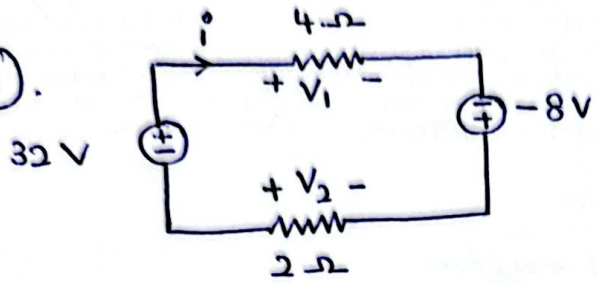
Assignment - 1

① .



→ Use Kirchhoff's Voltage Law (KVL)

$-32V + V_1 + (-8V) + V_2 = 0$

→ Use Ohm's Law,

$V_1 = 4\Omega \cdot i \qquad V_2 = 2\Omega \cdot i$

$-32 + 4i - 8 + 2i = 0$

$-40 + 6i = 0$

$6i = 40$

$i = \frac{40}{6} = 6.67A.$

→ $V_1 = 4 \times (6.67)$

$V_1 = 26.67V$ //

→ $V_2 = 2i$

$V_2 = 2(6.67)$

$V_2 = 13.33V$ //

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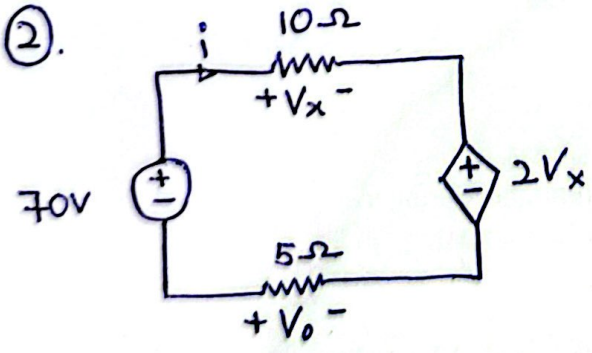
② .



$V_0 = 5 \cdot i = 5(2) = 10V$ //

$V_x = 10 \cdot i = 10(2) = 20V$ //

$2V_x$ → KVL →

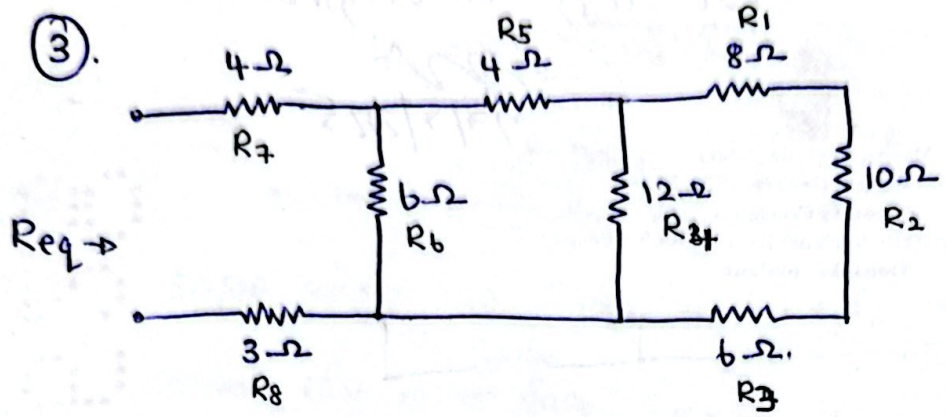
$-70V + 10i + 2V_x + 5i = 0$

$10i + 2(10i) + 5i = 70$

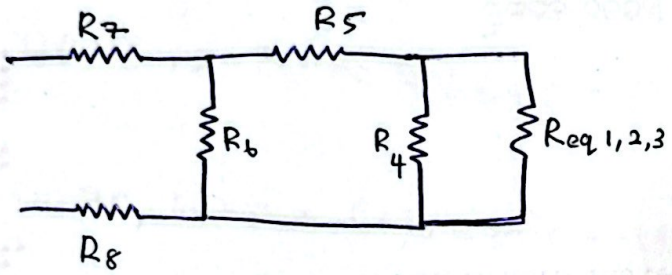
$35i = 70$

$i = \frac{70}{35} = 2A$

(3).

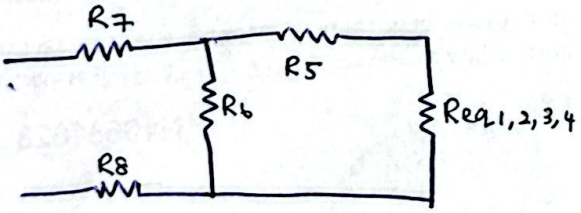


$R_1, R_2, R_3 \rightarrow Req_{1,2,3} = R_1 + R_2 + R_3 = 8 + 10 + 6 = 24\,\Omega$

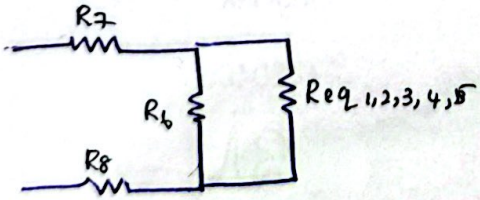


$$Req_{1,2,3}, R_4 \rightarrow Req_{1,2,3,4} = \frac{(Req)(R_4)}{(Req)+(R_4)} = \frac{(24)(12)}{(24)+(12)} = \frac{(24)(12)}{36_3}$$

$$Req_{1,2,3,4} = 8\,\Omega$$



$Req_{1,2,3,4,5} = R_5 + Req = 4 + 8 = 12\,\Omega.$



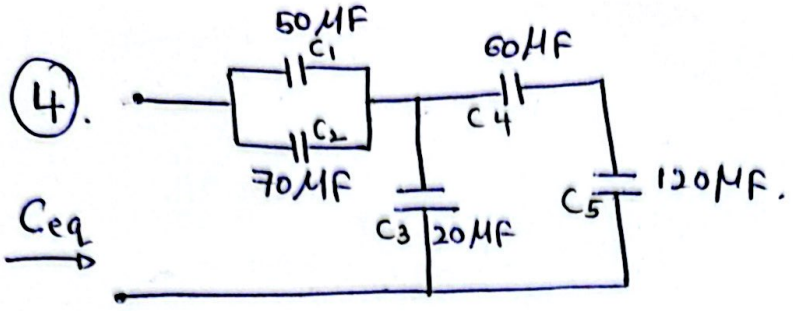
$$Req_{1,2,3,4,5,6} = \frac{(R_6)(Req)}{(R_6)+(Req)} = \frac{6 \times 12}{18} = 4\,\Omega$$

$Req_{1,2,3,4,5,6,7,8} = R_7 + R_8 + Req_{1,2,3,4,5,6}$

$= 4 + 3 + 4 = \underline{11\,\Omega}$

$\therefore \underline{Req = 11\,\Omega}$

(4).



50MF, 70MF ⇒ $C_{eq_{1,2}} = C_1 + C_2 = 50 + 70 = 120\mu F.$

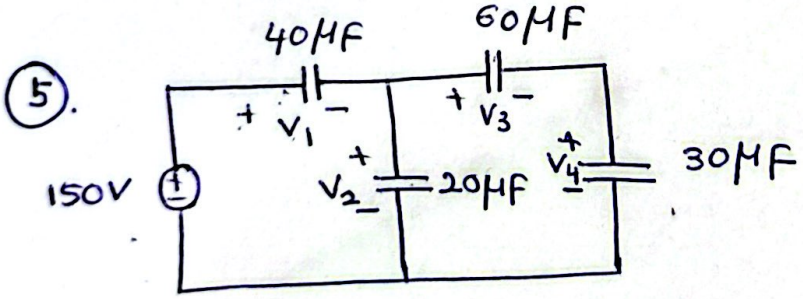
60MF, 120MF ⇒ $C_{eq_{C4,5}} = \frac{(C_4)(C_5)}{C_4+C_5} = \frac{(60)(120)}{180} = 40\mu F$

40MF, 20MF ⇒ $C_{eq_{3,4,5}} = C_3 + C_{eq_{4,5}} = 20 + 40 = 60\mu F.$

120MF, 60MF ⇒ $C_{eq_{1,2,3,4,5}} = \frac{(R_{eq_{1,2}})(C_{eq_{3,45}})}{(120)+(60)} = \frac{(120)(60)}{(180)} = 40$

∴ $C_{eq} = 40\mu F$

(5).



→ 60MF and 30MF in series, → $C_{eq} = \frac{(60)(30)}{90}$

$C_{eq} = 20\mu F.$

→ 20MF and 20MF in parellel, → $C_{eq} = 20+20 = 40\mu F$

~~→ 40MF and 40MF in series,~~ or.

Because of capacitance is equal (40MF and 40MF) the total voltage (150V) split exactly in half.

∴ V1 = 75V//

V2 = 75V//

By Capacitance Voltage divider Formula,

$$V_x = V_{total.}\left(\frac{C_{other}}{C_x + C_{other}}\right)$$

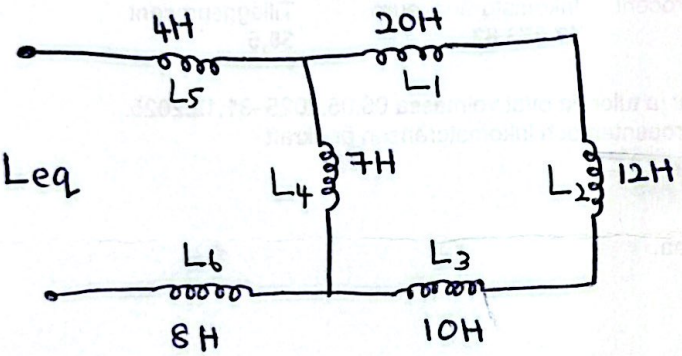
For V_3 (60MF) →

$$V_3 = 75\left(\frac{30}{60+30}\right) = 75\left(\frac{30}{90}\right) = 25V$$

For V_4 (30MF) →

$$V_4 = 75\left(\frac{60}{60+30}\right) = 75\left(\frac{60}{90}\right) = 50V$$

(6).

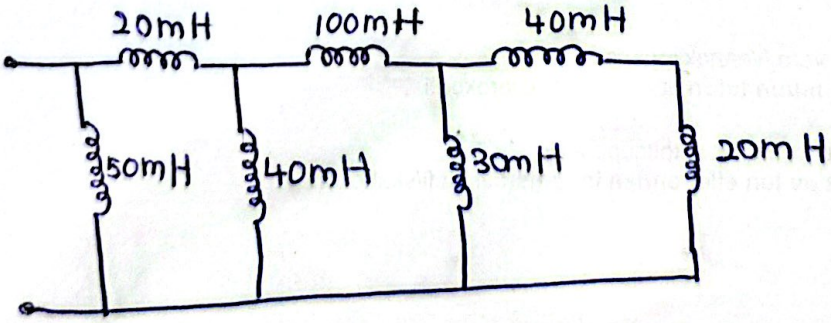


$$Leq_{1,2,3} = L_1 + L_2 + L_3 = 20 + 12 + 10 = 42H$$

$$Leq_{1,2,3,4} = \frac{(42)(L_4)}{(42)+(L_4)} = \frac{42(7)}{49} = 6H$$

$$Leq_{1,2,3,4,5,6} = 6H + L_5 + L_6 = 6 + 4 + 8 = \underline{\underline{18H}}$$

(7).



40mH, 20mH → $Leq_1 = 40 + 20 = 60mH$

60mH, 30mH → $Leq_2 = \frac{60 \times 30}{60+30} = \frac{60 \times 30}{90} = 20mH$

20mH, 100mH → $Leq_3 = 20 + 100 = 120mH$

120mH, 40mH → $L_{eq4} = \frac{120 \times 40}{120+40} = \frac{120 \times 40}{160} = 30mH$

30mH, 20mH → $L_{eq5} = 30 + 20 = 50mH$

$L_{eq} = \frac{50 \times 50}{50+50} = \frac{50 \times 50}{100} = 25mH$ //