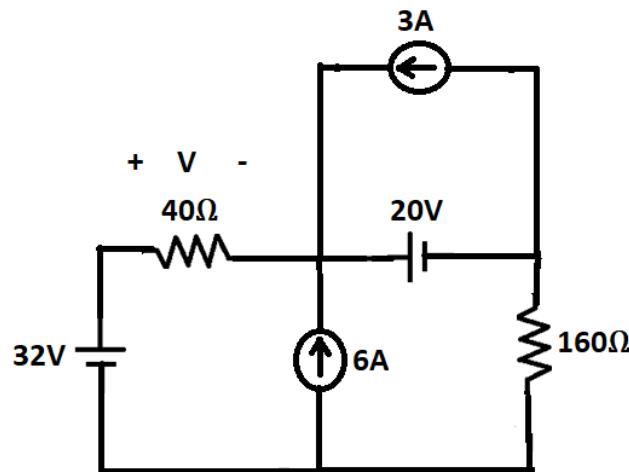


## NOTES – CLASS 13

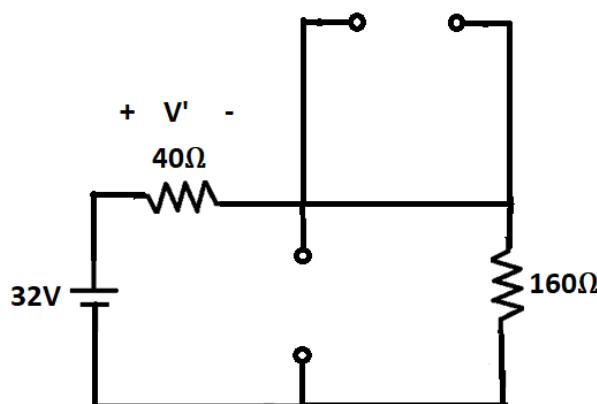
**Numerical Examples on Superposition Theorem:**

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



**Solution:**

Considering 32V source alone,

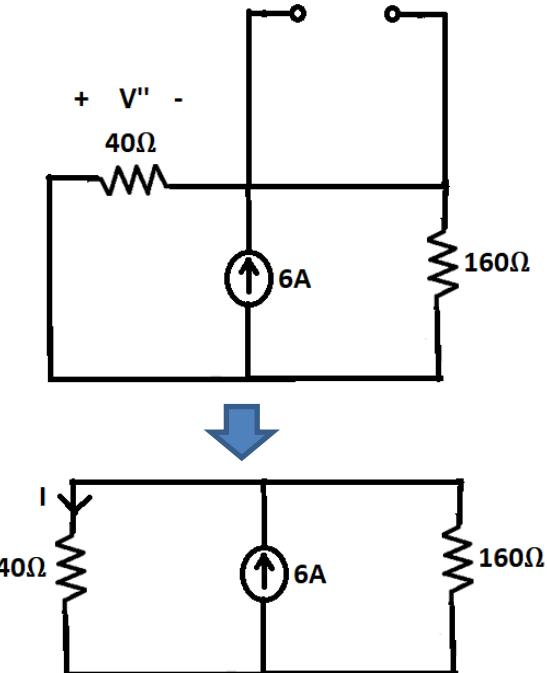


Since it is now a simple series network, apply voltage division rule

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

Considering 6A source alone,

## Unit I: DC Circuits



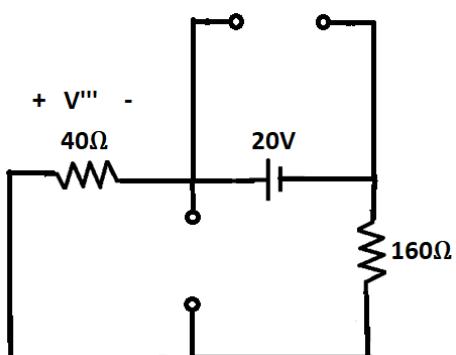
Applying current division rule,

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

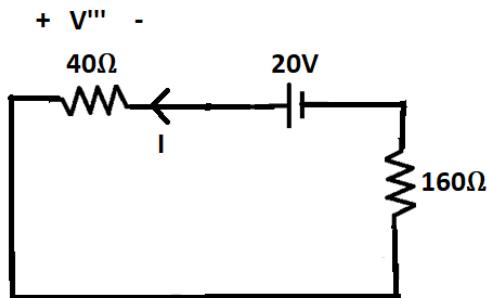
Therefore,

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

Considering  $20V$  source alone,



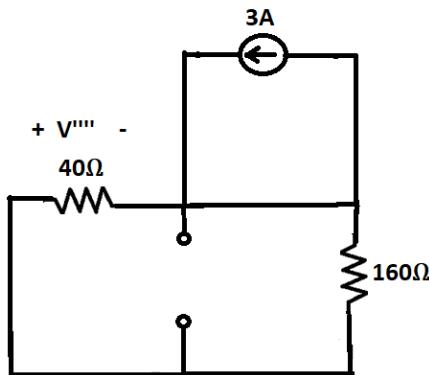
It can be redrawn as,

**Unit I: DC Circuits**


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

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

Considering 3A source alone,



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

Hence,  $V'''' = 0$

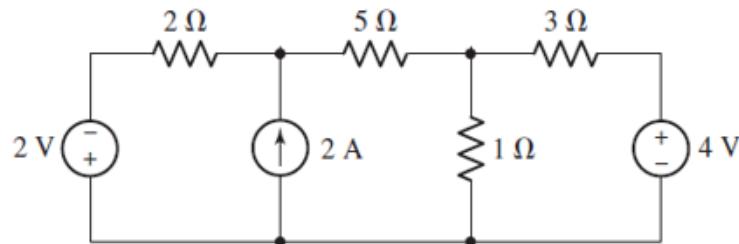
By Superposition Theorem,

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

### Numerical Example 2

In the given network, determine

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

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