C$

Q5 $\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \frac{1}{C_4} + \frac{1}{C_5}$

$\frac{1}{C} = \frac{1}{0.7\times10^{-6}} + \frac{1}{1.4\times10^{-6}} + \frac{1}{3.8\times10^{-6}} + \frac{1}{6.4\times10^{-6}} + \frac{1}{6.4\times10^{-6}}$

$= 2.53 \times 10^{6}$

$C = \frac{1}{2.53\times10^{6}} = 0.395 \times 10^{-6}\ F \Rightarrow 0.395\times10^{-6}\ F$

Q6 $Q = ?\quad V = 7V$

$Q = CV = 0.395\times10^{-6} \times 7 = 2.765\times10^{-6}\ C$

$= 2.765 \times 10^{-6}\ C \simeq 2.765\times10^{-6}\ C$

Q7 $V = ?\quad \frac{Q}{C_3} = \frac{2.765\times10^{-6}}{3.8\times10^{-6}} = 0.7276V$

$= 0.7276V \qquad 0.7276\ V$

Q8 Energy $= \frac{1}{2} CV^2$

$= \frac{1}{2} \times 0.395 \times 10^{-6} \times 7^2$

$9.6775 \times 10^{-6} J$ $9.6775 \times 10^{-6} J$

Q9 Capacitors parallel. $C = C_1 + C_2 + C_3 + C_4 + C_5$

$0.7 \times 10^{-6} + 1.9 \times 10^{-6} + 3.8 \times 10^{-6} + 6.0 \times 10^{-6} + 6.8 \times 10^{-6}$

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

Q10 $V = 7V$

$3.8 \times 10^{-6} \times 7 = 26.6 \times 10^{-6} C \Rightarrow 26.6 \times 10^{-6} C$

Q11 $4.0 \times 10^{-6} F$

$V = 7V \Rightarrow 7V$

Q12 $\frac{1}{2} C_2 V^2$

$= \frac{1}{2} \times 14.2 \times 10^{-6} \times 7^2$

$= 470.4 \times 10^{-6} J$

$= 470.4 \times 10^{-6} J \Rightarrow 470.4 \times 10^{-6} J$

Q13 $R_t = R_1 + R_2$

$= 7 + 11.4 = 18.4 \Omega \Rightarrow 18.4 \Omega$

Q14 $R_t^{-1} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{7} + \frac{1}{11.4} = 6.23$

$= 4.34 \Omega = 4.34 \Omega$

Q15 $R_{12} = \frac{R_1 \times R_2}{R_1 + R_2} = \frac{11.4 \times 7}{11.4 + 7} = \frac{79.8}{18.4}$

$H = Y_2 = 3.5$ $= 4.337 + 3.5 = 7.84 \Omega$

$= 7.84 \Omega$

Q16 $V = 4.6V$

$I = V/R = 4.6/12\Omega$

$= 0.25A$

Q17 $V^2/R_L = 4.6^2/18\Omega = 1.15W$

Q18 $P_{R_1} = I^2 R_1 = (0.25)^2 \times 7$

$= 0.4375W$

Q19 $P R_2 = I^2 R_2 = (0.25)^2 \times 11$

$= 0.7125W$

Q20 $I = 4V/2\Omega = 2A$ -

Q21 $R_{tot} = ?$

R_2 and $R_4 = \frac{R_2 \times R_4}{R_2 + R_4} = \frac{6 \times 3}{14} = \frac{24}{7}\ \Omega$

$R_{243} = \frac{24}{7} + \frac{12}{7} = \frac{24+87}{7}$

$R_{243} = \frac{103}{7}$

$R_{eq} = \frac{\frac{103}{7} \times 2}{\frac{103}{7} + 2} = 1.7705\ \Omega$

$= 1.7705\ \Omega$

Q22 Current supplied by battery

$= \frac{4}{1.7705} = 2.2592$

$= 2.2592\ A$

$\Rightarrow 2.2592\ A$

Q23 R_2? $\frac{V_{24}}{R_2} = \frac{0.96}{6} = 0.16\ A$

$= 0.16\ A$

Q24 $I = P/V = 75/92 = 0.815\,A$

Q25 $75 = I^2R$

$R = 92/0.815^2$

$= 112.9\,\Omega$

$= 112.98\,\Omega \simeq 112.88\,\Omega$

Q26 $P/2 = 112.88/2 = 56.44$

$= 92^2/56.44 = 149.938\,W$

$\simeq 149.9\,W = 149.96\,W$

Q27 The higher the power, the lower the resistance

Q22 $R_1 = 1\Omega \quad R_2 = 4\Omega \quad R_3 = 4\Omega \quad R_4 = 5\Omega$

$I_1 = 0.031\,A$

Q_{29} $I_2 = 0.02\,A$

Q_{30} $R = 55\,k\Omega \qquad V = 9\,V$

$C = 135\,\mu F \qquad [V?$

$T_1 = 6.02\ sec$

Q_{31} $V = 9\,V$

Q_{32} $135 \times 9 = 1215\,\mu C$

Q_{33} $\frac{1}{2} \times 135\,\mu^{-6} = 5.47 \times 10^{-3}\,J$

Q_{34} $\frac{5.47 \times 10^{-3}}{3.2 \times 10^{-6}} = 1709.375$