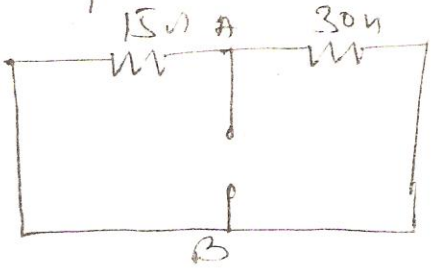
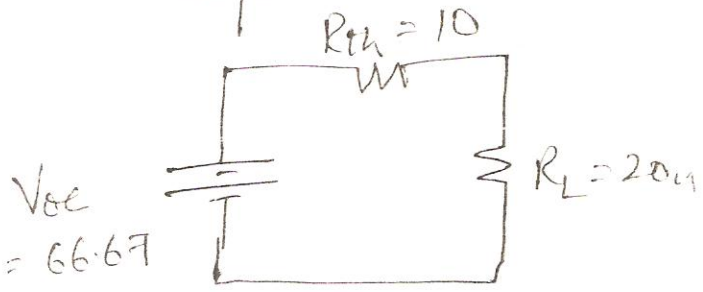
2nd Step — Calculate R_{th}



$R_{th} = 15 \| 30 = \frac{15 \times 30}{15+30} = \frac{450}{45}$

$R_{th} = 10\Omega$

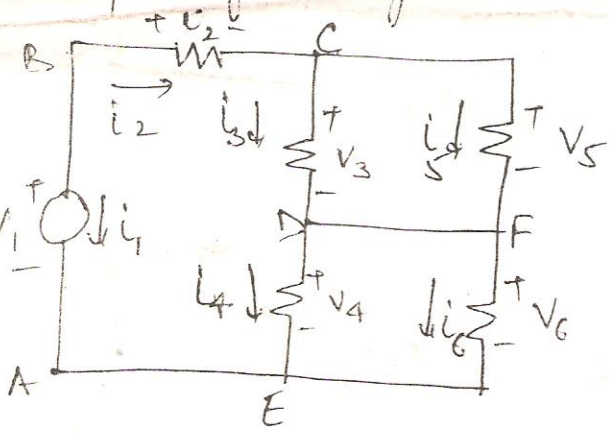
∴ Equivalent Thevenin's circuit is as follows-



$$I_L = \frac{V_{oc}}{R_{th}+R_L} = \frac{66.67}{10+20} = \frac{66.67}{30} = 2.22 \text{ amp}$$

∴ $I_L = 2.22$ amp.

Example of Tellegen's Theorem (Ans 2(a))



Let $V_1 = 7$, $V_2 = 2$ & $V_3 = 7$

Apply KVL in loop ABCEFA

$V_4 = 2$ is required.

Around loop CDFC $V_5 = 3$ is requi

& in loop DFED

$V = 2$ is required.

Now apply KCL at node B

let $i_1 = 5$ then it is required $i_2 = -5$ & At node C

let $i_3 = 3$ then i_5 is required ie $i_5 = -8$ & At node D

assume $i_4 = 4$ then i_6 should be equal to -9.

Accordiy to Tellegen's Theorem :-

$$\sum_{k=1}^{n} v_k i_k = 0$$

$$\therefore = 7\times5 + 2\times(-5) + 3\times3 + 2\times4 + 3\times(-8) + 2\times(-9)$$

$$= 0.$$

Hence Theorem is verified.