EXPEREMENT-6

AIM: To verify the Millman's Theorem using MULTISIM software.

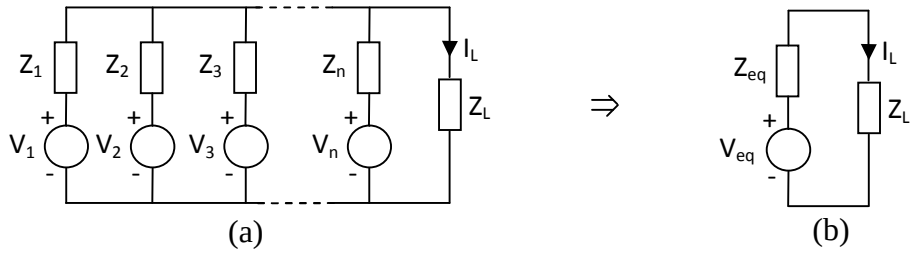
SOFTWARE REQUIRED: MULTISIM software.

THEORY:

Millman's theorem:

Statement 1: For Voltage sources in parallel

"If V_1, V_2, V_3…… V_n voltage sources with internal impedances Z_1, Z_2, Z_3 ….Z_n are connected in parallel; they can be replaced by an equivalent circuit consisting of a voltage source V_{eq} in series with impedance Z_{eq}."



(a) (b)

Fig.1

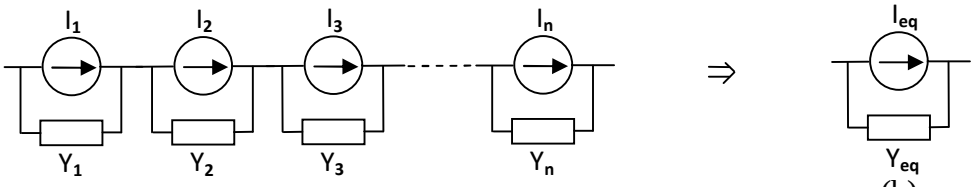
Where

$$V_{eq} = \frac{\frac{V_1}{Z_1} + \frac{V_2}{Z_2} + \frac{V_3}{Z_3} + \ldots\ldots\ldots \frac{V_n}{Z_n}}{\frac{1}{Z_1} + \frac{1}{Z_2} + \frac{1}{Z_3} + \ldots\ldots\ldots \frac{1}{Z_n}} = \frac{\sum_{i=1}^{n} \frac{V_i}{Z_i}}{\sum_{i=1}^{n} \frac{1}{Z_i}}$$

$$Z_{eq} = \frac{1}{\frac{1}{Z_1} + \frac{1}{Z_2} + \frac{1}{Z_3} + \ldots\ldots\ldots \frac{1}{Z_n}} = \frac{1}{\sum_{i=1}^{n} \frac{1}{Z_i}}$$

Statement 1: For current sources in series

"If I_1, I_2, I_3…… I_n voltage sources with internal impedances Y_1, Y_2, Y_3 ….Y_n are connected in series; they can be replaced by an equivalent circuit consisting of a current source I_{eq} in parallel with admittance Y_{eq}."



(a) (b)

Fig.2

Where

$$I_{eq} = \frac{\frac{I_1}{Y_1} + \frac{I_2}{Y_2} + \frac{I_3}{Y_3} + \ldots\ldots \frac{I_n}{Y_n}}{\frac{1}{Y_1} + \frac{1}{Y_2} + \frac{1}{Y_3} + \ldots\ldots \frac{1}{Y_n}} = \frac{\sum_{i=1}^{n} \frac{I_i}{Y_i}}{\sum_{i=1}^{n} \frac{1}{Y_i}}$$

$$Y_{eq} = \frac{1}{\frac{1}{Y_1} + \frac{1}{Y_2} + \frac{1}{Y_3} + \ldots\ldots \frac{1}{Y_n}} = \frac{1}{\sum_{i=1}^{n} \frac{1}{Y_i}}$$

<u>Circuits:</u> In the following circuits figure 3 & 4 find the voltage across and current in Z_L by Millman's Theorem. Take Z_L equal to your class roll no.

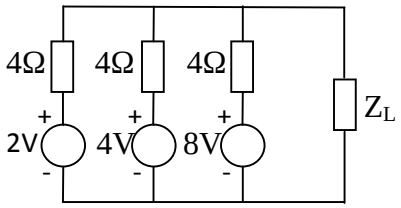


Fig.3

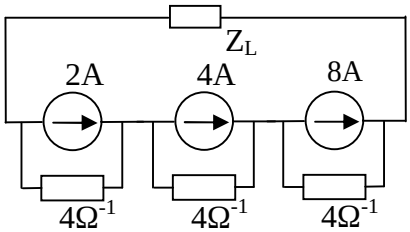


Fig.4

SOFTWARE CIRCUITS:

OBSERVATION:

CALCULATIONS:

RESULT: In the above circuits and simulation Millman's Theorem is verified.

PRECAUTION:

1. Ground the circuit before simulation.
2. Design circuit carefully.
3. Use variable resistance carefully.
4. Save the file properly
5. Don't change the setting the software and computer.