

Experiment: To study Super position's theorem.

Objective: To verify the Super position's Theorem.

Apparatus: Virtual using Tinkercad (www.tinkercad.com)

Theory: Superposition theorem states that - "In a linear, bilateral network, consisting of several sources, the resultant current in any branch is the algebraic sum of the currents caused by the separate independent sources acting alone replacing all other sources by their respective internal resistances." This theorem when used for evaluating response in a complicated network containing several sources, simplifies the analysis. The theorem is particularly used in case of network, where sources generating voltages or currents of different frequencies are acting simultaneously, considering the effect of individual source independent of others.

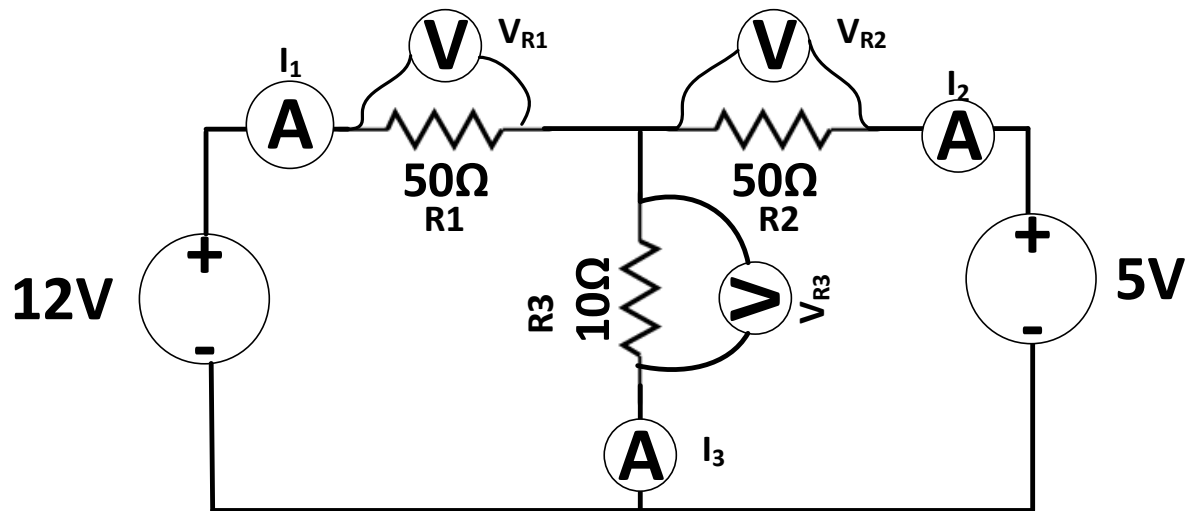


Fig. Circuit diagram for verification of Superposition theorem

Procedure:

1. Connect circuit as shown in diagram on tinkercad workspace. Consider only one voltage source at a time, first 12V.
2. Start the simulation and note down I_1 , I_2 & I_3 one by one by connecting current meter in series of resistances R_1 , R_2 & R_3 . Also note down the voltages across the resistances V_{R1} , V_{R2} and V_{R3} by connecting the multimeter in voltage mode in parallel to the resistances.
3. Now consider only 5V and note down I_1 , I_2 & I_3 one by one by connecting current meter in series of resistances R_1 , R_2 & R_3 . Also note down the voltages across the resistances V_{R1} , V_{R2} and V_{R3} by connecting the multimeter in voltage mode in parallel to the resistances.
4. Now consider both 12V & 5V to note down I_1 , I_2 & I_3 one by one by connecting current meter in series of resistances R_1 , R_2 & R_3 . Also note down the voltages across the resistances V_{R1} , V_{R2} and V_{R3} by connecting the multimeter in voltage mode in parallel to the resistances.

5. Now compute the same through analytical method by calculating the currents and voltages for all the nodes and tabulate the results. Compute the percentage error if any.

Observation Table: -

CURRENT & VOLTAGE	EXPERIMENTAL			Theory			%Error
	I/P DC VOLTAGE						
	12V	5V	(12V+5V)	12V	5V	(12V+5V)	
I ₁							
I ₂							
I ₃							
V _{R1}							
V _{R2}							
V _{R3}							

Circuit diagram on Tinkercad:

(paste here)

Calculations:

Conclusion: