Chapter - 7.

① $N_1 = 100$ $N_2 = 600$

$V_1 = 120V$ $V_2 = ?$

$I_1 = 12A$ $I_2 = ?$

$$K = \frac{N_2}{N_1} = \frac{600}{100} = 6$$

$V_2 = KV_1$

$V_2 = 6 \times 120$

$= 720V$

$I_2 = I_1/K$

$I_2 = 12/6$

$I_2 = 2A$

②. $V_1 = 240V$ $V_2 = 12V$

$I_1 = ?$ $K = ?$ $I_2 = 40A$

$V_2 = KV_1$

$K = V_2/V_1$

$$K = \frac{12}{240} = \frac{1}{20}$$

$$\frac{N_2}{N_1} = \frac{1}{20}$$

$$I_2 = \frac{I_1}{K}$$

$\cancel{K = \frac{I_1}{I_2}}$ $I_1 = KI_2$

$$I_1 = \frac{1}{20} \times 40$$

$I_1 = 2A$.

3.

K in term of impedence = $K = \sqrt{Z_2/Z_1}$

- P.N - Junction - ~~Diode~~

$V_B = ?$

$a = 100°C$ $b = 0°C$

$t = 25°C$ $0.7V$

(a).

$\Delta V_B = -0.002\,\Delta t$

$\Delta t = t_2 - t_1$

$\Delta t = 100 - 25° = 75°$

$\Delta V_B = -0.002 \times 75° = -0.015V$

V_B at $100°C = 0.7 + -0.015V$

$0.7 - 0.015V$

$= 0.55V$

(b).

$\Delta V_B = -0.002\,\Delta t$

$\Delta t = 0° - 25°$

$\Delta t = -25°$

$\Delta V_B = -0.002 \times (-25°)$

$= 0.05V$

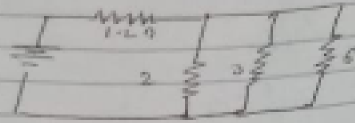
V_B at ~~25~~ $0°$

$V_B = 0.7 + 0.05$

$= 0.75V$

$R_{eq} = ?$
$I = ?$

branch current.



- Voltage drop across R_1

  - $V_{R_1} = 5 \times 0.2 = 1\,V$
    Current through R_1 will be same because it is in series.

- Voltage across R_{234} will be same because they are in parallel which is 5V.

- Current throug R_2

  $I_{R_2} = V/R \Rightarrow 5/2 = 2.5A$

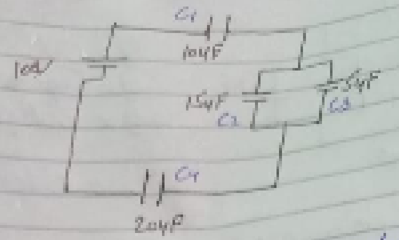
- Current through R_3

  $I_{R_3} = \frac{V}{R} \Rightarrow \frac{5}{3} = 1.66\,A$
  $= 1.7A$

- Current through R_4

  $I_{R_4} = \frac{V}{R} \Rightarrow 5/6 \Rightarrow 0.83\,A$
  $0.8A$

1)



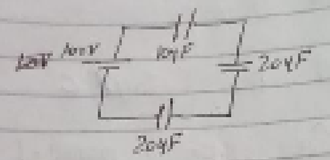
$C_{eq} = ?$

$q = ?$

C_2 and C_3 are paralel so,

$C_{23} = C_2 + C_3$

$= 15 + 5 \Rightarrow$ ~~20μF~~ $20\mu F$



No all are in series so,

$$\frac{1}{C_{eq}} = \frac{1}{10} + \frac{1}{20} + \frac{1}{20}$$

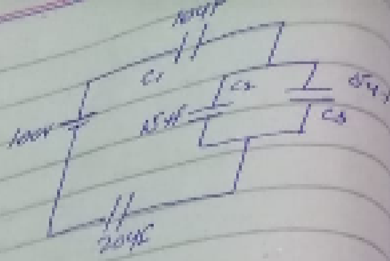
$$= \frac{2+1+1}{20} = 4/20$$

$$C_{eq} = 20/4 = 5\mu F$$

- Now lets find charge through each capacitor but we have to find voltage drop across each capacitor.

- Voltage is same for parallel but it is devided in series as ~~current~~ Charge is alternative of it.

Total Charge:



1)

$Q = CV$
$Q_T = C_T V$
$= 5 \times 100$
$= 500 \mu C$

Let calculate charge through each capacitor.

Charge through C_1 will be same because it is connected in series. that is $500 \mu C$.

Charge through C_2, and C_3 will be obtained by formula,

- $Q_2 = Q_T\left(\frac{Q_2}{Q_2+Q_3}\right)$
  $= 500\left(\frac{15}{20}\right) = 375 \mu C.$

- $Q_3 = Q_T\left(\frac{Q_3}{Q_2+Q_3}\right)$
  $Q_3 = 500\left(\frac{5}{20}\right) = 125 \mu C$

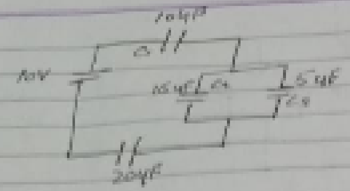
- Charge through C_4 will $500 \mu C$ as it is in series.

Voltage through each capacitor.

Voltage drop across C_1

$Q = CV$
$V = Q/C$

$\Rightarrow \frac{500}{10} \Rightarrow 50$ volts



$Q = CV$
$Q = 5\mu F \times 10$
$Q = 50\mu C$

$\because$ C (columb)

Voltage drop across ~~ϕ~~ C_1

$Q = CV$, $V = Q/C$

$V_{c_1} = \frac{50}{10} = 5$ volts

Current will be 50μ C

C_2 and C_3 are parallel to each other so voltage will be same which is 5 volts be charge (q) will be devided.

Charge through C_2

~~$Q_{c_2} = C_2/V \Rightarrow \frac{15}{5} = 3\mu C$~~

~~Charge through C_3~~

~~$Q_{c_3} = \frac{C_3}{V} = \frac{5}{5} = 1\mu C$~~

$Q_{c_2} = Q_T\left(\frac{C_2}{C_2+C_3}\right)$

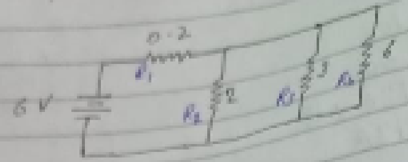
$= 50\left(\frac{15}{20}\right) \Rightarrow 37.5\mu C$

$= 50\left(\frac{5}{20}\right) \Rightarrow \underline{\underline{12.5}}$

$R_{eq} = ?$
$I = ?$

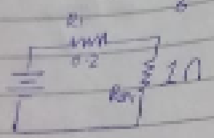
Paper - 2018
Numericals

1)

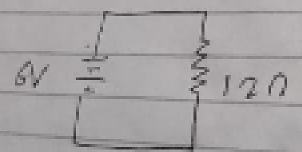


R_2, R_3, R_4 are in parallel so,

$$\frac{1}{R_{234}} = \frac{1}{2} + \frac{1}{3} + \frac{1}{6}$$
$$= \frac{3+2+1}{6} = 6/6 = 1\Omega$$



$$R_{eq} = 0.2 + 1$$
$$= 1.2\Omega$$



Current $I = V/R \Rightarrow \frac{6}{1.2} = 5A$

Power $P = VI \Rightarrow 6 \times 5 = 30$ watt
$= I^2R \Rightarrow 5^2 \cdot 1.2 = 30$ watt

- If short circuit happens infinite current will flow through the circuit.