FUNDEMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING

(ECE-1002)

VIT AP

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ECE LAB REPORT

- ## LIST OF EXPERIMENTS

Content Outlines		
Weeks	**Topics**	**Task/Reading**
1	***Experiment #1***: Ohm's Law & Series and parallel circuits	***Experiment #1***
2	***Experiment #2***: Kirchoff's current law	***Experiment #2***
3	***Experiment #3:*** kirchoff's voltage law	***Experiment #3***
	Experiment #4: Thevenin's and Norton's theorem and Maximum power transfer theorem	***Experiment #4***
4	***Experiment #5***: Superposition Theorem	***Experiment #5***
5	***Experiment #6:*** verification of diode	***Experiment #6***
6	***Experiment #7:*** design of half rectifier	***Experiment #7***
7	***Experiment #8:*** design of Bridge rectifier with and without capacitor	***Experiment #8***
9	***Experiment #9:*** BJT Characteristic and Biasing Circuits	***Experiment #9***

EXPERIMENT NO.1

TITLE : verification of ohm's law (simulation)

OBJECTIVE :

- *To verify Ohm's law (V=IR) where current through a resistor is proportional to the voltage across it.*
- *To verify that in a series circuit;*
  - *The total resistance is equal to the sum of the individual resistors.*
  - *The voltage drops across the resistors equals to the applied voltage.*
  - *The value of the current is the same in all parts of the circuit.*
- *To verify that in parallel circuits;*
  - *The equivalent resistance is the reciprocal of the sum of reciprocals of the individual resistors.*
  - *The branch current in parallel equal to the supply current.*
  - *The voltage drop across each resistor in parallel is the same.*
  - *To verify by measurement and calculation for two different networks: the total current and the branch values, the voltage drop across various parts of the networks and the method for determining the equivalent resistance of such networks.*

- *Equipments :*
  - *Instruments*
  - *DC power supply*
  - *Two digital multimeters.*
  - *Resistors ; 1.0kΩ, 1.5kΩ, 6.8kΩ*

EQUIPMENT : computer and ni multisim software

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CIRCUIT DIAGRAM :

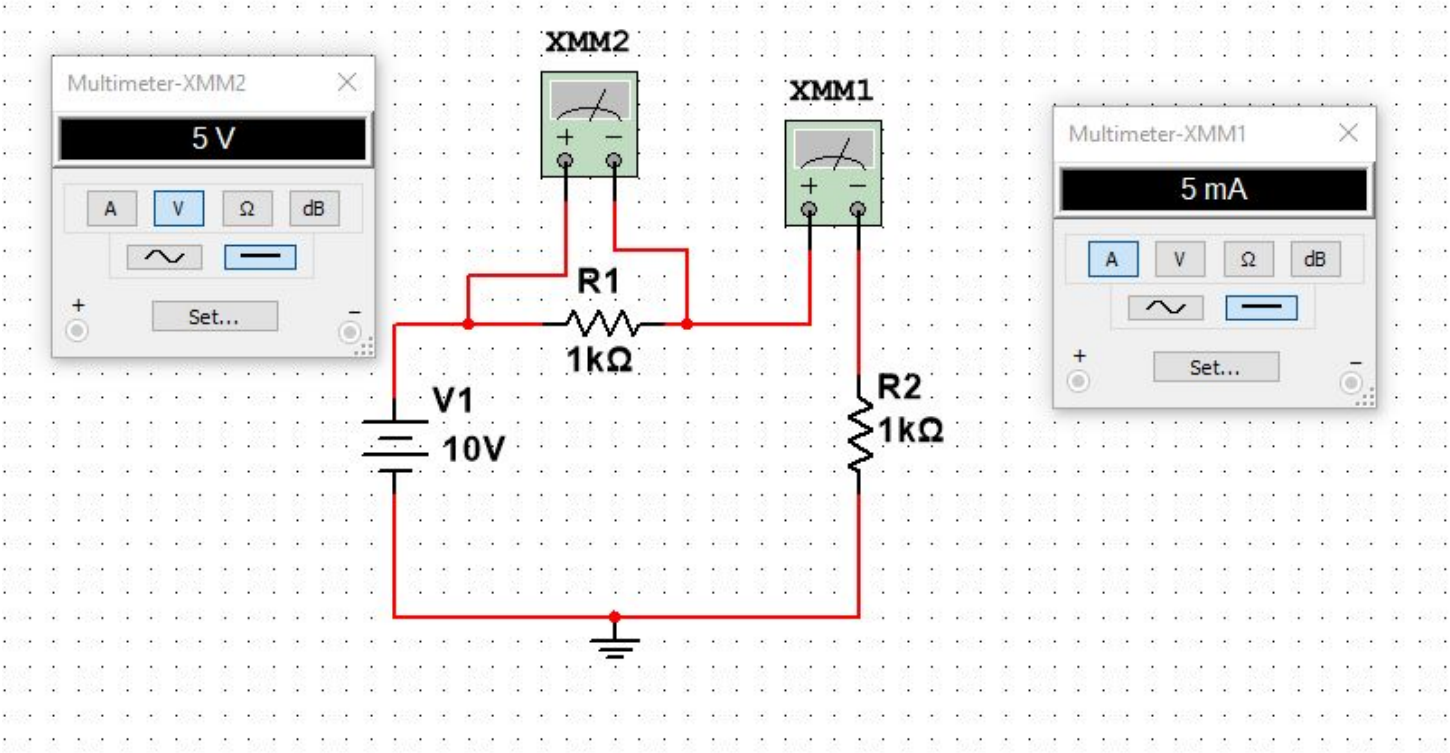

FIG 1 DC CIRCUIT

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EXPERIMENT NO. 2

TITLE: Kirchhoff's Current Law

Objective:

a) To verify Kirchhoff's current laws.

Equipment:

Instruments

DC power supply

Three digital multimeters.

Components Resistors ; 300Ω (2), 330 Ω, 1.8 kΩ, 2.7 kΩ, 3.0 kΩ

Procedures:

Part A : Kirchhoff's Current Law:

1. Measure the branch currents entering node A by placing ammeter as shown in *FIG*
2. Record the magnitude and the direction of the current as indicated by each ammeter in *Table*

CIRCUIT DIAGRAM :

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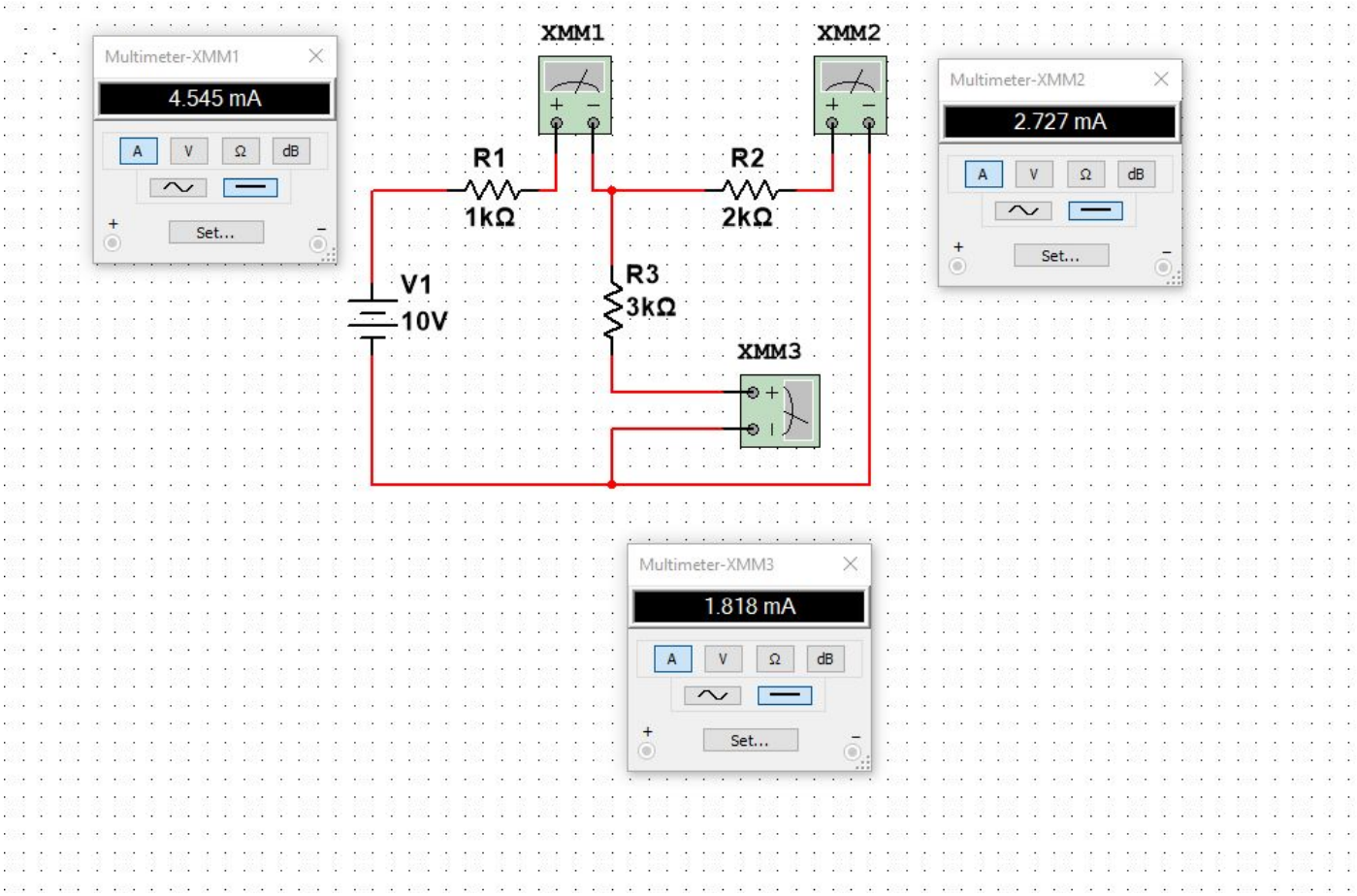

EXPERIMENT NO.3

Objective:

b) To verify Kirchhoff's voltage laws.

Equipment:

Instruments

DC power supply

Three digital multimeters.

Components Resistors ; 300Ω (2), 330 Ω, 1.8 kΩ, 2.7 kΩ, 3.0 kΩ

Part A: Kirchhoff's Voltage Law:

- Measure the resistance of each resistor. Set the supply voltage to 10V. Record the measured values in *Table*
- Construct the circuit shown in
- Commence at point A and measure the potential difference between each successive pair of lettered terminals for Mesh 1. i. e. A-B, B-C, C-D and D-A.

(Note: DMM's probes have to be placed consistently.)

- Record down the measured values in *Table*
- Measure the potential difference for the points AC, CE and EA. Verify Kirchhoff's voltage law using the displayed values. (Note that V_{CA} is actually $V_C - V_A$). What can be deduced from this condition? Record the measured values in *Table*

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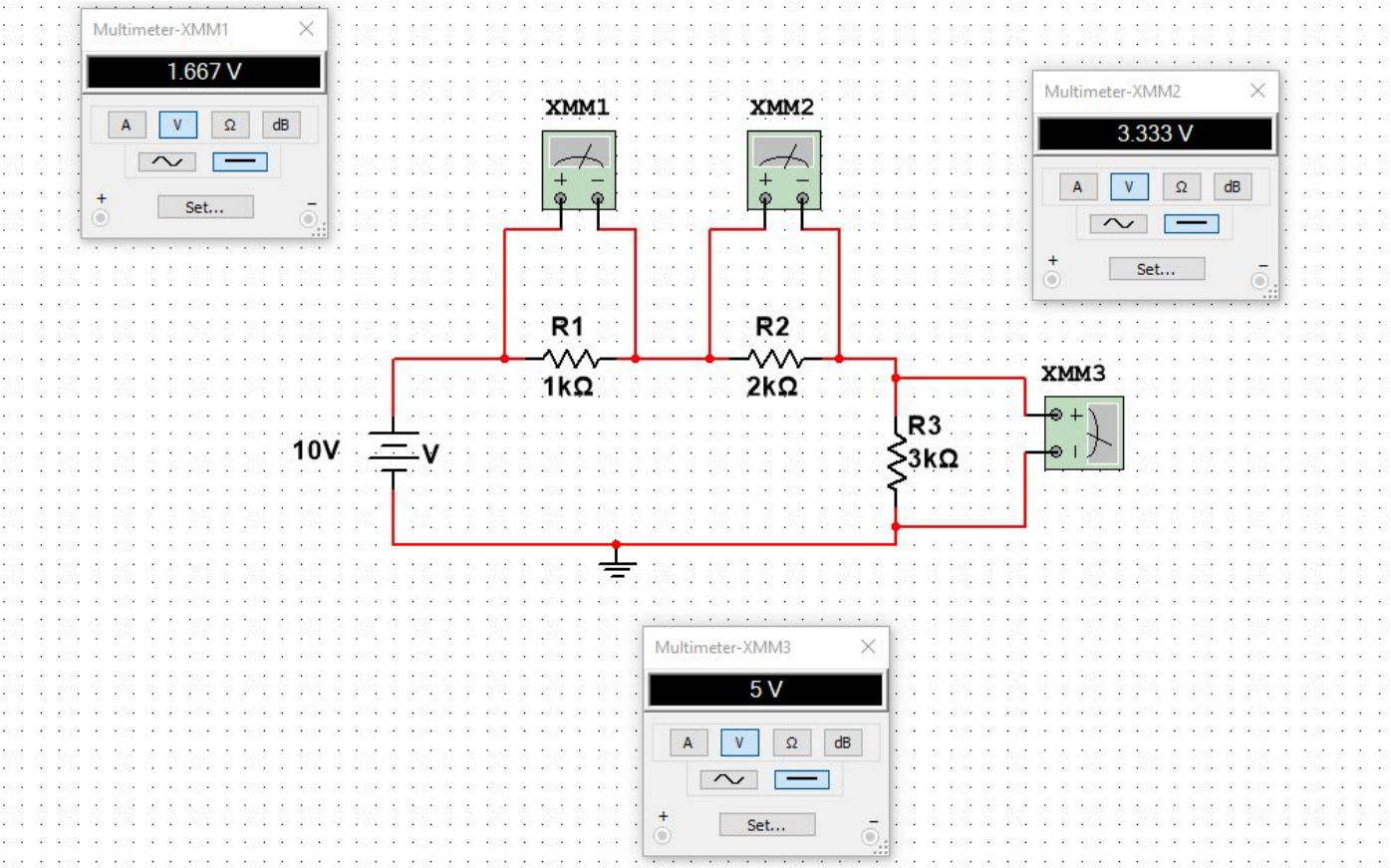
CIRCUIT DIAGRAM :



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EXPERIMENT NO. : 4

Title : Thevenin's & Norton's Theorem and Maximum Power Transfer Theorem

Objectives:

a) To applied Thevenin's and Norton's theorems in finding the current flowing in a particular resistor (variable load) in a particular network.

b) To verify the theorems by comparing the simulated values to those obtained by measurement.

c) To verify the maximum power transfer theorem.

Equipment:

Instruments

DC power supply
Digital multimeters

Components

Resistors 1.8kΩ; 3.6kΩ; 820Ω; 100 Ω (2); 180 Ω
Rheostat (2)

Diagram :

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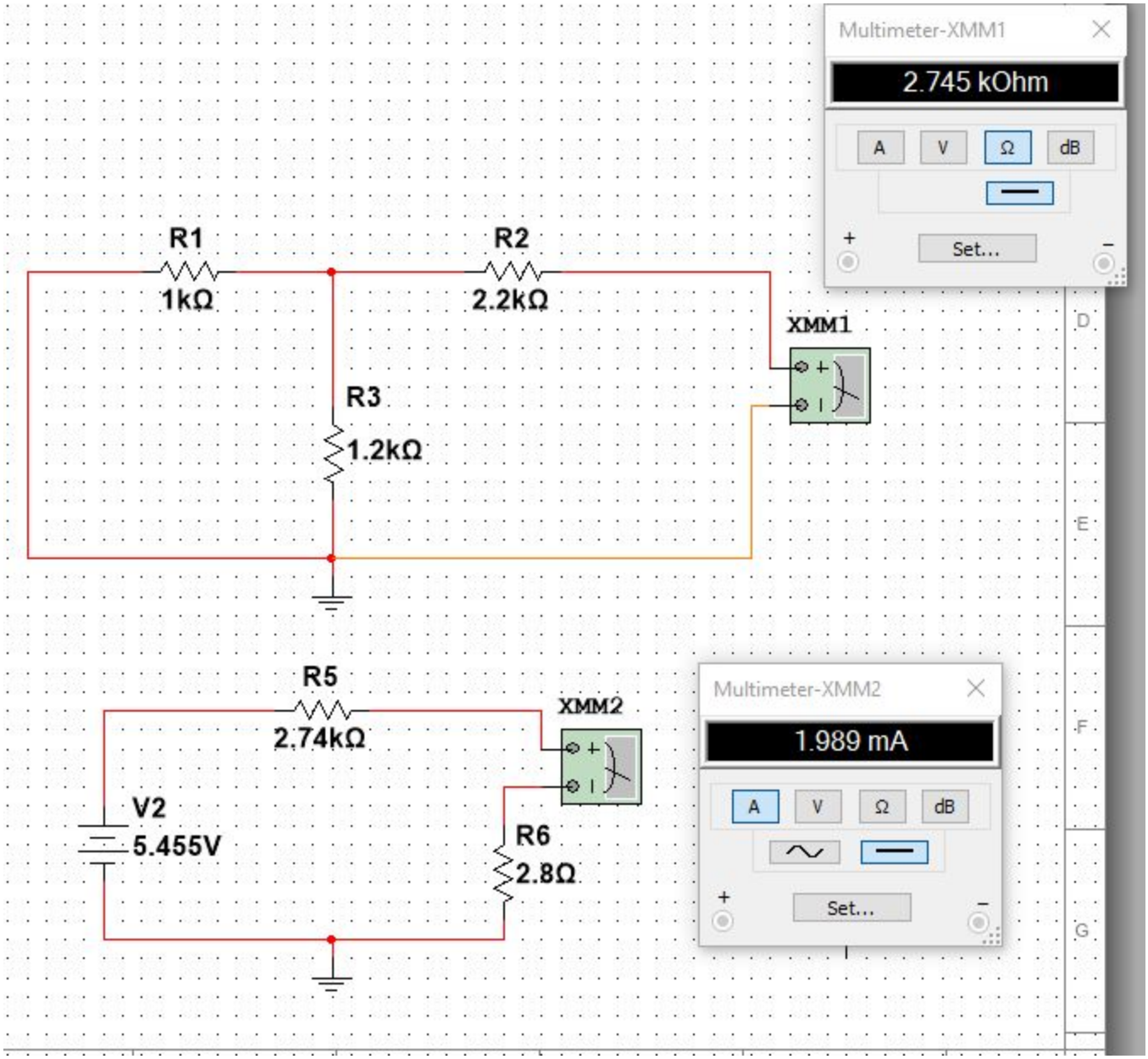

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EXPERIMENT NO. : 5

TITLE : Superposition Theorem

Objective:

To verify experimentally the Superposition theorem which is an analytical technique of determining currents in a circuit with more than one EMF source.

Equipment:

Instruments

Two DC power supplies of suitable voltage and current ratings.
Three DC voltmeters (0-5 V).
One multimeter.
Trainer board

Components

Three potentiometers (10 kΩ)

Procedures:

1. Set up the network (circuit) as in *Fig. 3.1*.
2. Keep both sources active in the circuit by keeping the poles of SPDT s in proper position.
3. Apply 5 volts from E_1 and 10 V from E_2.
4. Set the rheostats R_1, R_2, R_3 at such value so that none of the ammeter readings I_1, I_2, I_3 exceeds the power supplies (E_1 and E_2 current ratings and the rheostat current) ratings.
5. Measure the current I_2 and record it in *Table 1*.
6. Render E_2 inactive.
7. Measure the current I_2' in the branch R_2 and record it in *Table 1*.
8. Render E_1 inactive.
9. Measure the current I_2'' in the branch R_2 and record it in *Table 1*.
10. Verify if $I_2 = I_2' + I_2''$ which would validate the superposition theorem for this particular circuit.
11. Repeat steps 4 to 10 by changing R_1, R_2, and R_3 and take a few more sets of readings.
12. Find theoretically the current I_2 with reference to *Fig. 3.1* by applying the superposition theorem considering E_1 = 15 volts, E_2 = 20 volts and R_1, R_2, R_3 at their measured values recorded in *Table*

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CIRCUIT DIAGRAM :

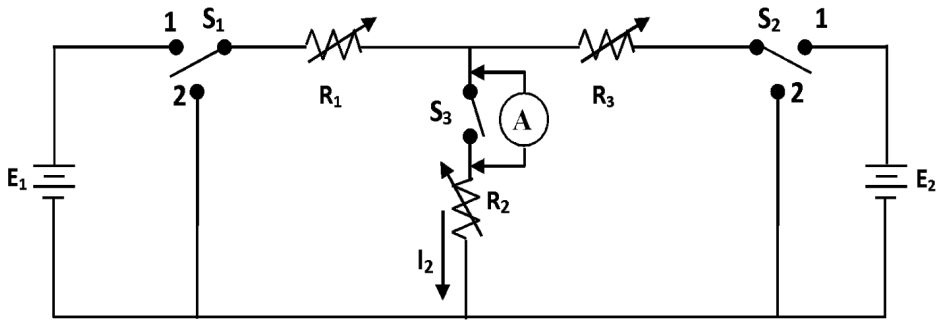
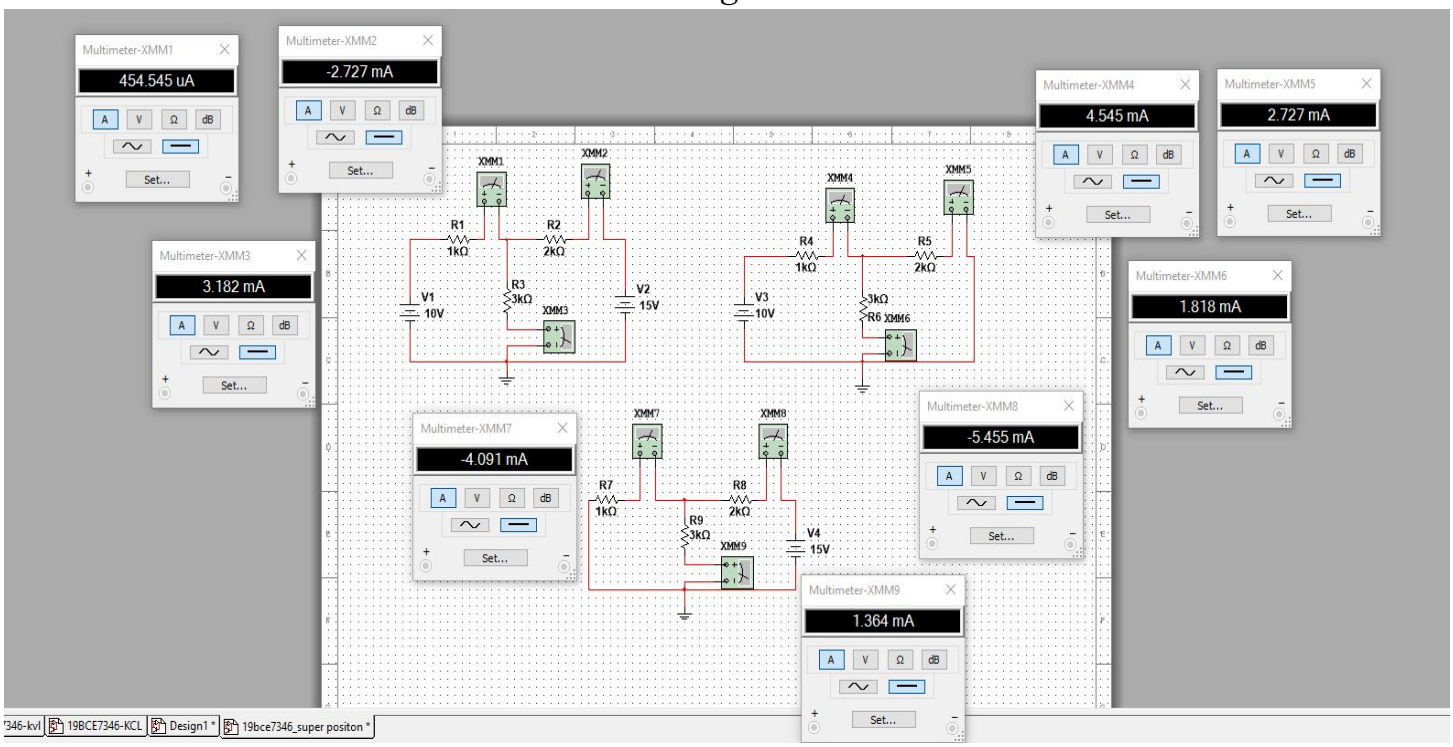


Fig. 3.1



EXPERIMENT NO. : 6

Title : Diode Characteristic and Application

Objectives:

a. To study the characteristics of a silicon (Si) diode and a germanium (Ge) diode.
b. To calculate and draw the DC output voltages of half-wave

Equipment:

Instruments
DC power supply
2 Digital Multimeters (DMM)
Function Generator
Oscilloscope

Components
Silicon Diode (D1N4002), Germanium Diode (1N34A)
Resistors: 1kΩ
Resistors: 2.2kΩ, 3.3kΩ

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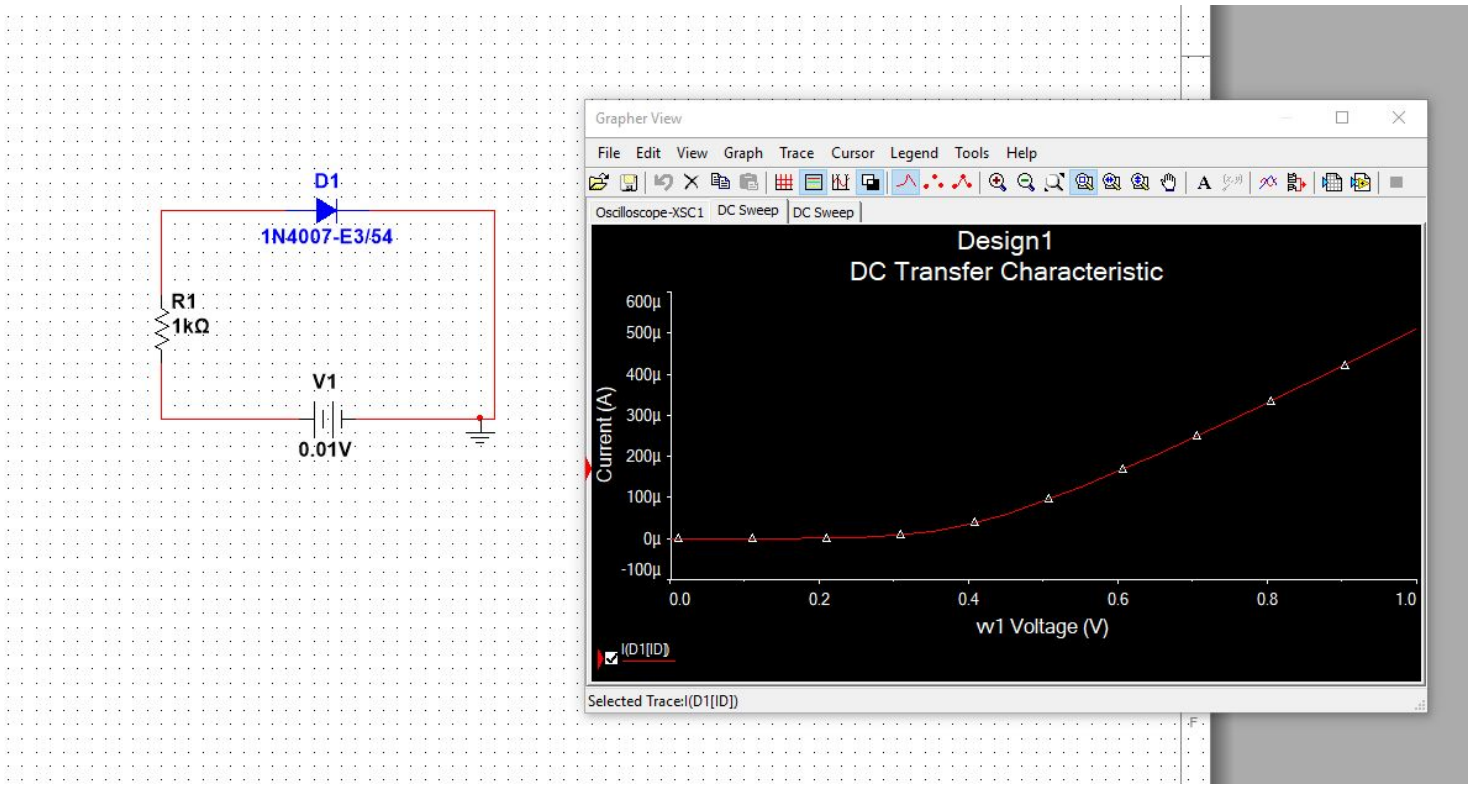
Circuit diagram :



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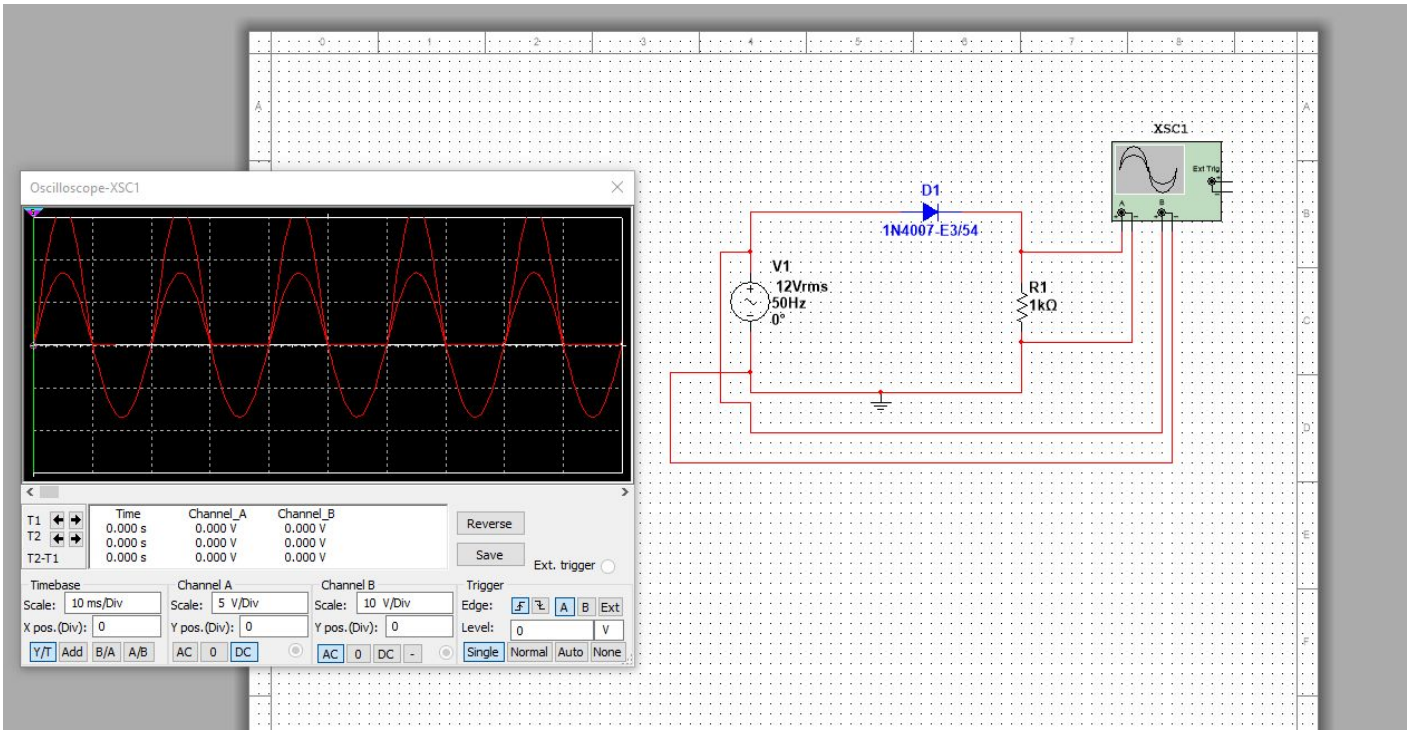
EXPERIMENT NO.7

Title : design of half rectifier

Circuit diagram :



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EXPERIMENT NO.8

TITLE : design of bridge rectifier with and without capacitor

CIRCUIT DIAGRAM :

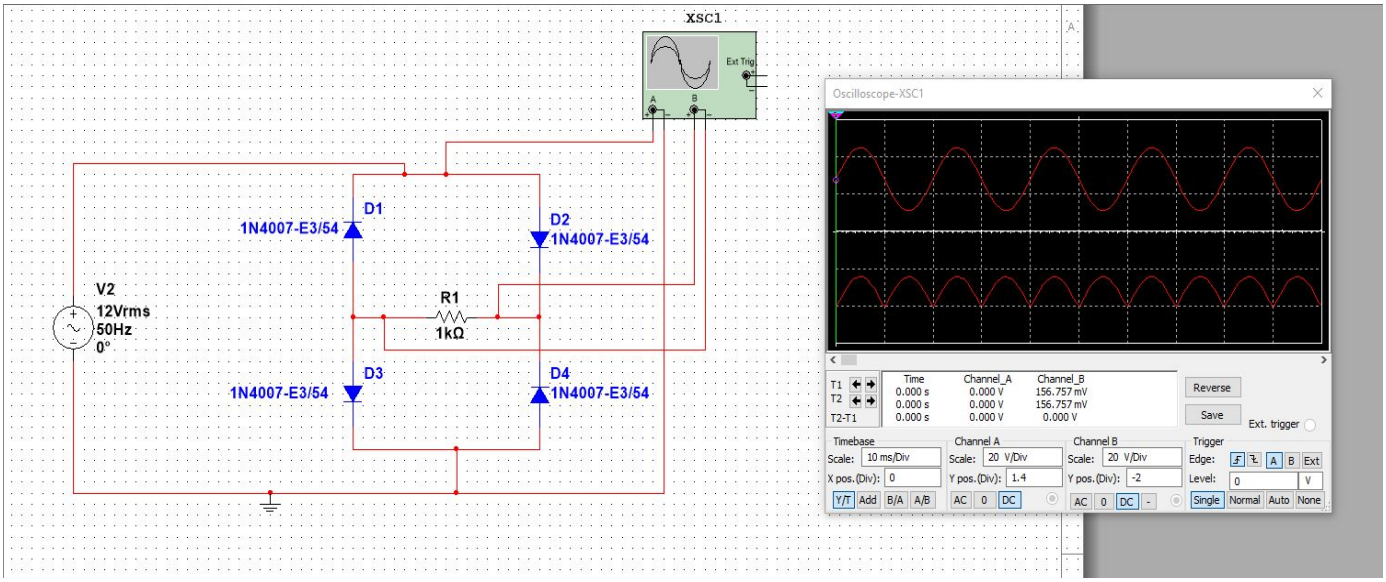

Fig : Bridge rectifier with out capacitor

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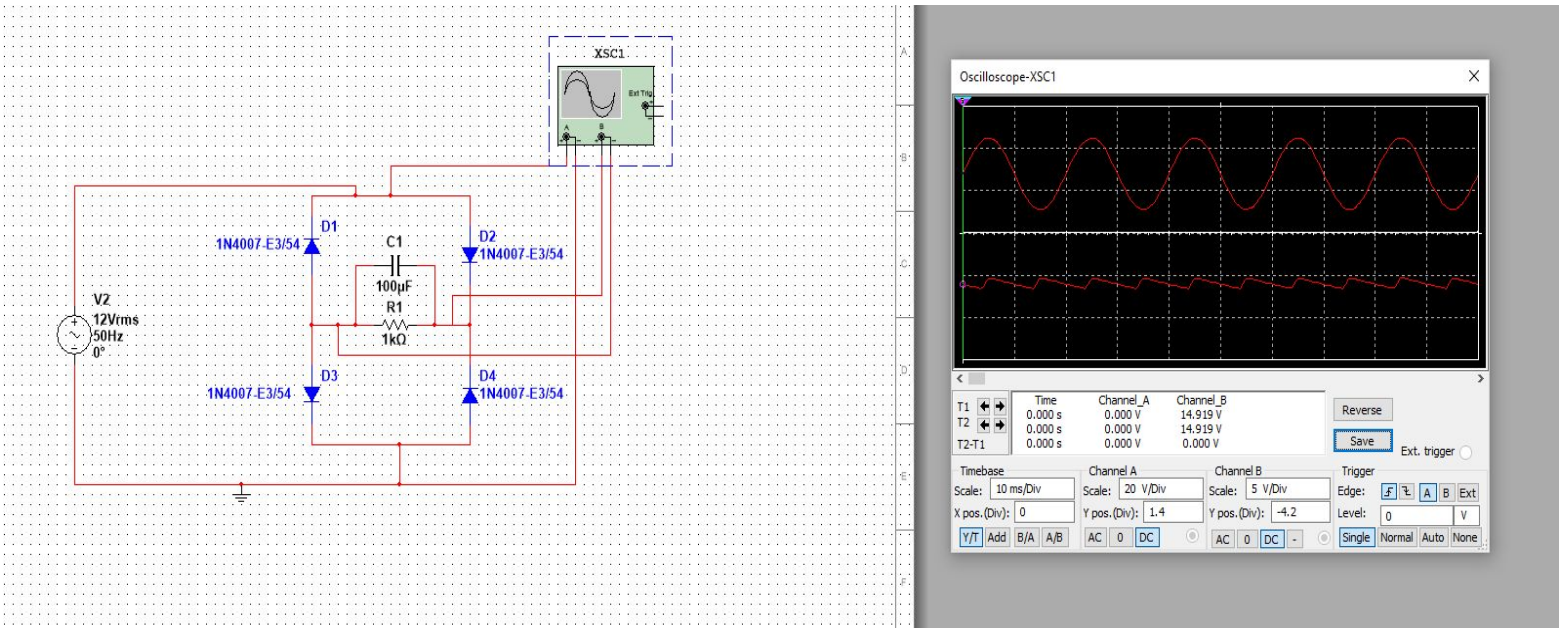

Fig : Bridge with capacitor

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EXPERIMENT NO. 9

TITLE : BJT Characteristics & Biasing Circuits

Objectives:

a) To provide the characteristics of a transistor using experimental methods.
b) To determine the quiescent operating conditions of a voltage-divider-bias BJT configurations.

Equipment:

Instruments
1 DC Power Supply
3 Digital Multimeter (DMM)

Components
Resistors: 680 Ω, 6.8 kΩ, 1 kΩ, 3 kΩ, 22 kΩ, 330 kΩ, 10 kΩ potentiometer, 1MΩ potentiometer
Transistors: 2N3904

Circuit diagram :

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