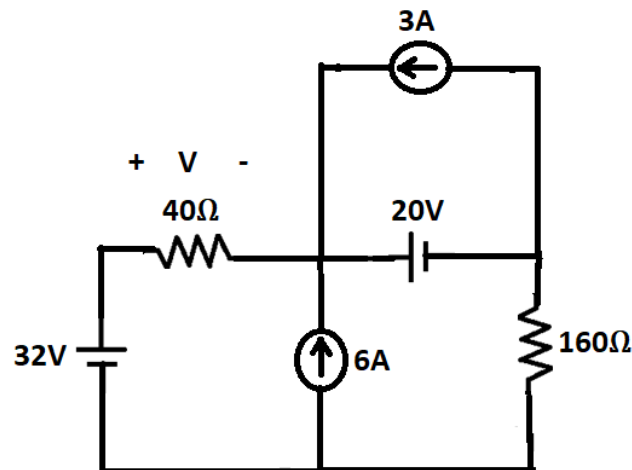


## Unit I: DC Circuits

### NOTES – CLASS 13

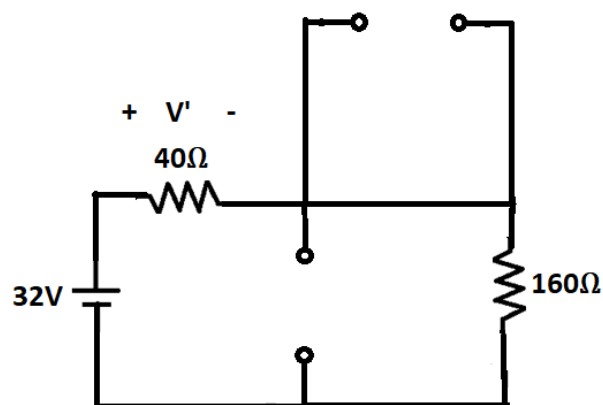
#### Numerical Examples on Superposition Theorem:

Numerical Example 1: Obtain voltage 'V' using Superposition Theorem.



#### Solution:

Considering 32V source alone,

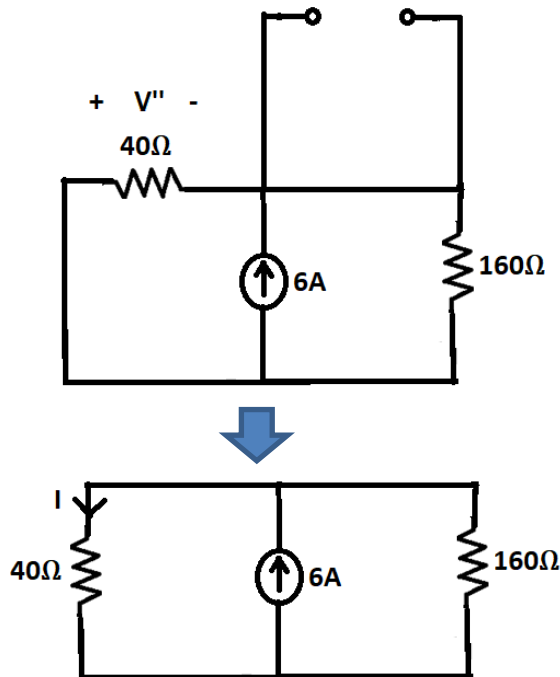


Since it is now a simple series network, apply voltage division rule

$$V' = 32V * \frac{40\Omega}{200\Omega} = 6.4V$$

Considering 6A source alone,

## Unit I: DC Circuits



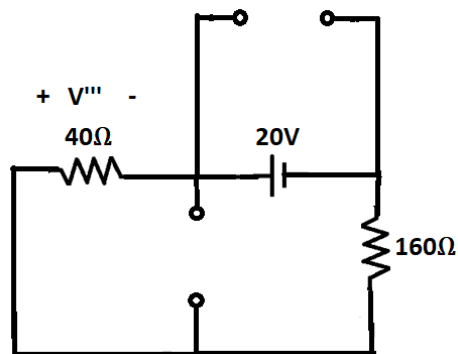
Applying current division rule,

$$I = 6A * \frac{160\Omega}{200\Omega} = 4.8A$$

Therefore,

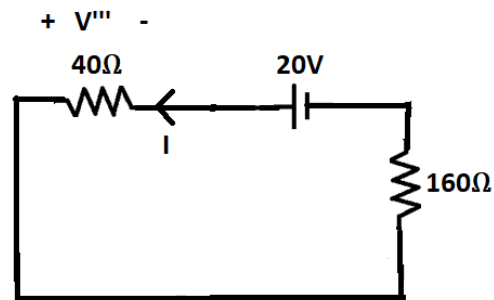
$$V'' = -4.8A * 40\Omega = -192V$$

Considering 20V source alone,



It can be redrawn as,

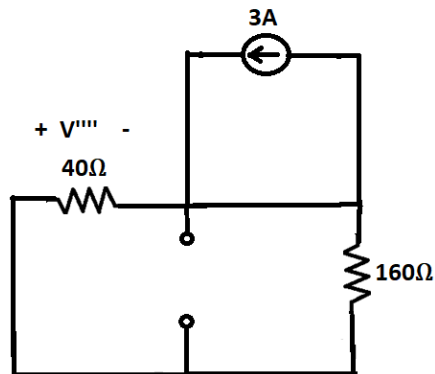
## Unit I: DC Circuits



$$I = \frac{20V}{200\Omega} = 0.1A$$

$$V''' = -0.1A \cdot 40\Omega = -4V$$

Considering 3A source alone,



Current from the 3A current source flows through the short circuit. Hence, current through 40Ω resistor is zero.

Hence,  $V'''' = 0$

By Superposition Theorem,

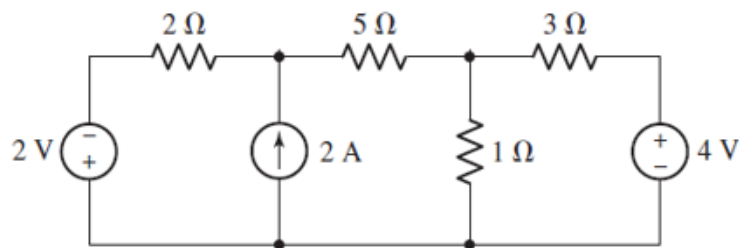
$$V = V' + V'' + V''' + V'''' = -189.6V$$

## Unit I: DC Circuits

### Numerical Example 2

In the given network, determine

- current through  $5\Omega$  resistor if only 2V battery is active in the network with all other sources inactive.
- current through  $3\Omega$  resistor if only 4V source is active in the network with all other sources inactive.



### solution

i) With 2V source alone active

$$\text{current in } 5\Omega \text{ resistor} = \frac{2V}{(2\Omega + 5\Omega + 0.75\Omega)} = 0.258A$$

ii) With 4V source alone active

$$\text{current in } 3\Omega \text{ resistor} = \frac{4V}{((7\Omega \parallel 1\Omega) + 3\Omega)} = 1.032A$$