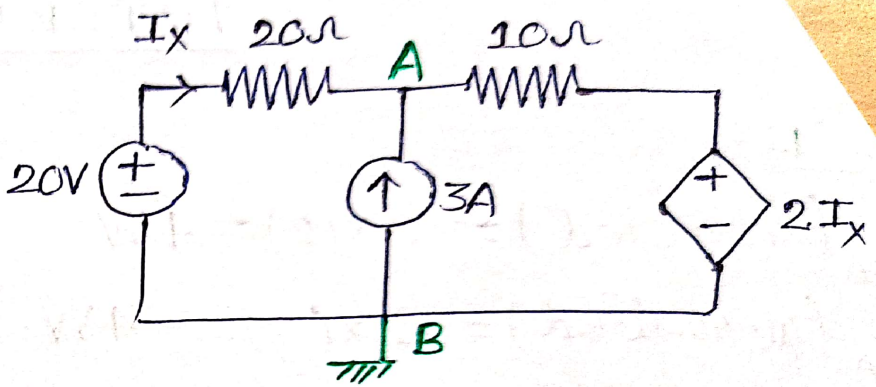
SOL(3) :-



Apply nodal analysis at node 'A' —

$$\frac{V_A - 20}{20} + \frac{V_A - 2I_x}{10} = 3$$

$$V_A - 20 + 2V_A - 4I_x = 60$$

$$3V_A - 4I_x = 80 \quad \text{—— (1)}$$

By circuit — $I_x = \frac{20 - V_A}{20}$

$$V_A = (20 - 20I_x) \quad \text{—— (2)}$$

By eqⁿ (1) & eqⁿ (2), we get —

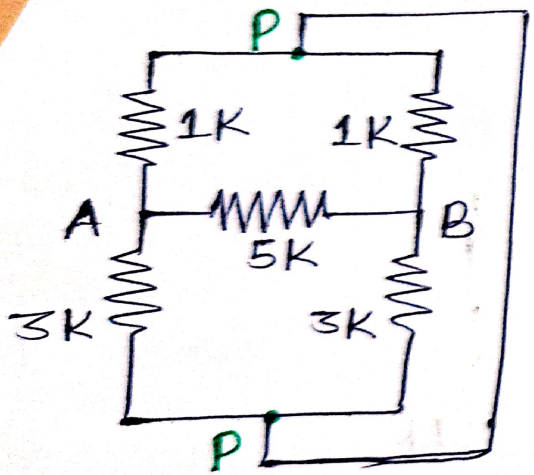
$$3(20 - 20I_x) - 4I_x = 80$$

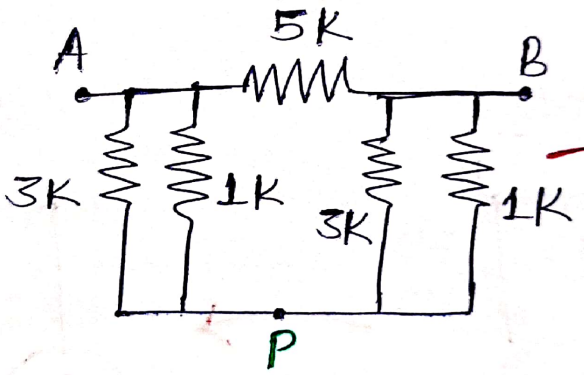
$$60 - 60I_x - 4I_x = 80$$

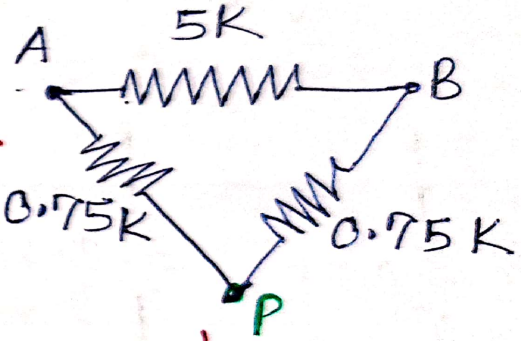
$$64I_x = -20$$

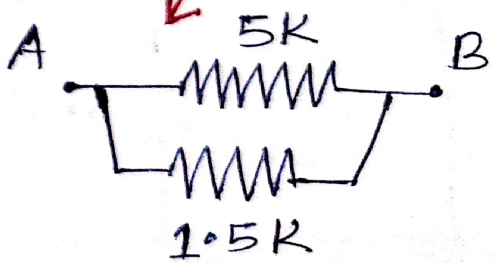
$$\therefore I_x = (-20/64) = (-0.31)\,A$$

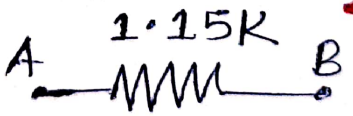
4(5) :-







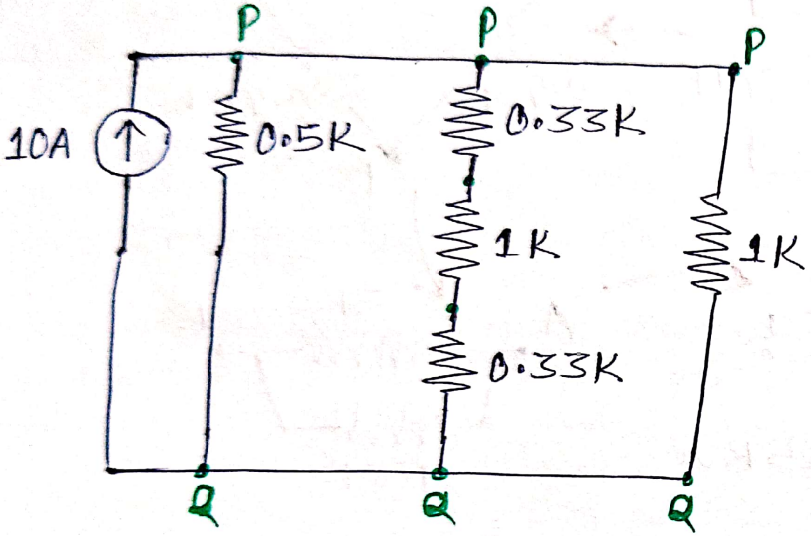


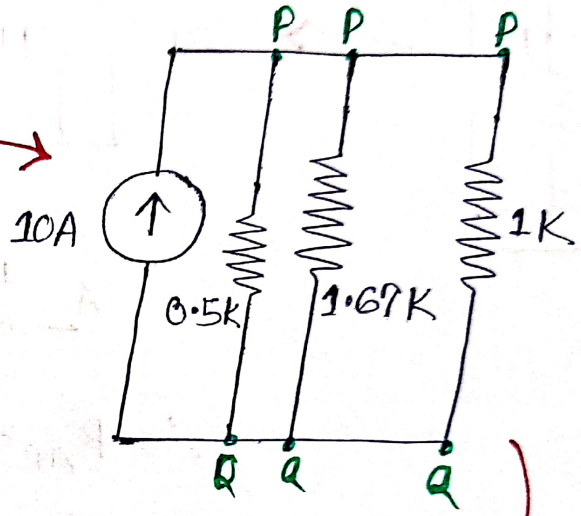


$\therefore R_{AB} = 1.15 K\Omega$

SOL(6) :- By circuit —

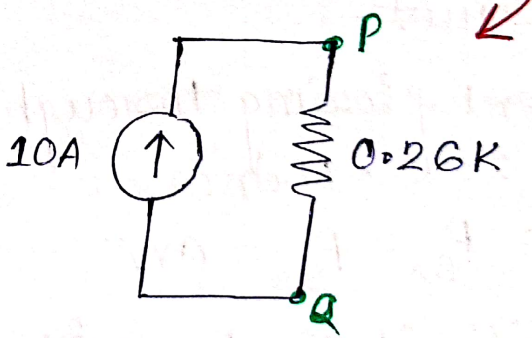
Sol(9)÷ By given circuit —





$\therefore V_{PQ} = 0.26 \times 10$

$= 2.6$ KVolt



SOL(6):- By circuit—

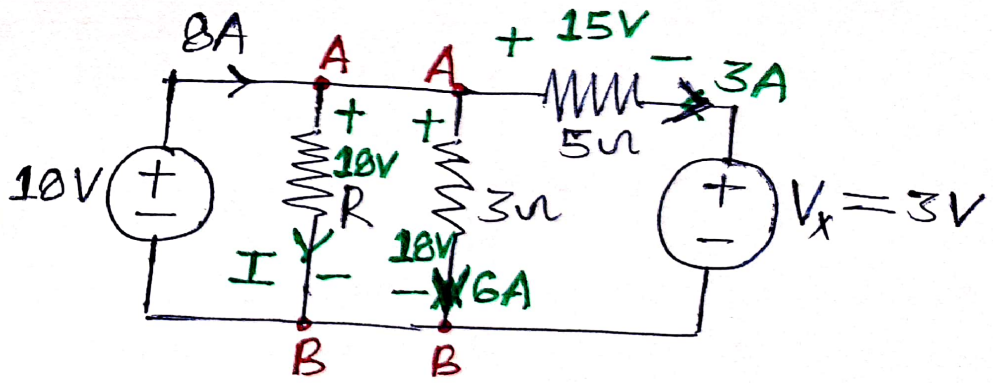
The current flowing through 6Ω, 7Ω, 8Ω and 9Ω resistance will be zero. Hence—

$$P_{6\Omega} = P_{7\Omega} = P_{8\Omega} = P_{9\Omega} = 0W$$

Now, $P_{4\Omega}$ (dissipation) $= (5)^2(4) = 100W$

$P_{5\Omega}$ (dissipation) $= (4)^2(5) = 80W$

SOL(7):- By circuit—



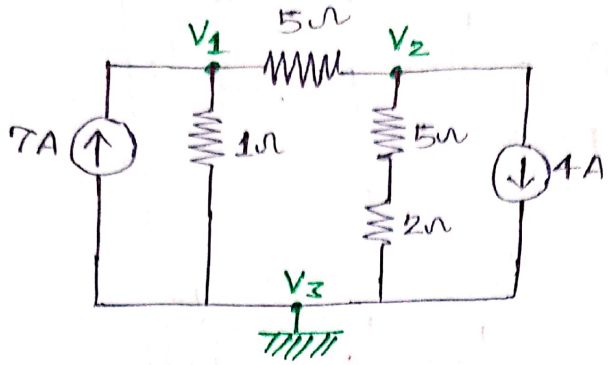
apply KCL at node A—

$8 = 6 + I + 3$

$\therefore I = 8A - 9A = -1A$

$\therefore R = \left(\frac{10}{-1}\right) = -10\Omega$ 'OR' $R = 10\Omega$

SOL(10):-



By nodal analysis —

$$\frac{V_1}{1} + \frac{V_1 - V_2}{5} = 7$$

$$5V_1 + V_1 - V_2 = 35$$

$$6V_1 - V_2 = 35 \quad \text{——— (1)}$$

$$\frac{V_2}{7} + 4 + \frac{V_2 - V_1}{5} = 0$$

$$5V_2 + 140 + 7V_2 - 7V_1 = 0$$

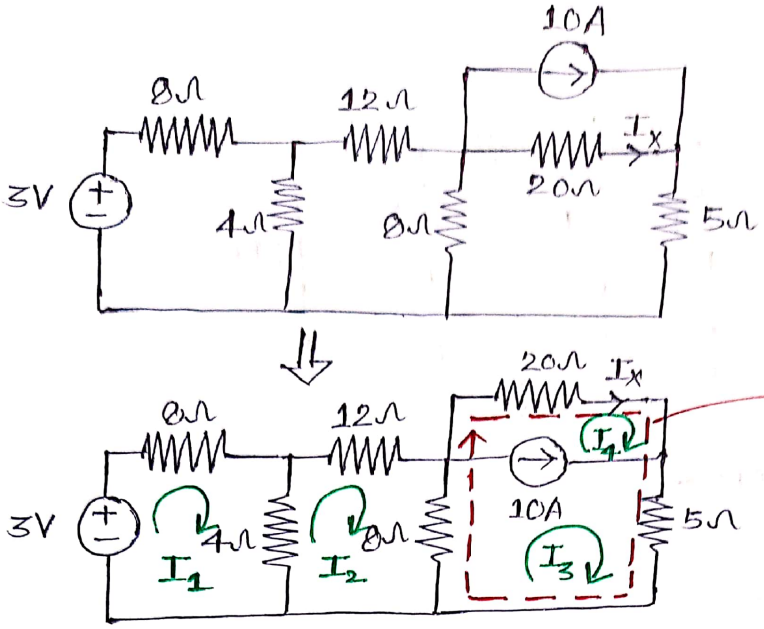
$$-7V_1 + 12V_2 = -140 \quad \text{——— (2)}$$

By eqn (1) & (2), we get —

$$\therefore V_1 = 4.31 \text{ Volt}$$

$$\therefore V_2 = -9.15 \text{ Volt}$$

SOL(9) :-



In loop ① → $-3 + 8I_1 + 4(I_1 - I_2) = 0$

$12I_1 - 4I_2 = 3$ ——— (1)

In loop ② → $4(I_2 - I_1) + 12I_2 + 8(I_2 - I_3) = 0$

$-4I_1 + 24I_2 - 8I_3 = 0$ ——— (2)

In loop ③ & ④ → $8(I_3 - I_2) + 20I_4 + 5I_3 = 0$

$-8I_2 + 13I_3 + 20I_4 = 0$ ——— (3)

$I_3 - I_4 = 10$ ——— (4)

$I_x = I_4$ ——— (5)

after solving, we get —

$\therefore I_1 = 1.05\ A$

$\therefore I_2 = 2.39\ A$

$\therefore I_3 = 6.64\ A$

$\therefore I_x = I_4 = -3.36\ A$