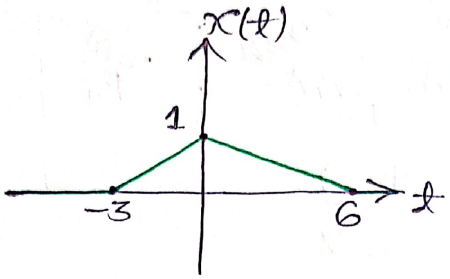
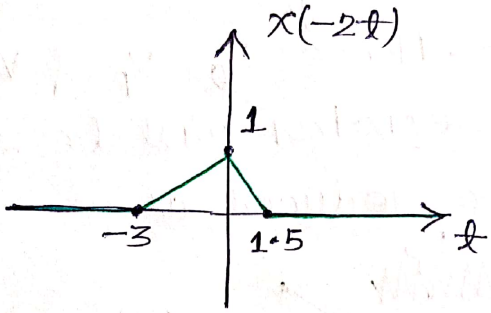
Re Quiz-1 Rubric

Sol (1) :-

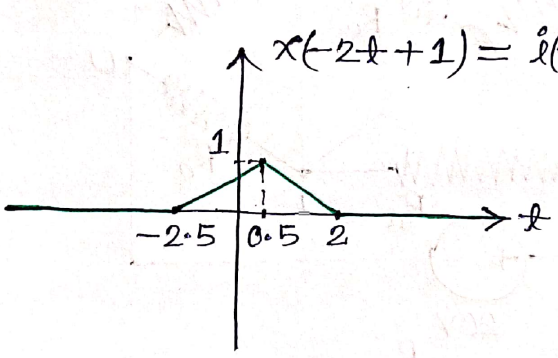
First we need to draw signal/current, $i(t) = x(-2t+1)$



Time Scaling + Time Reversal operation



Time Shifting operation



— (2 Marks)

as we know that — $Q = \int_{-\infty}^{\infty} i(t) \cdot dt$

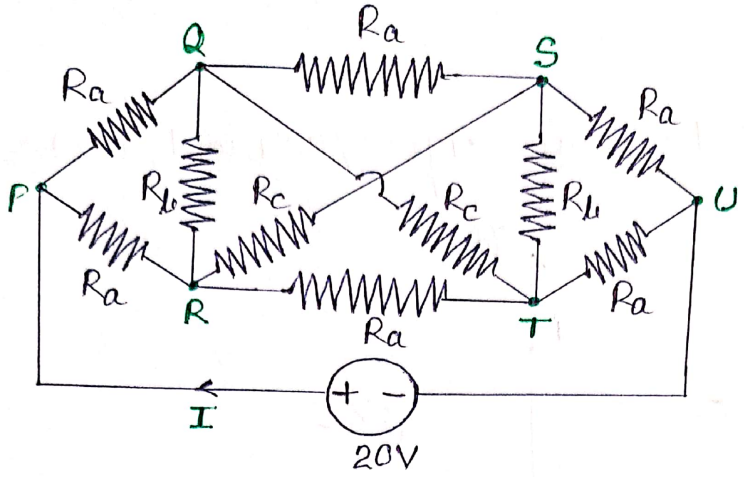
$= \int_{-2.5}^{2} i(t) \cdot dt$

= area of $i(t)$ signal

$= \frac{1}{2} \times 4.5 \times 1$

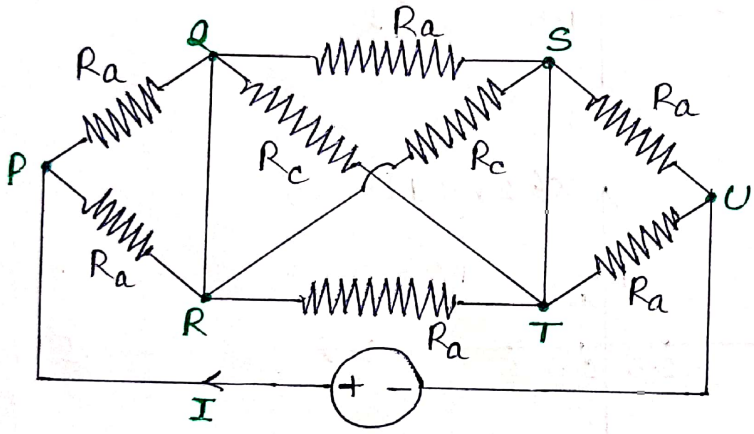
$= 2.25\ C$ — (3 Marks)

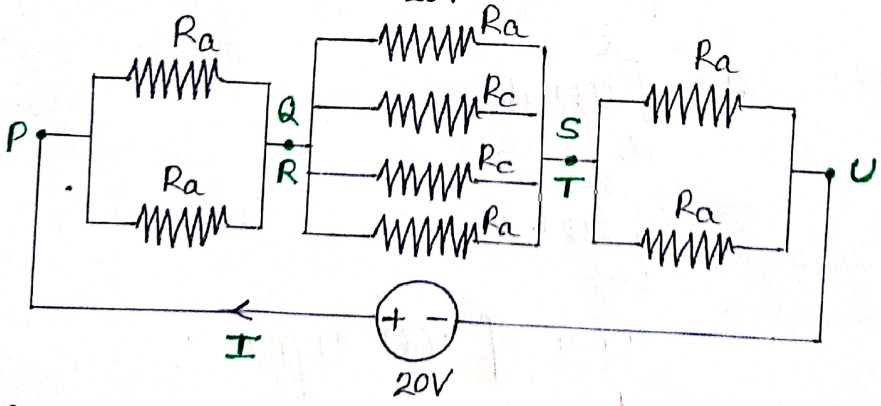
SOL(2):-



As the given network is symmetric network w.r.t. 20V voltage source. Hence $V_Q = V_R$ & $V_S = V_T$. So current through both R_b resistor will be zero. — (1 Marks)

Now network can be reduced as —





Given— $R_a = 5\Omega$, $R_c = 10\Omega$

Hence equivalent resistance between 'P' & 'U',

$$\therefore R_{eq} = 2(R_a \| R_a) + (R_a \| R_c \| R_c \| R_a)$$

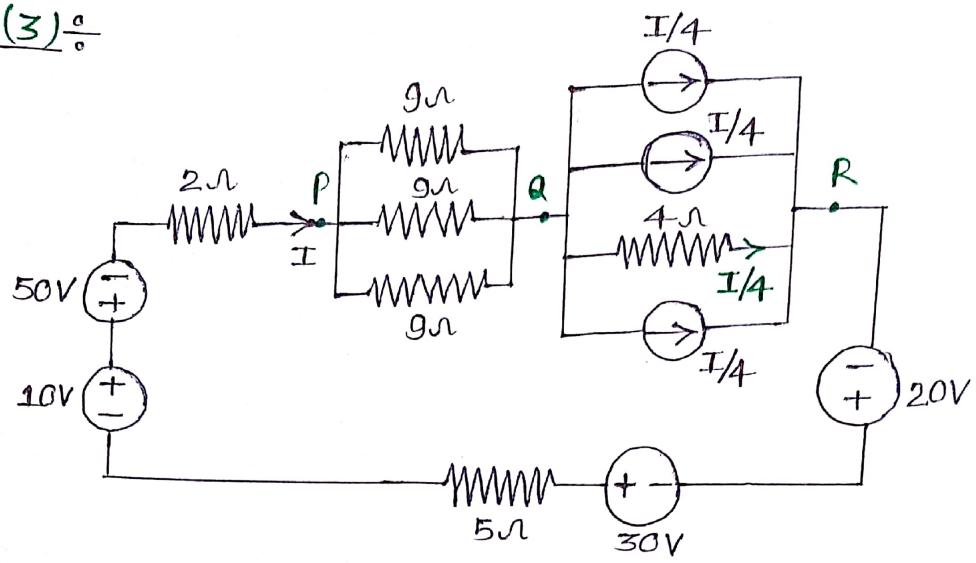
$$= R_a + \left(\frac{R_a}{2} \| \frac{R_c}{2}\right) = 5 + \left(\frac{10}{2} \| \frac{5}{2}\right) = 6.67\,\Omega$$

— (2 Marks)

$\therefore$ Current through source $= I = \frac{20}{R_{eq}} \cong 3\,A$

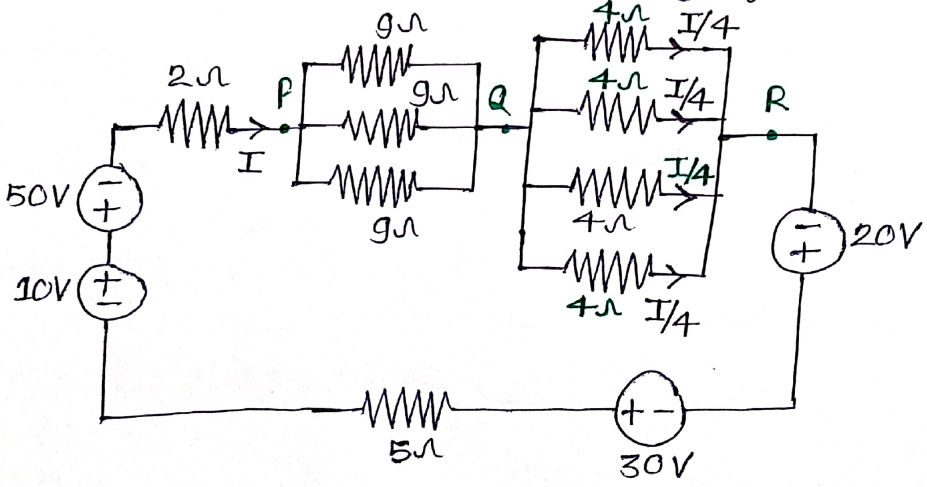
— (2 Marks)

Sol(3):-

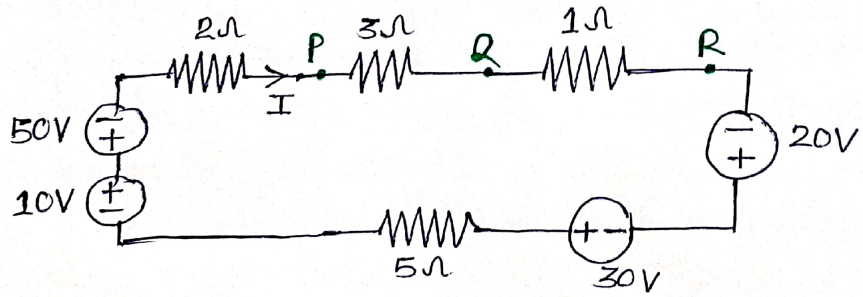


In the given network between point 'Q' & 'R', all branch having equal current (I/4) & voltage drop. Hence all parallel branch ~~shall~~ have equal resistance (4Ω).

Now network can be reduced as—



—(1 Marks)



Apply KVL— $50 + (2+3+1+5)I - 20 - 30 - 10 = 0$

$11I = 10$

$I = (10/11)A = (0.91)A$

∴ Current through '4Ω' resistance $= (I/4) = 0.23A$

—(2 Marks)

∴ Voltage across '4Ω' resistance $= 4 \times 0.23 = 0.92$ Volt

—(2 Marks)