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Section: 08 Faculty: SSH1

Course Code: EEE141L

Ex

7.7

~~$V_1 = \frac{R_1 F}{R_1 + R_2}$~~

$$V_1 = \frac{R_1 F}{R_1 + R_2} = \frac{5(\Omega)(12V)}{5\{\Omega\} + 3\Omega} = \frac{60V}{8} = 7.5V$$

$$V_3 = \frac{R_3 F}{R_3 + R_4} = \frac{6(\Omega)(12V)}{6\Omega + 2\Omega} = \frac{72V}{8} = 9V$$

The open circuit voltage V_{ab} is determined by applying Kirchoff's voltage law around the indicated loop in Fig 7.21 in the clockwise direction at terminal a.

$$+V_1 - V_3 + V_{ab} = 0$$

and $V_{ab} = V_3 - V_1 = 9V - 7.5V = 1.5V$

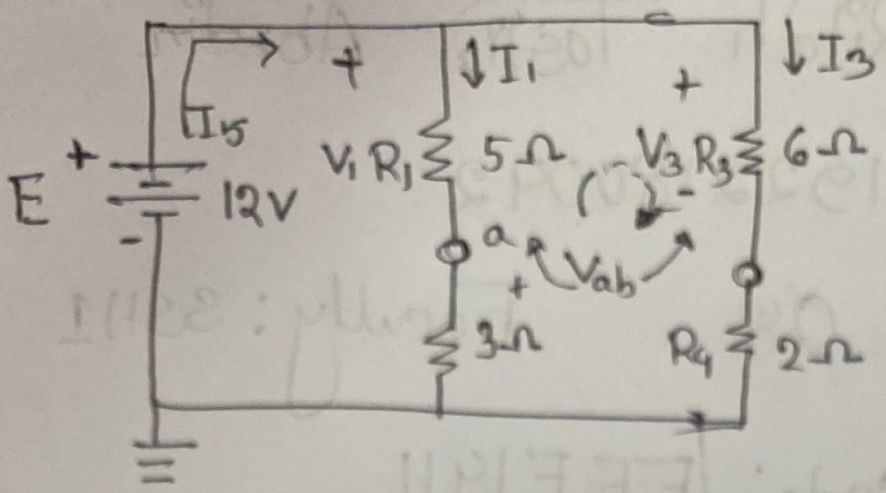
(b) By Ohm's Law,

$$I_1 = \frac{V_1}{R_1} = \frac{7.5V}{5\Omega} = 1.5A$$

$$I_3 = \frac{V_3}{R_3} = \frac{9V}{6\Omega} = 1.5A$$

Applying Kirchhoff's current law

$$I_S = I_1 + I_3 = 1.5A + 1.5A = 3A$$



7.8 $V_2 = E_1 = 6V$

$-E_1 + V_1 - E_2 = 0$

and $V_1 = E_2 + E_1 = 18V + 6V = 24V$

Applying Kirchhoff's current law to note a yeilds

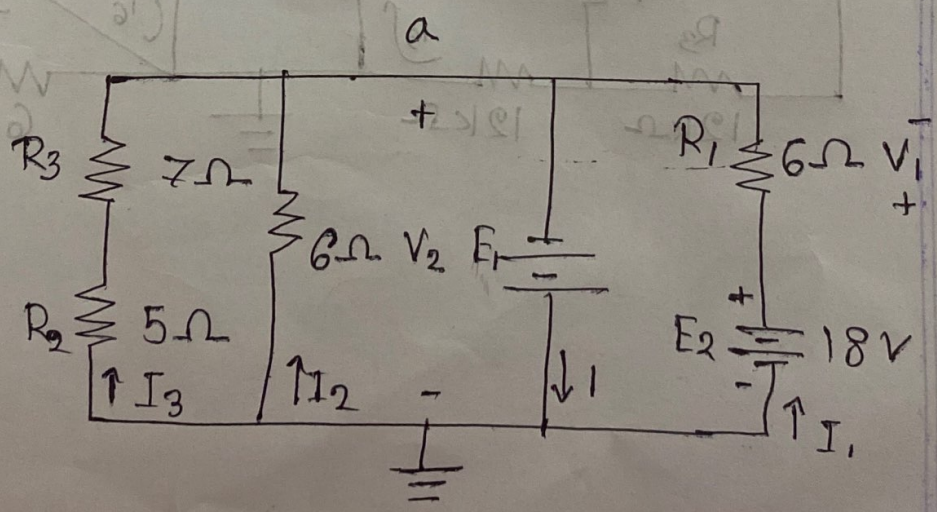
$I = I_1 + I_2 + I_3$

$= \frac{V_1}{R_1} + \frac{E_1}{R_4} + \frac{E_1}{R_2 + R_3}$

$= \frac{24V}{6\Omega} + \frac{6V}{6\Omega} + \frac{6V}{12\Omega}$

$= 4A + 1A + 0.5A$

$I = 5.5A$



7.10

~~Redrawing the network~~

$$I_5 = \frac{E}{R_{(1.2.3)||4} + R_5} = \frac{72\,V}{12k\Omega + 12k\Omega} = \frac{72\,V}{24k\Omega} = 3mA$$

with,

$$V_7 = \frac{R_{7||(8.9)}\,E}{R_{7||(8.9)} + R_6} = \frac{(4.5k\Omega)(72\,V)}{(4.5k\Omega) + 12k\Omega} = \frac{324\,V}{16.5} = 19.6V$$

$$I_6 = \frac{V_7}{R_{7||(8.9)}} = \frac{19.6\,V}{4.5k\Omega} = 4.35mA$$

and $I_3 = I_5 + I_6 = 3mA + 4.35mA = 7.35mA$