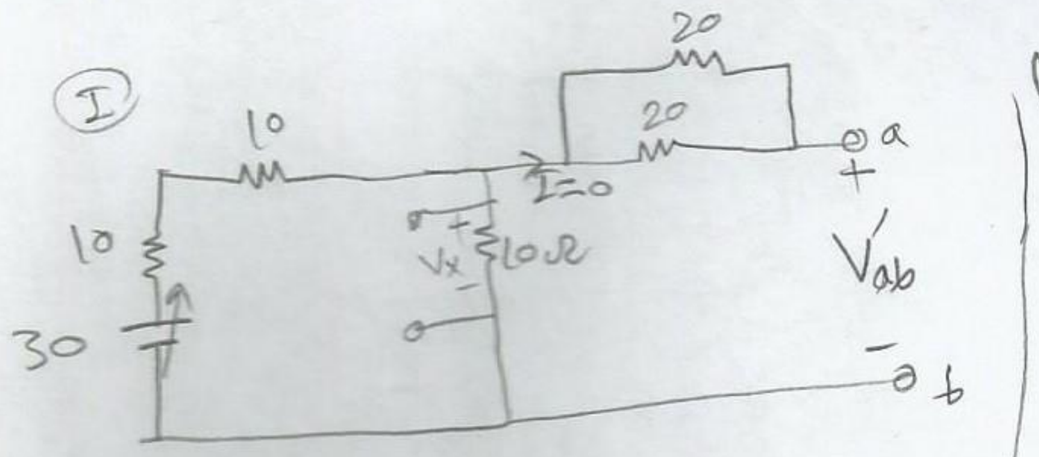
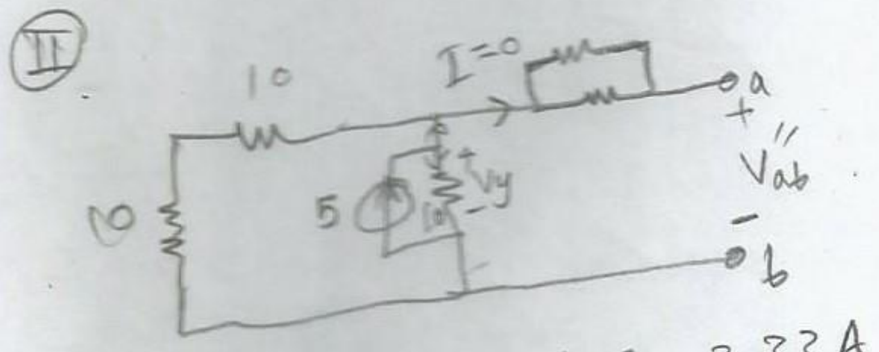
Q-3

(a)

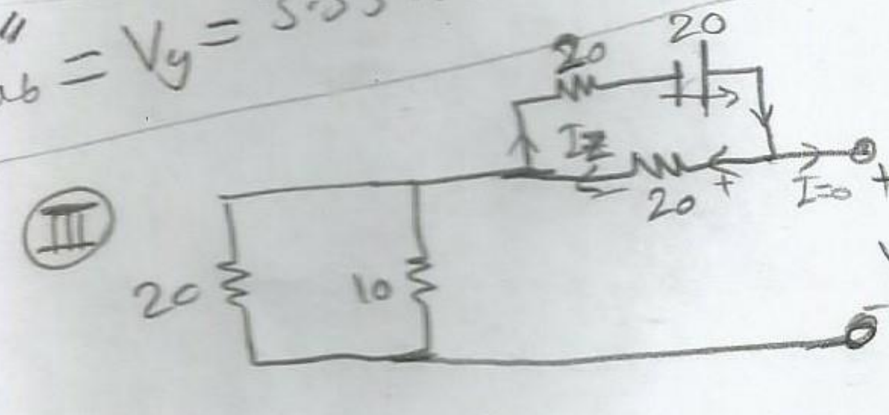


$\therefore V'_{ab} = V_x = 30 \times \frac{10}{10+10+0} = 10\,V$



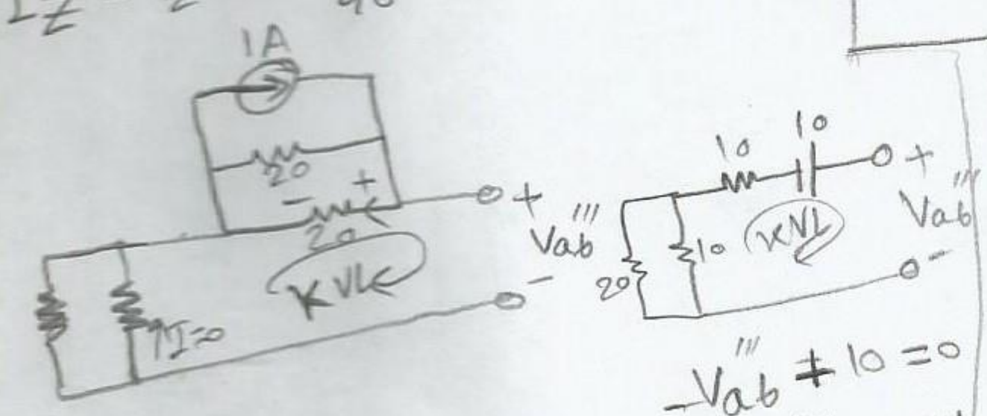
$I_y = 5 \times \frac{20}{20+10} = \frac{100}{30} = 3.33\,A$

$V''_{ab} = V_y = 3.33 \times 10 = 33.3\,V$



$I_Z = \frac{1}{2}A = \frac{20}{40}$

or



$-V'''_{ab} + 10 = 0$

$\therefore V'''_{ab} = 10\,V$

by KVL

$-V'''_{ab} + 20(\frac{1}{2}) - (0)(10) = 0$

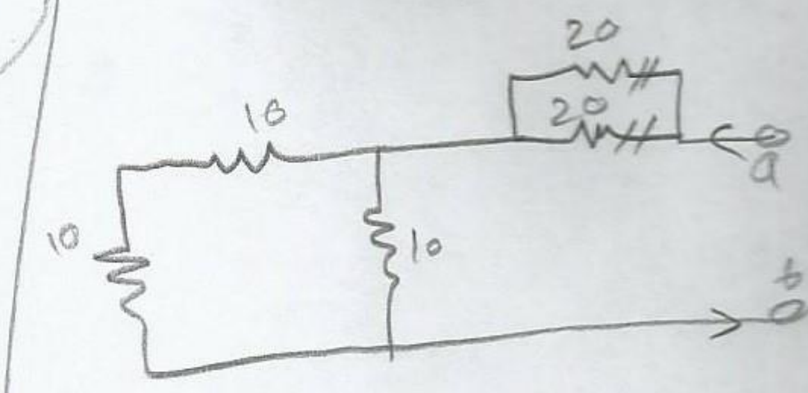
$\therefore V'''_{ab} = 10\,V$

$\therefore V_{ab} = 10 + 33.3 + 10 = 53.3\,V$

(b) Norton equivalent: I_N R_N a b

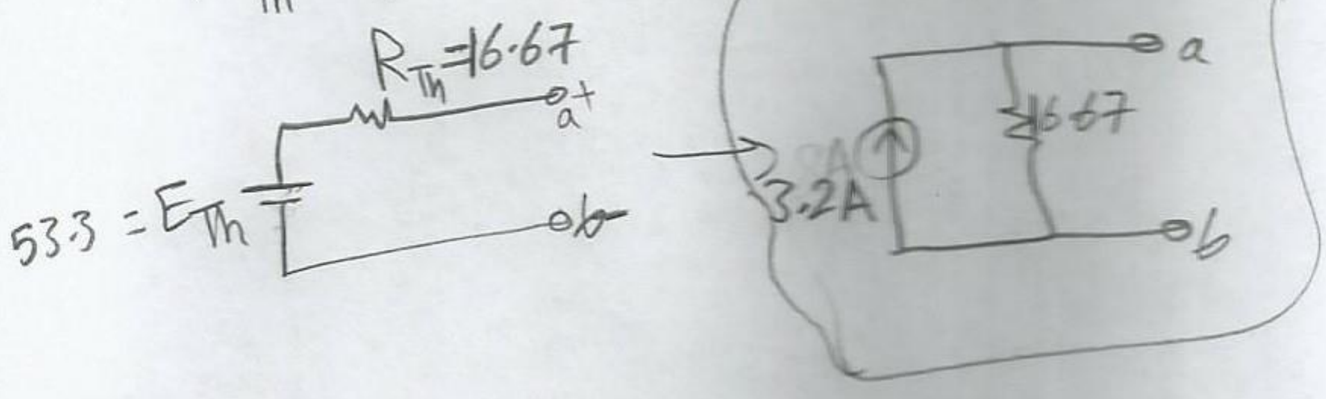
since $E_{Th} = 53.3\,V$

$\therefore R_{Th} \Rightarrow$

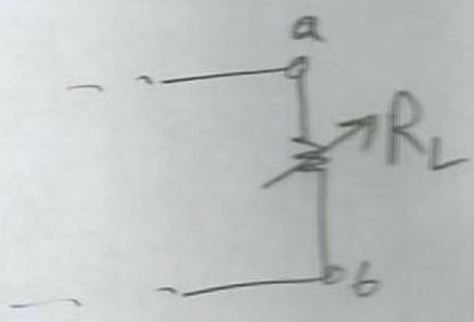


$\Rightarrow \leftarrow R_{Th} = R_N$

$\therefore R_{Th} = R_N = 10 + (10 // 20) = 16.67\,\Omega$



(c)



to get P_{Lmax} $\therefore R_L = R_N = 16.67$

$P_{Lmax} = \frac{1}{4}\frac{E_{Th}^2}{R_{Th}} = \frac{1}{4} I_N^2 R_N$

$= 42.67\,W$