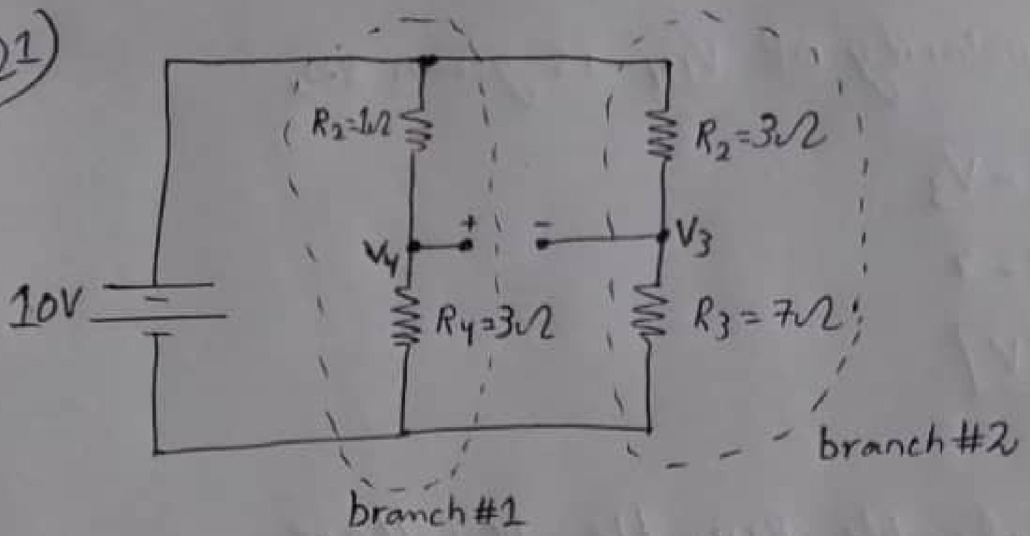
Q1)



Since branch #1 and branch #2 are parallel so applying voltage divider rule on R_4 to calculate the voltage.

$$V_4 = \frac{V_{cc}\ R_4}{R_1 + R_4}$$

$$V_4 = \frac{(10)(3)}{1+3}$$

$$\boxed{V_4 = 7.5\text{ V}}$$

applying voltage divider rule on R_3 to calculate the voltage of R_3.

$$V_3 = \frac{V_{cc}\ R_3}{R_2 + R_3}$$

$$V_3 = \frac{(10)(7)}{3+7}$$

$$\boxed{V_3 = 7\text{ V}}$$

since the polarity of V_{TH} is given so,

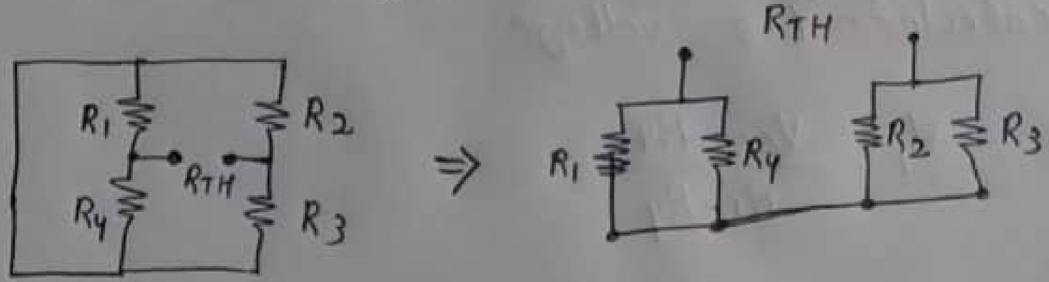
$$V_{TH} = V_4 - V_3$$

$$V_{TH} = 7.5 - 7$$

$$\boxed{V_{TH} = 0.5V}$$

FOR R_{TH}:-

when we calculate the R_{TH}, the DC voltage source will become short circuit so the circuit will be changed.



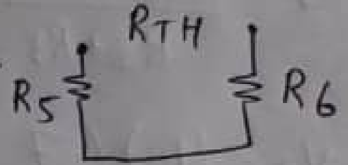
since R_1 and R_4 are parallel so,

$$R_5 = \frac{R_1 R_4}{R_1 + R_4} = \frac{(1)(3)}{(1)+(3)} = 0.75\Omega$$

since R_2 and R_3 are parallel so,

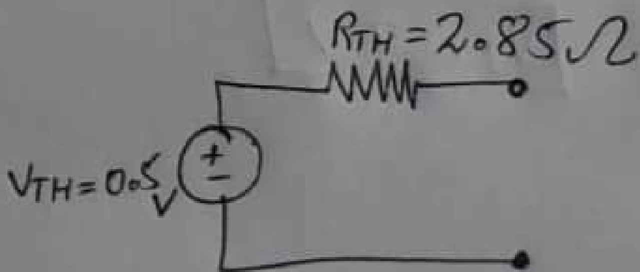
$$R_6 = \frac{R_2 R_3}{R_2 + R_3} = \frac{(3)(7)}{3+7} = 2.1\Omega$$

R_5 and R_6 will become in series.

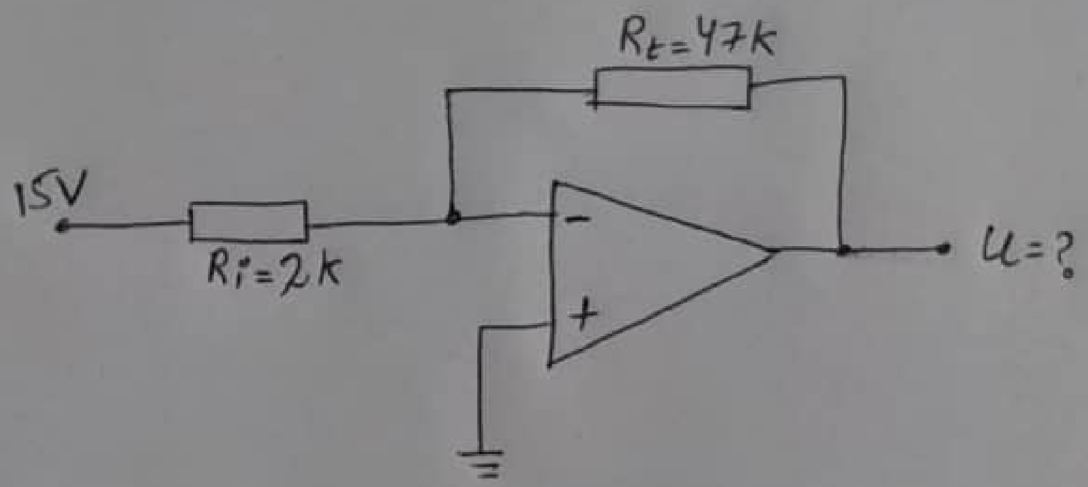


$$R_{TH} = R_5 + R_6 = 0.75 + 2.1$$

$$\boxed{R_{TH} = 2.85\Omega}$$



Q2)



for Inverting Amplifer

$$A_V = \frac{V_{out}}{V_{in}} = \frac{-R_t}{R_i}$$

$$V_{out} = \frac{-R_t}{R_i} \times V_{in}$$

$$V_{out} = \frac{-(47k)}{2k} \times (15)$$

$$u = V_{out} = -352.5\ V$$ Ans

For Amplitude:-

$$20 \log\left(\frac{R_t}{R_i}\right)$$

$$20 \log\left(\frac{47k}{2k}\right)$$

$$27.42\ dB$$