Sri
SAI RAM ENGINEERING COLLEGE
An Autonomous Institution | Affiliated to Anna University & Approved by AICTE, New Delhi
Accredited by NBA and NAAC "A+" | An ISO 9001:2015 Certified and MHRD NIRF ranked institution
Sai Leo Nagar, West Tambaram, Chennai - 600 044. www.sairam.edu.in
Founder Chairman : MJF. Ln. Leo Muthu

LAB RECORD

I YEAR / II SEMESTER

ACADEMIC YEAR 2020-21

20ESGE201 – ENGINEERING PRACTICES LAB

DEPARTMENT OF MECHANICAL ENGINEERING

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Certificate

Register No. : 141920105074

Certified that this is the Bonafide Record of work done by Mr. R SURYA_____ **in the ____B.E_____ Degree Course _____EEE_____ in the 20ESGE201-ENGINEERING PRACTICES laboratory(Civil and Mech) during the academic year _2020-2021_**

Station : Chennai – 600 044

Date : 05.08.2021

STAFF IN-CHARGE **HEAD OF THE DEPARTMENT**

Submitted for End Semester Practical Examination held on _05.08.2021_ at **Sri Sai Ram Engineering College**, Chennai – 600 044.

INTERNAL EXAMINER **EXTERNAL EXAMINER**

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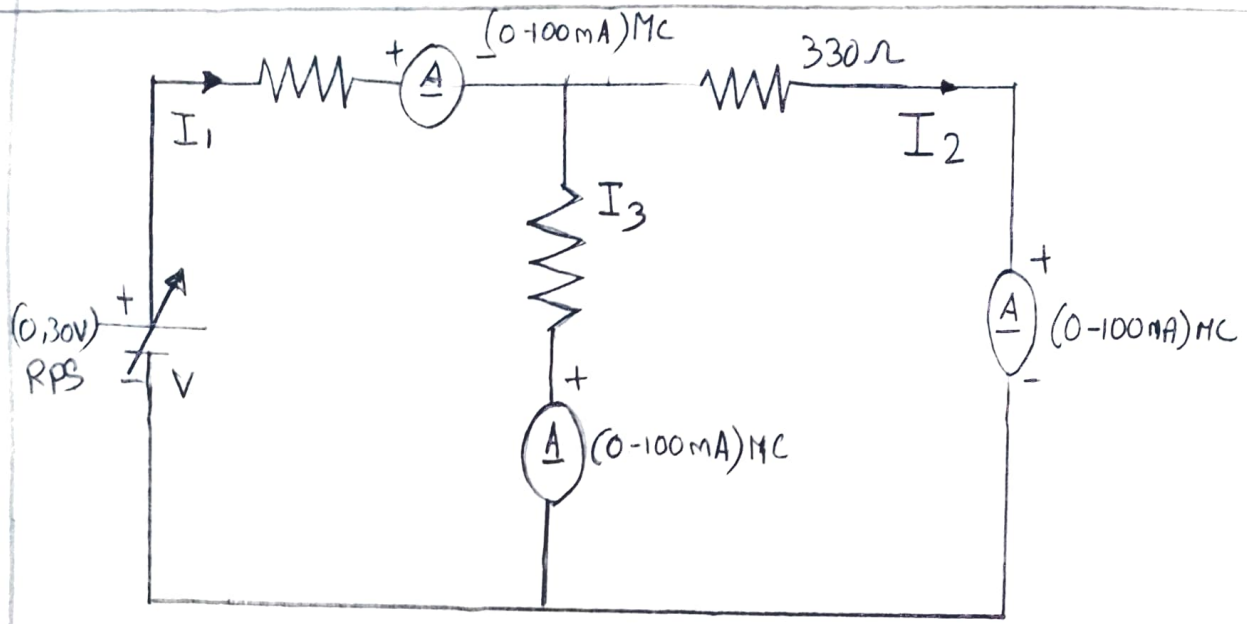


S.No	V (Volts)	I_1 (mA)	I_2 (mA)	I_3 (mA)	$I_1 = I_2 + I_3$ (mA

Exp no 1

Simulation and experimental verification of electrical circuit problems using Kirchoff's voltage and current law.

Aim: To verify i.) Kirchoff's current law
ii.) Kirchoff's voltage law.

Apparatus Required

S.NO	Name of the apparatus	Range	Type	Quantity
1	RPS			
2	Resistor			
3	Ammeter			
4	Voltmeter			
5	Bread board			
6.	Connecting wire.			

Software Required. MATLAB 7.1

S. No.	V (Volts)	I_1 (mA)	I_2 (mA	I_3 (mA)	$I_1 = I_2 + I_3$ (mA)

S.NO	V Volts	V_1 Volts	V_2 Volts	V_3 Volts	$V = V_1 + V_2 + V_3$ Volts

Kirchoff's current law:

Procedure:

* Connect the circuit as per the circuit diagram
* Switch on the supply.
* Set different values of voltage in RPS
* Measure the corresponding values of branch current I_1, I_2, I_3.
* Enter the readings in tabular column

Formula:

Σ Current entering a node = Σ Current leaving the node.

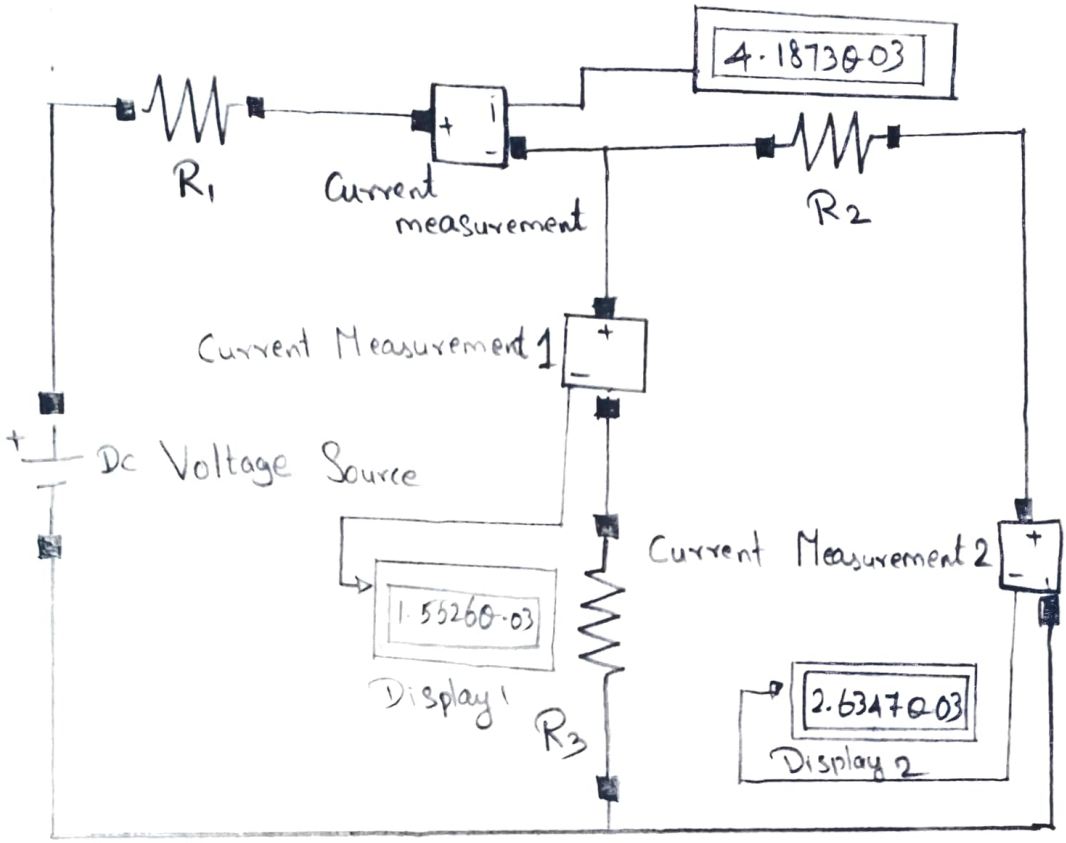
$$I_1 = I_2 + I_3$$

Kirchoff's Voltage law:

Procedure:

* Connect the circuit as per the diagram.
* Switch on the supply.
* Set different values of voltage in RPS
* Measure the corresponding value of voltage across R_1, R_2 and R_3

S. NO.	V Volts	V_1 Volts	V_2 Volts	V_3 Volts	$V = V_1 + V_2 + V_3$ Volts


4.18730-03
R1
Current measurement
R2
Current Measurement 1
Dc Voltage Source
Current Measurement 2
1.55260-03
Display 1
R3
2.63470-03
Display 2

Formula

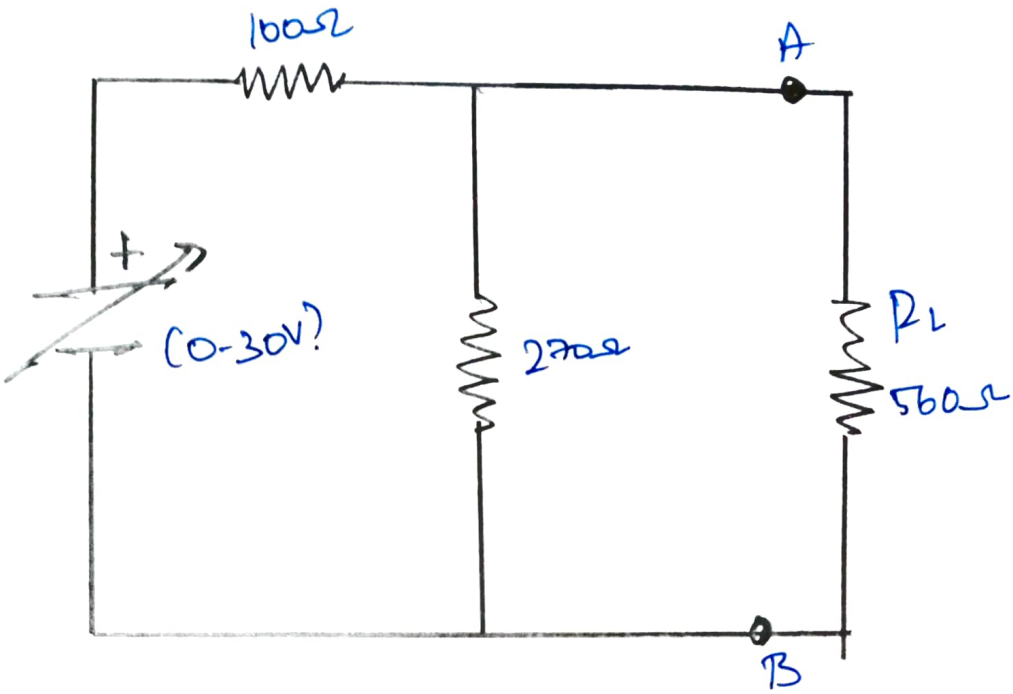
Σ Voltage in closed loop $= 0$

$$V - V_1 - V_2 - V_3 = 0$$

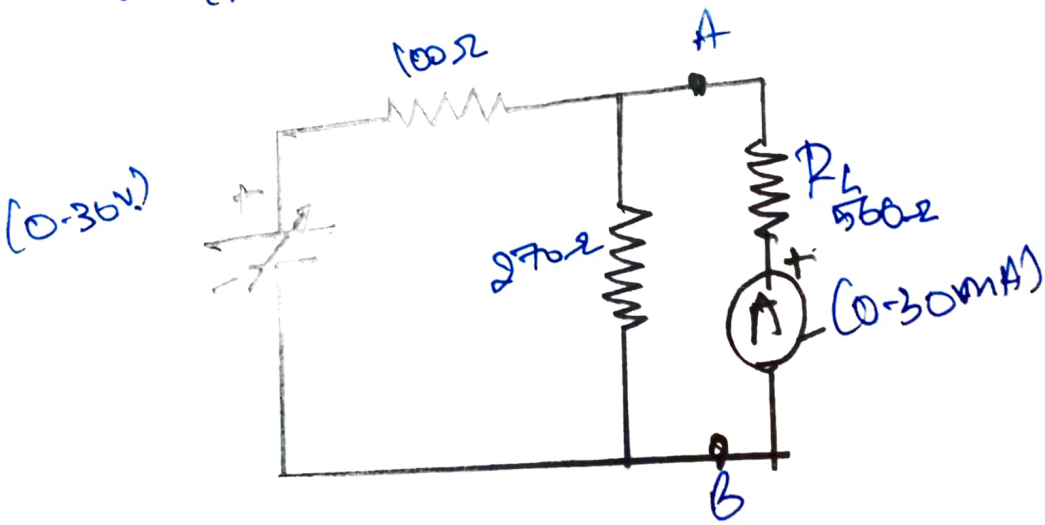
Simulation Procedure:

* Open a new MATLAB model
* Connect the circuit as shown
* Debug and run the circuit
* For different input voltages, record the current and voltages and verify with theoretical value

Result: Thus the Kirchoff's Current and Voltage laws are verified.



To find load Current.



Exp no: 2

Simulation and Experimental verification of Electrical circuit problem using Thevenin's Theorem.

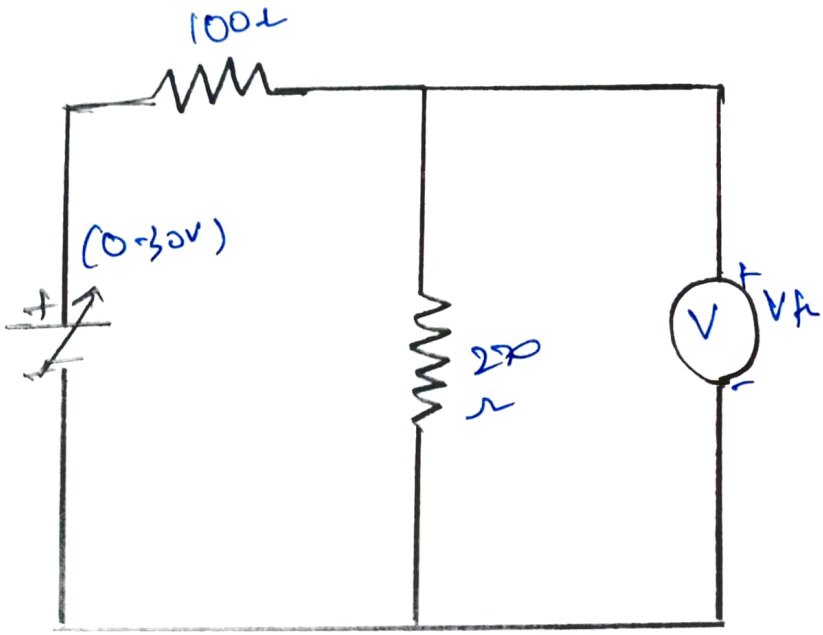
Aim: To verify Thevenin's Theorem.

Apparatus Required:

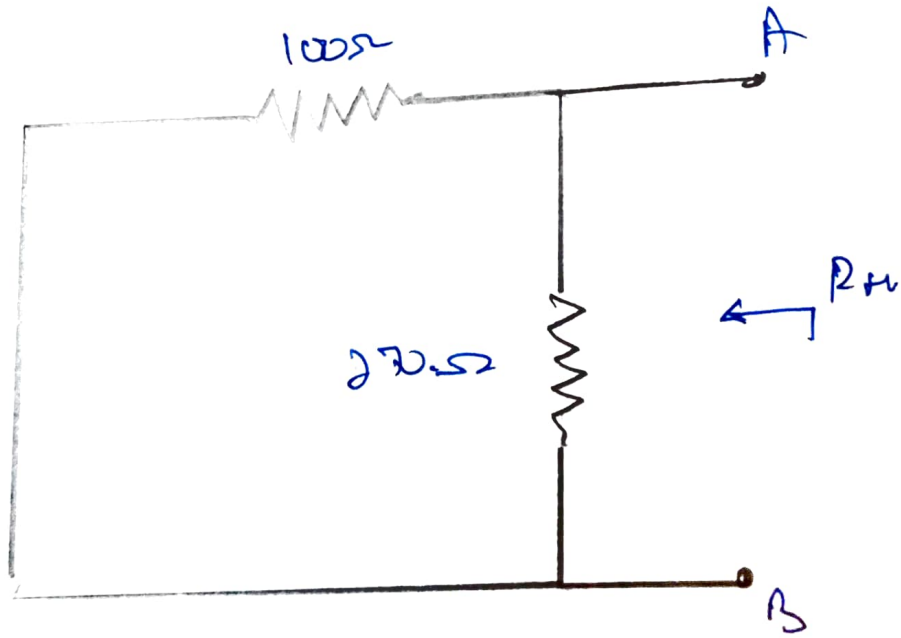
S.no	Name of the Equipment	Range	Quantity.
1	Resistor		
2	DC power supply		
3	Voltmeter		
4	Ammeter		
5	Wires		
6	Breadboard		

Software Required: MATLAB 7.1

To find V_{th}:



To find R_{th}



Thevenin's Theorem:

Statement: Any two terminal linear network composed of voltage sources, current sources and resistors, can be replaced by equivalent two terminal network consisting of an independent voltage source in series with a resistor.

Procedure:

* Give connections as per the circuit diagram
* Measure the current through R_L in the ammeter
* Open circuit the output terminals by disconnecting load resistance R_L
* To find the R_{th}, replace the voltage src by short circuit Voltage V_{th}.
* Give connections as per the Thevenin's Equivalent Circuit
* Measure the current through load resistance in Thevenin's Equivalent Circuit.

Simulation Procedure

* Open a new MATLAB model
* Connect the circuit as shown.
* Debug and run the circuit
* For different input voltages, record the current and voltage and verify with theoretical values

Result: Thus, the thevenin was verified.

Exp no. 3

Simulation and Experimental verification of electrical circuit problems using Norton's Theorem.

Aim : To verify Norton's theorem.

Apparatus Required:

S.No	Name of Equipment	Range	Quantity
1.)	Resistor		
2.)	DC power supply		
3.)	Voltmeter		
4.)	Ammeter		
5.)	Wires.		
6.)	Bread Board.		

Software Required: MATLAB 7.1

Norton's Theorem:

Any two terminal linear network (N) a voltage source, current source and resistor, can be replaced by an equivalent two-terminal network consisting of an independent current source in parallel with a resistor.

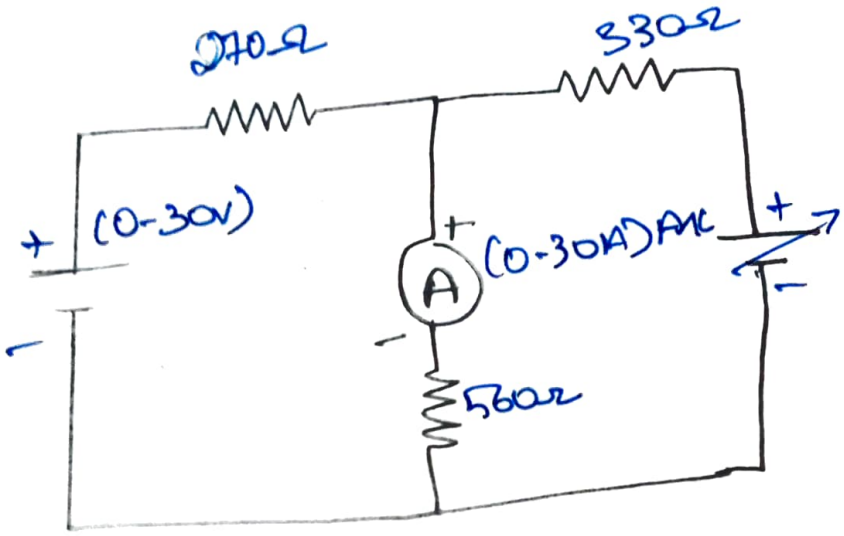
Procedure:

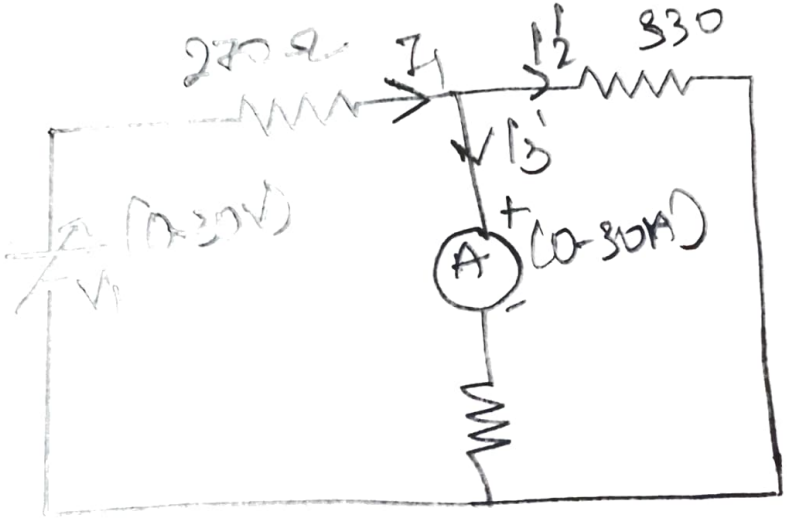
* Give connections as per the diagram.
* Measure the current through R_L in ammeter
* Short circuit A and B through an ammeter
* Measure the norton current in ammeter.
* Give connections as per the Norton's Equivalent circuit
* Measure the current through R_L
* Verify Norton's theorem by comparing current in RL.

Simulation Procedure:

* Open new MATLAB
* Connect the circuit as shown.
* Debug and run the circuit
* For different input voltage, record the current and voltage and verify with theoretical value.

Result: Thus the Norton's theorem was verified


270Ω
330Ω
+
(0-30V)
-
+
A
(0-30mA) AMC
-
560Ω
+
-


270Ω
I1
I2
330
I3
(0-30V)
V1
+
A
(0-30mA)
-

Exp No: 4

Simulation and experimental verification of Electrical circuit problem using superposition theorem.

Aim: To verify superposition theorem.

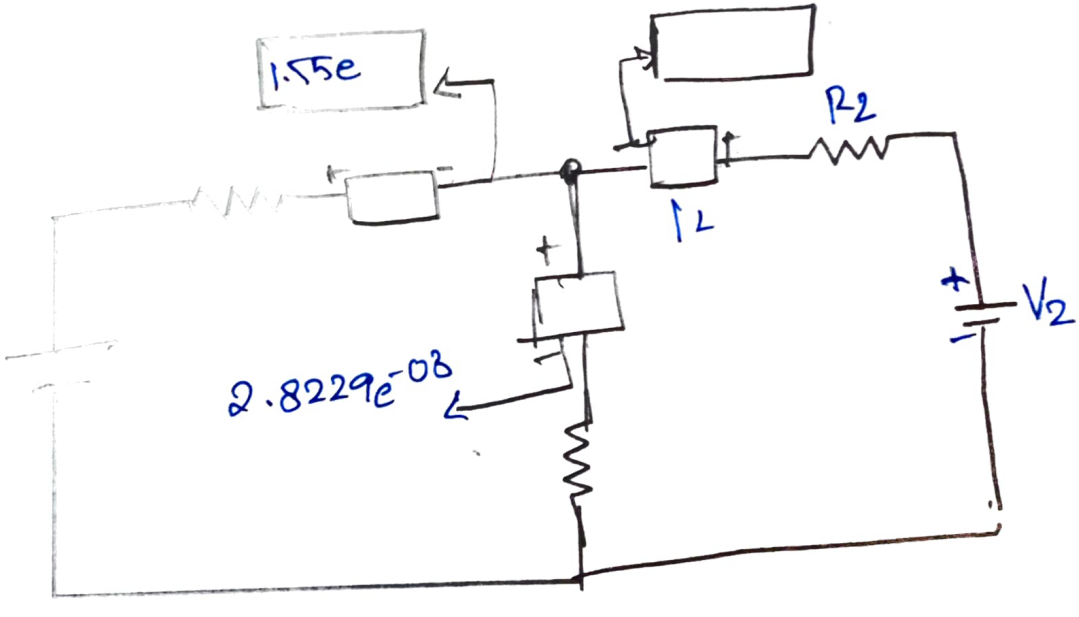
Apparatus Required:

S.no	Name of Equipment	Range	Quantity.
1	Resistor		
2	DC power supply		
3	Voltmeter		
4	Ammeter		
5	Wire		
6	Bread Board.		

Software Required. MATLAB 7.1

V_1	V_2	V_3

V_1	V_2	V_3



Superposition theorem:

Formula:

$$I_3'' + I_3' = I_3$$

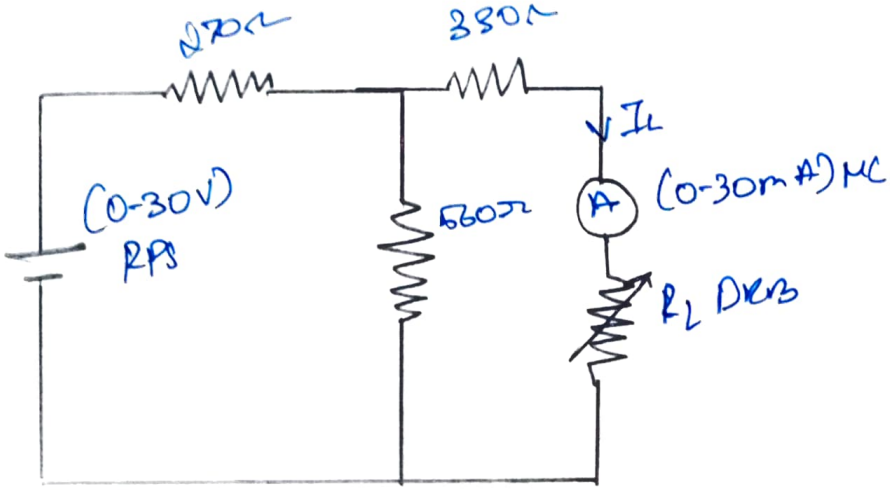
Procedure:

* Connections are made as per the circuit
* Switch on the supply
* Note the reading of 3 ammeter.
* One of the voltage source V_1 is connected and the other voltage source is V_2.
* Note the three ammeter readings
* Note the three ammeter reading
* Algebric add the currents in steps and above the compare with the current in step to verify the theorem

Simulation Procedure:

* Open a new MATLAB model
* Connect the circuit.
* Debug and run the circuit
* For differential voltage, record the current and voltage and verify.

Result: Thus the superposition theorem was verified



Observation table

S.No	R_L (KΩ)	I_L (mA)		$P=I^2R_L$	
		Practical value	Theory value	Practical value	Theory value

Exp 5.

Simulation and experimental verification of electrical circuit problems using maximum Power Transfer theorem.

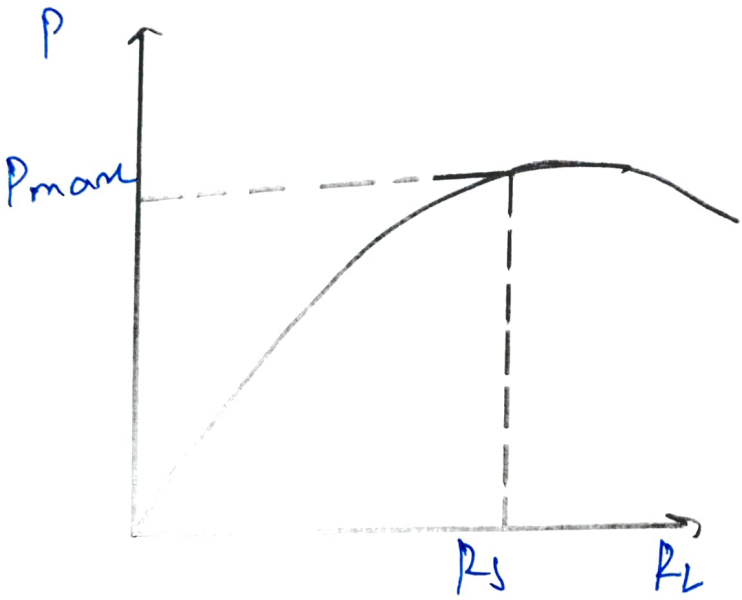
Aim : To verify maximum power transfer theorem.

Apparatus Required:

SNO	Name of Equipment	Range	Quantity
1.)	Resistor		
2.)	DC power supply		
3.)	Voltmeter		
4.)	Ammeter		
5.)	Wires		
6.)	Bread Board.		

Software Required : MATLAB 7.1

Model Graph



Procedure:

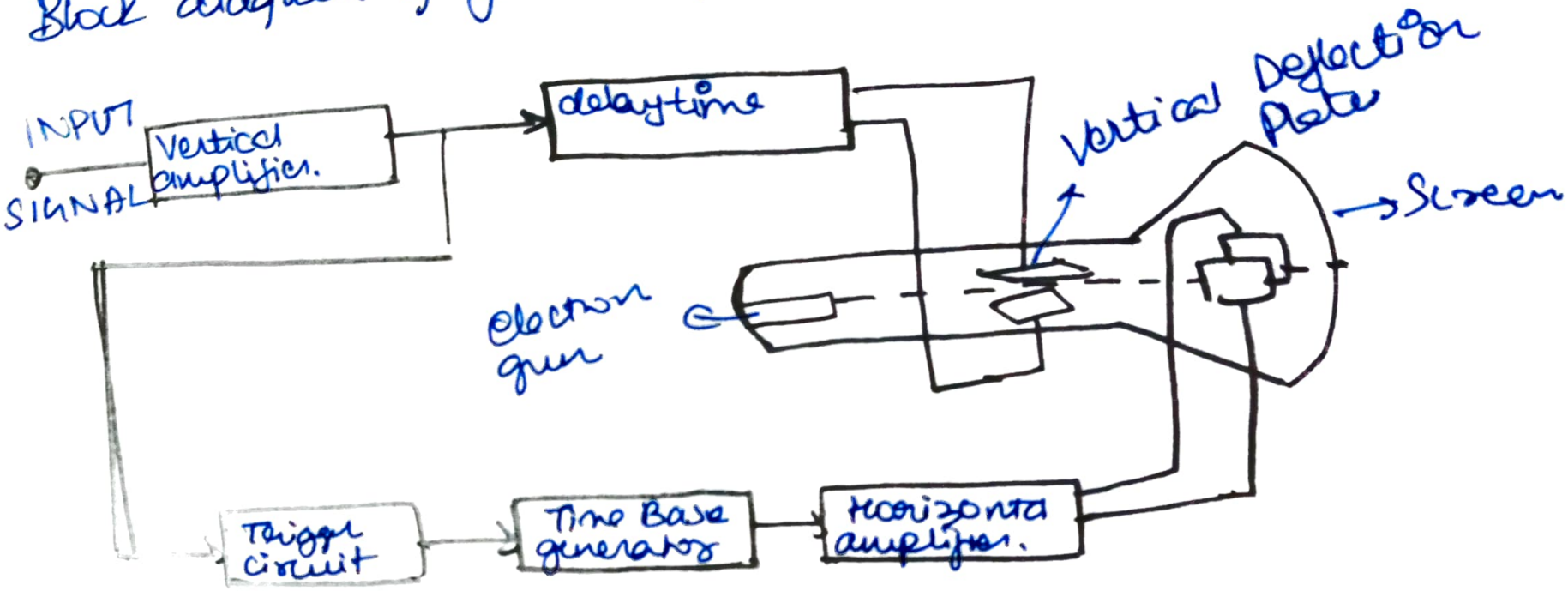
* Find the load current for the minimum position of Rheostat theoretically.
* Select the ammeter Range
* Give connections as per the circuit diagram.
* Calculate the power delivered in R_L
* Plot the curve between R_L and power.
* Check whether the power is maximum at a value of load resistance that equal source resistance.

Simulation Procedure:

* Open a new MATLAB
* Connect the circuit
* Debug and run the circuit
* For different input voltages, record the current and voltages and verify with value

Result: Thus the Maximum power transfer theorem was verified.

Block diagram of general purpose CRO:



Exp no: 6

Study of analog and digital Oscillation and measurement of sinusoidal voltage frequency and power factor.

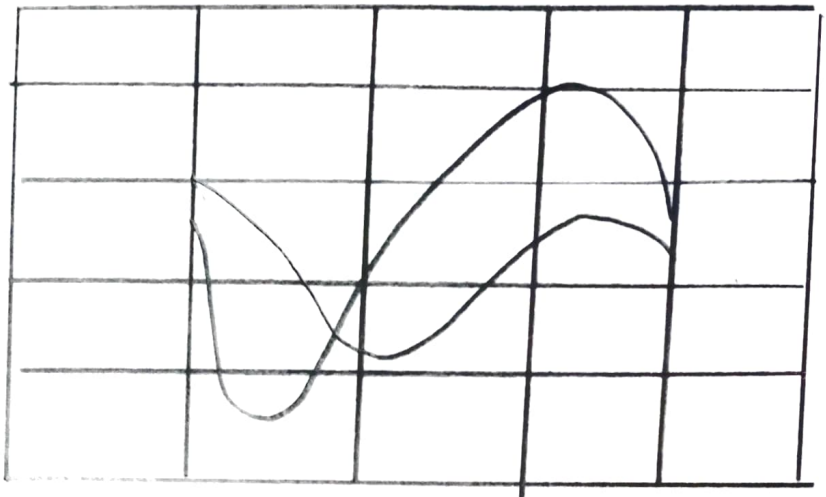
Aim: To understand the cathode ray oscilloscope and to become familiar with it's usage, and to function generator to measure amplitude, frequency and time period.

Apparatus Required

S.no	Name of Equipment	Qty
1	CRO	
2	function generator	
3	Probe	

Procedure.

* Measurement of Voltage using CRO: A voltage can be measured by noting deflection
* Measuring of frequency using a CRO by determining a correctly calibrated CRO can be used in confunction.



phase shift in cm

one period in cm.

S.NO	Type of wave	Time period	Amplitude	Theory frequency	Practical frequency
1					
2					
3					

* A simple method of determining the frequency of a signal is to estimate it's periodic time from the trace on the screen of a CRT.

* The calibrated time scale can be used to calculate the phase shift between two sinusoidal signal of the same frequency. If a dual trace or beam CRO is available to display the two simultaneous both of the signal will appear in proper time perspective.

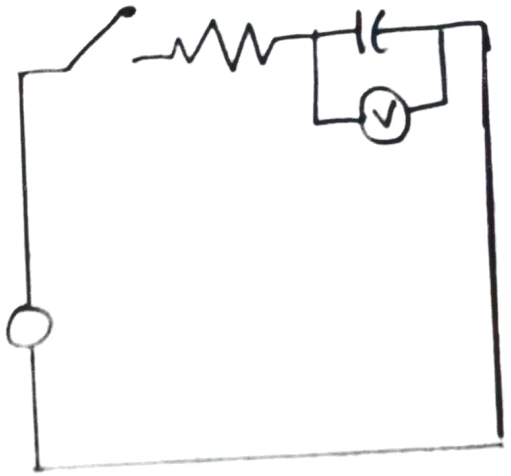
$$\theta = \frac{\text{phase shift in cm}}{\text{one period in cm}}$$

Measurement of PF:-

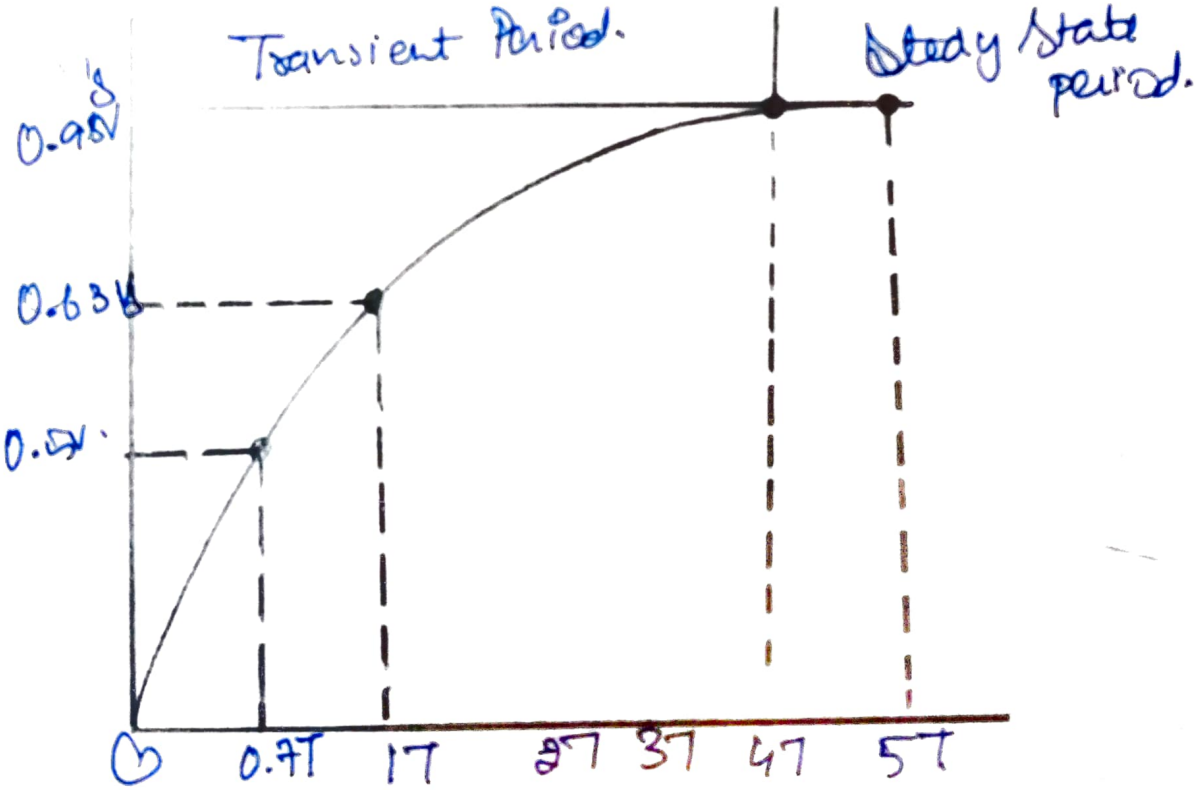
$$pf = VI\cos\theta$$

Result: Thus the analog and digital oscilloscopes were studied and measurement of sinusoidal frequency and power factor.

Circuit diagram for RC transient



Model graph:



Expno 7:

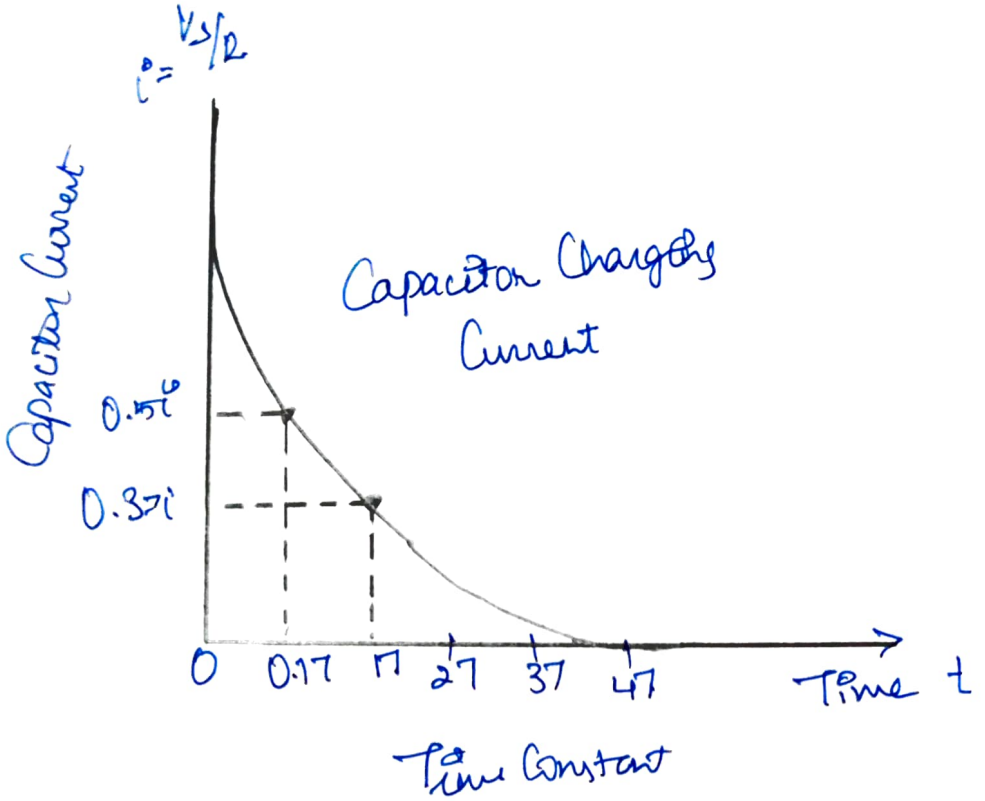
Simulation and experimental validation of R-C electric circuit transient

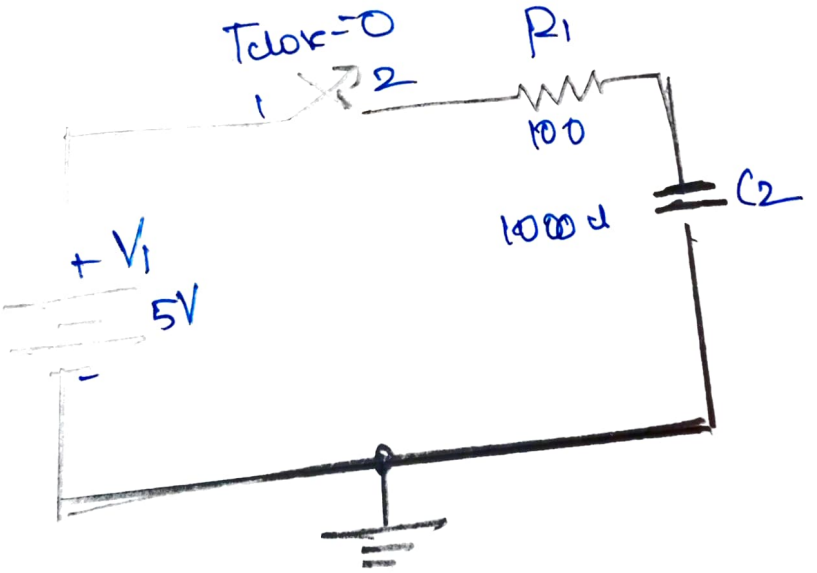
Aim :- To find the time constant of series RC dielectric circuit

Software Required: Pspice lite

Apparatus Required.

S.NO	Name of Equipment	Range	Quantity
1.)	Resistor	100Ω	1
2.)	Function generator	–	1
3.)	Voltmeter	(0-30V	1
4.)	Decade capacitance box	–	1
5.)	Wires.	Single	Few 10
6.)	Bread Board.		1


i = Vs/R
Capacitor Current
Capacitor Charging Current
0.5i
0.37i
0
0.1τ
τ
2τ
3τ
4τ
Time t
Time Constant


Tclok=0
1
2
R1
100
C2
1000 u
+ V1
5V
-

Procedure:

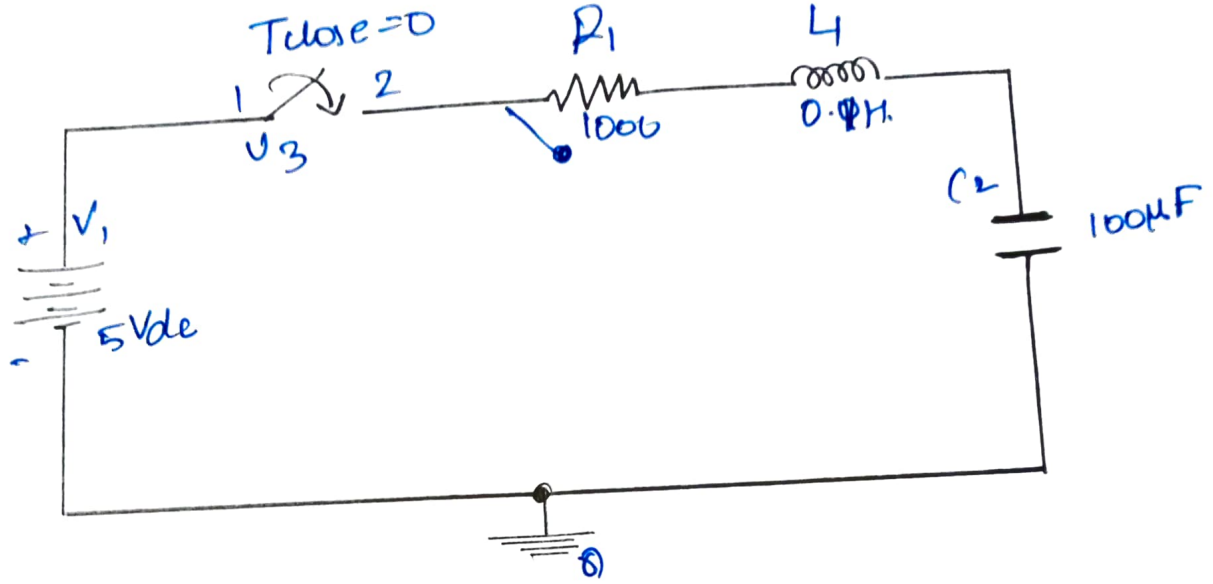
* Make the connection as per the circuit
* Vary the frequency by using function generator
* For different frequencies tabulate the value of voltage across capacitor.
* Calculate the time period.

Simulation Procedure.

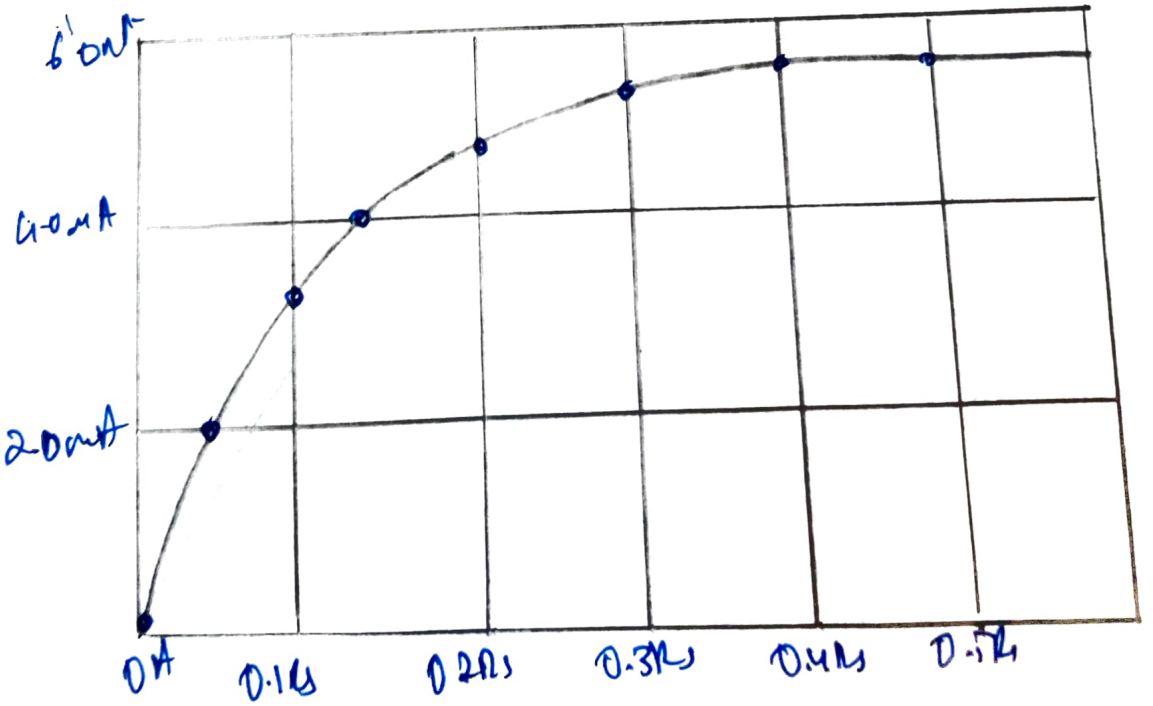
* Open a new Pspice capture project
* Construct the circuit
* Create simulation profile

Result: Thus the transient response of RC circuit found practically.

Circuit diagram



Output waveform.



Exp no. 8

Simulation and experimental validation of frequency response of RLL electric circuit

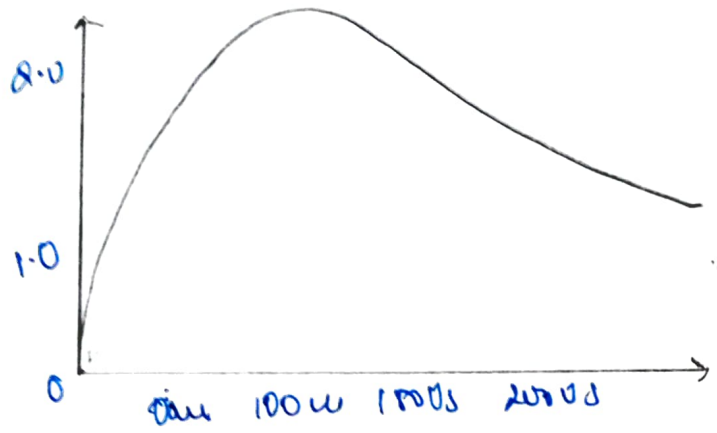
Aim :- To simulate and find the frequency response of RLC electric circuit

Software Required: PSpice Lite

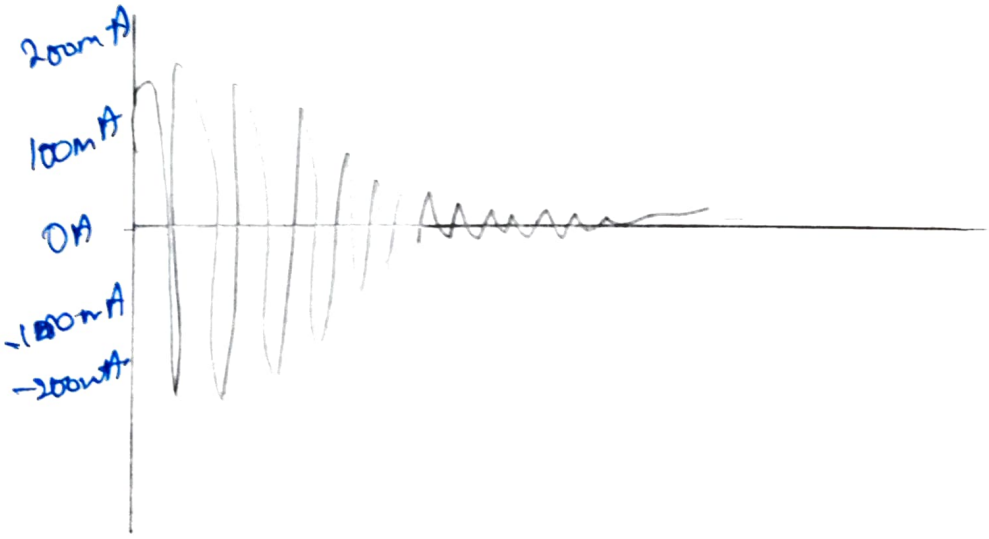
Procedure :

* Make the connection as per the circuit diagram.
* Vary the frequency by using function generator.
* For different frequencies tabulate.
* Calculate the time period.
* Plot the graph for time period Vs voltage across the capacitor

Case (ii)



Case (iii)



Simulation procedure:

* Open a Pspice Capture Project
* Connect the circuit as shown
* Create Simulation profile and run the model.

Result:

Thus the transient response of RLC circuit are found practically.

Exp no. 9

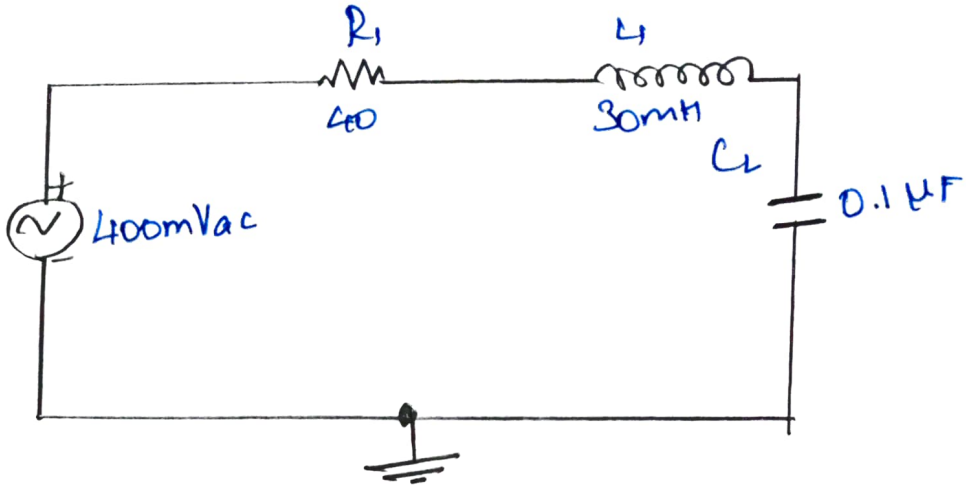
Design and Simulation of Series Resonance Circuit.

Aim: To plot the current vs frequencies graph of series resonant circuit and hence measure their bandwidth.

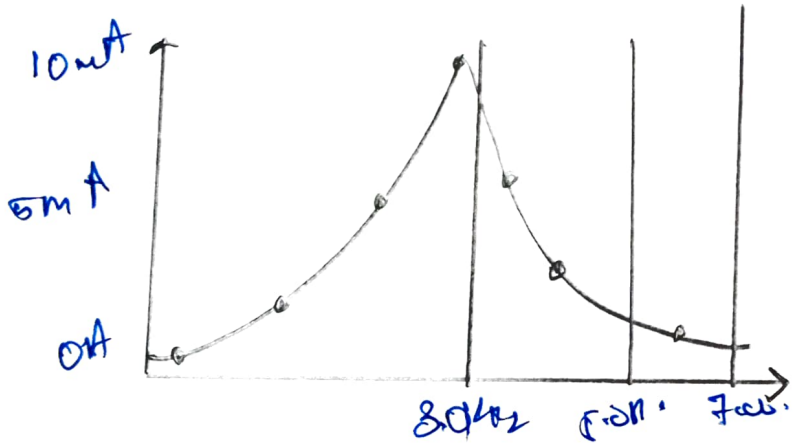
Software Required: Pspice 9.1 Lite

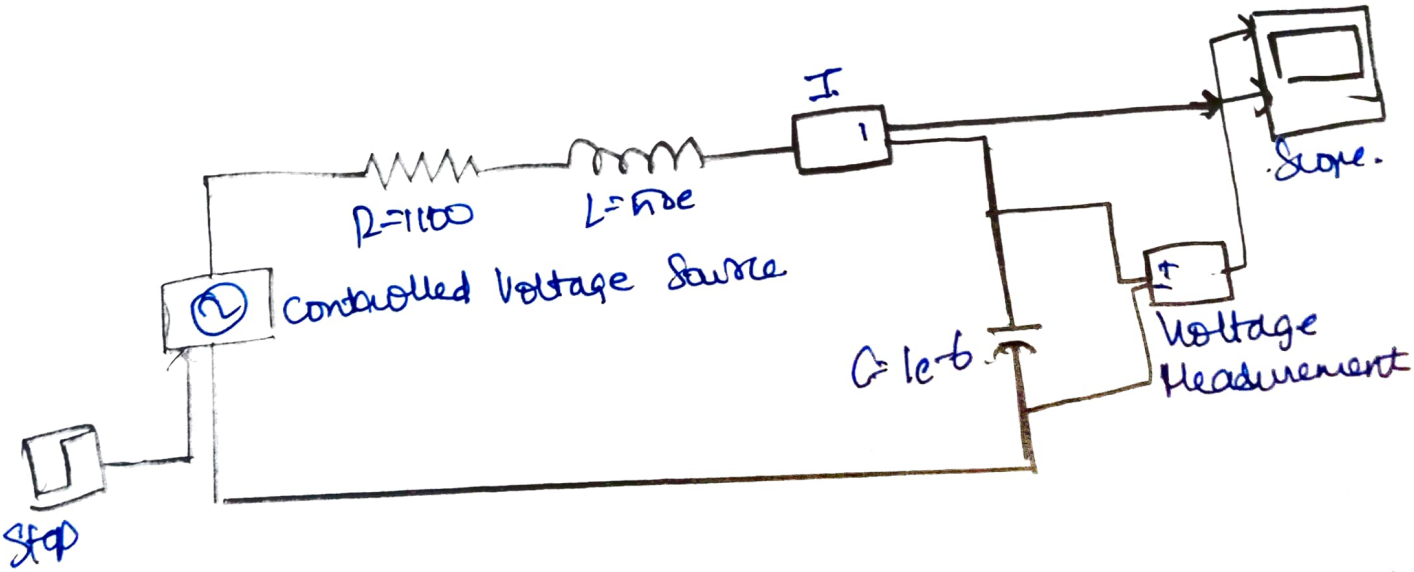
Apparatus Required.

S.No	Name of Equipment	Type	Range	Quantity
1.)	Function Generator	–	–	1
2.)	Resistor	–	1000Ω	1
3.)	Decade Inductance box	–	–	1
4.)	Decade Capacitance box	–	–	1
5)	Ammeter	MI	(0-30) mA	1
6.)	Connecting wire	Single strand	–	Few nos

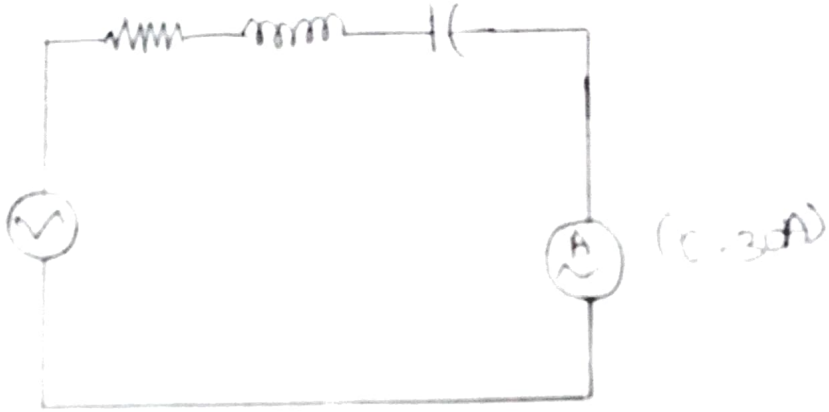


Output waveform.





Circuit diagram.



Observation table.

S.No	Freq in Hz	Current in A

Procedure:

* Connect the circuit.
* Vary the frequency and note down the corresponding meter readings.
* Draw the current vs frequency curve and measure the bandwidth

Simulation Procedure:

* Open a new MATLAB. a Pspice project
* Connect the circuit
* Debug and run the circuit
* For Pspice Capture run the model create simulation profile.

Result: Thus the current Vs frequency graph of series and parallel resonant circuit were plotted and the bandwidth, resonant frequency.

i) Series Resonant

Resonant frequency =

Bandwidth =

Q-Factor =

Exp no. 10

Design and Simulation of parallel Resonant Circuit

Aim: To plot the magnitude & phase angle of current for various frequencies for the given RLC.

Software Required: MATLAB PSpice 9.1 Lite

~~Name of the Component~~

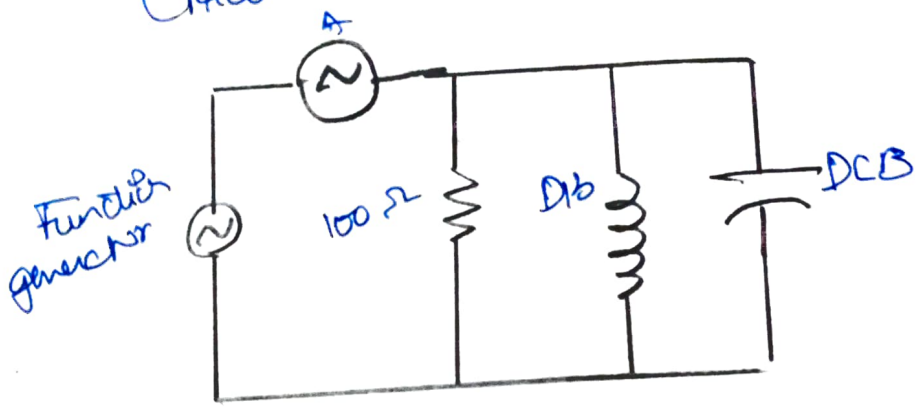
Procedure.

1. Connect the circuit as per the circuit diagram.

2. Vary the frequency and note down the corresponding meter reading.

3. Draw the current Vs frequency curve and measure the band width, resonant frequency and Q factor.

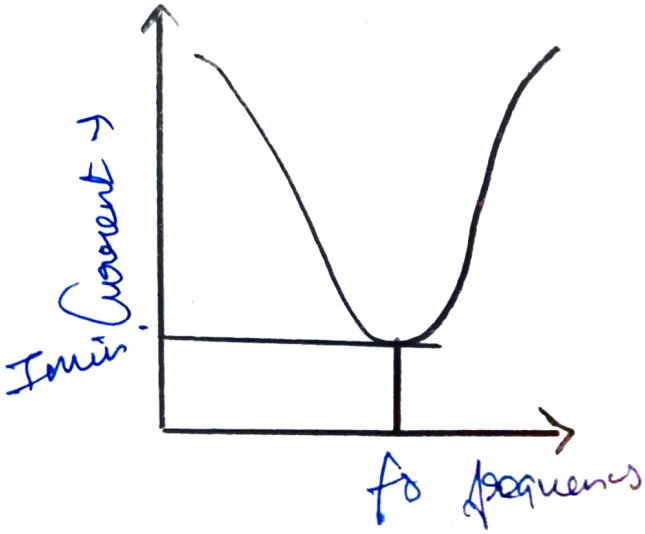
Circuit diagram.



Observation table:

S.no	frequency	Output

Model graph.



Simulation Procedure:

1. Open a new MATLAB/SIMULINK model or PSpice CAPTURE project.
2. Connect the circuit as shown in the figure.
3. Debug and run the circuit.
4. By double clicking the power gui plot the value of current for the different values of frequencies (for MATLAB Simulink.)
5. For PSpice CAPTURE run the model create simulation profile and run the model.

Result:

Thus the current Vs frequency graphs of Series and parallel resonant circuits were plotted and the bandwidth, resonant frequency and Q factor were measured. They were found to be

(a) Parallel resonance

Resonant frequency =

Bandwidth =

Q - factor =