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THIRD YEAR.
SECTION - "I"
ROLL NO. - 01
ENROLLMENT NO. 12019009001127.

ANALOG ELECTRONICS CIRCUITS LAB.

ASSIGNMENT - 1.
(Experiment No. : 01)

Date :- 06.08.2021.

University of Engineering & Management, Kolkata.

Experiment No. : 01

Title : Study of Ripple and Regulation characteristics of Half wave and Full wave rectifier with and without using a capacitor.

Aim : The aim of this experiment is to make a circuit which will show the effect on Ripple factor for both the Half and Full wave rectifier based on with or without capacitors. Also, the same principle is used in Half wave rectifier while converting from AC to DC.

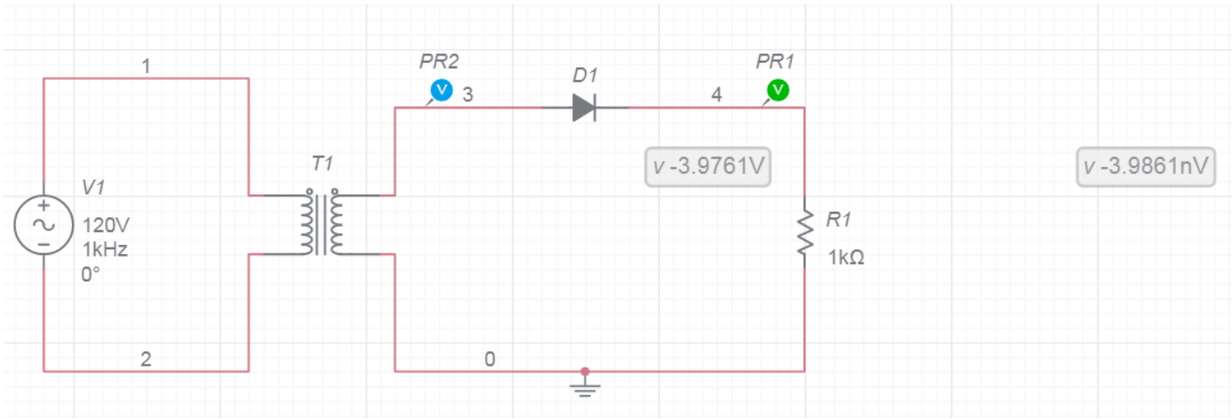
■ Section A : Half wave rectifier without using a capacitor.

Apparatus required :-
a. AC power source (120V).
b. Diode
c. Resistor (1kΩ).
d. Transformer (1P1S).
e. Ground.
f. voltmeters.

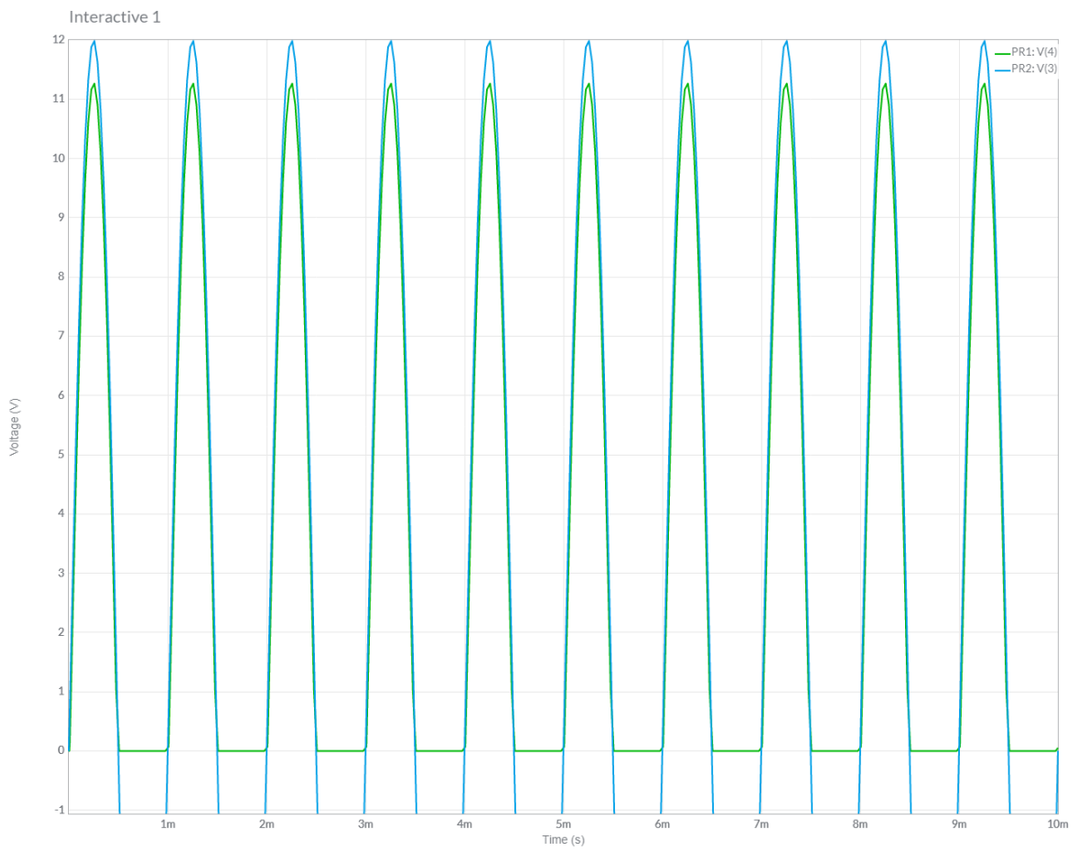
Procedure : (will be same for all the four cases).
(a) Open Multisim Live simulator in your browser and click on new circuit for creating a new circuit.
(b) Drag all the apparatus and place them accordingly.
(c) After placing the apparatus, connect them using the connecting wires.
(d) Place the voltmeters for taking the readings.
(e) Save the circuit
(f) Run the simulation and from the split graph area find out the graph based on the readings that the circuit is providing.
(g) Take the readings from the curve and then provide the analysis based on the data.

Circuit Diagram of Half wave rectifier without using capacitor

Circuit Simulation :



Graphical Representation of the Voltage :



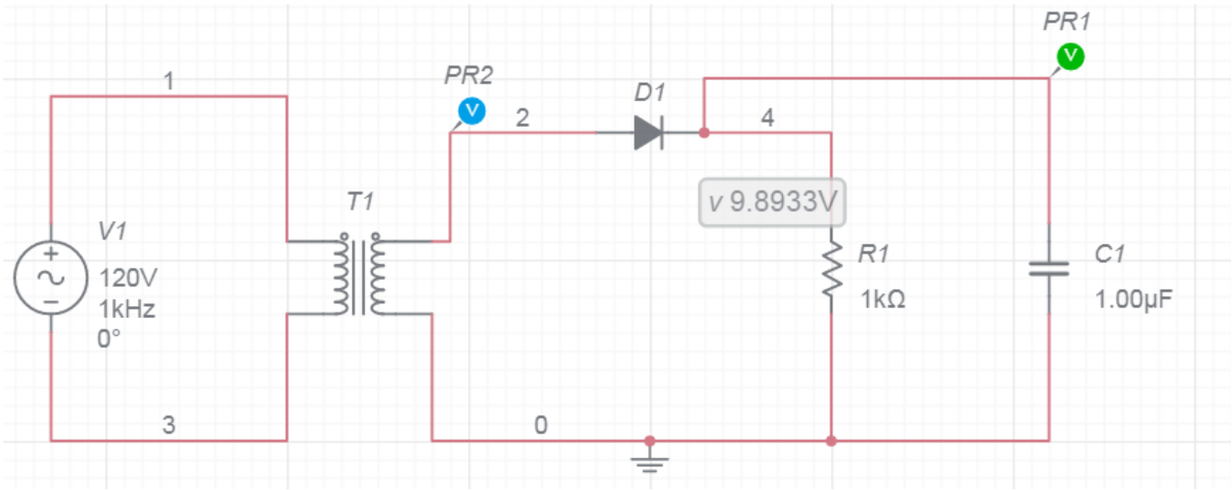
■ Section B : Half wave rectifier with a capacitor of different values (1μF, 4.5μF, and 10μF).

Apparatus Required :-
(a) AC power source (120V).
(b) Diode
(c) Resistor (1kΩ).
(d) Transformer (1P1S).
(e) Ground.
(f) Voltmeters.
(g) Capacitors (1μF, 4.5μF and 10μF).

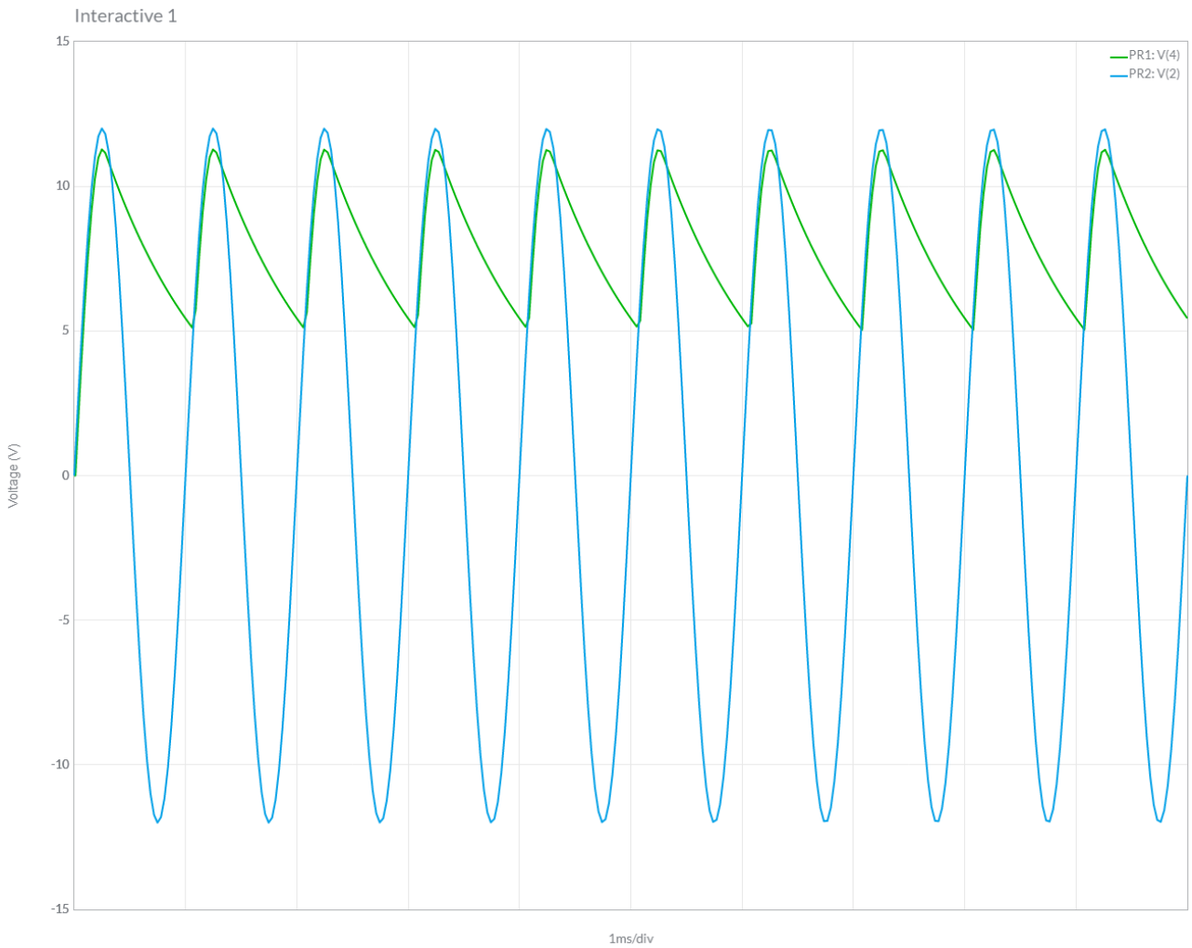
Procedure :-
(a) Open Multisim Live Simulator in your browser and click on new circuit for creating a new circuit.
(b) Drag all the apparatus from the apparatus box and place them accordingly.
(c) connect them using wires.
(d) Place the voltmeters on the circuit for taking the readings.
(e) Save the circuit and then Run the simulation.
(f) From the split graph take the corresponding graph and then provide analyse based on the graph.

Circuit Diagram of Half wave rectifier with different types of capacitors

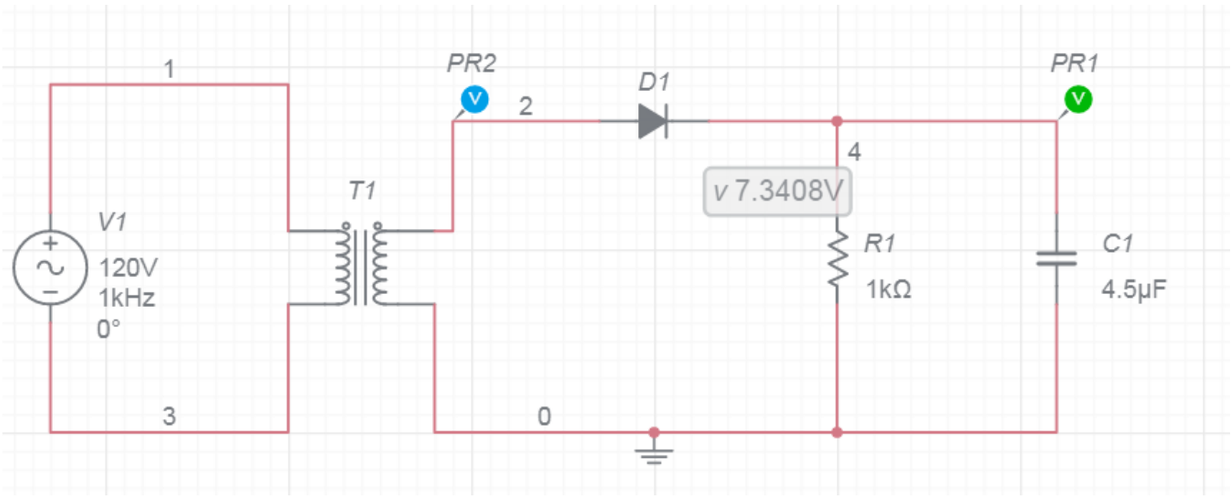
Circuit Simulation : [For Capacitance of 1μF]



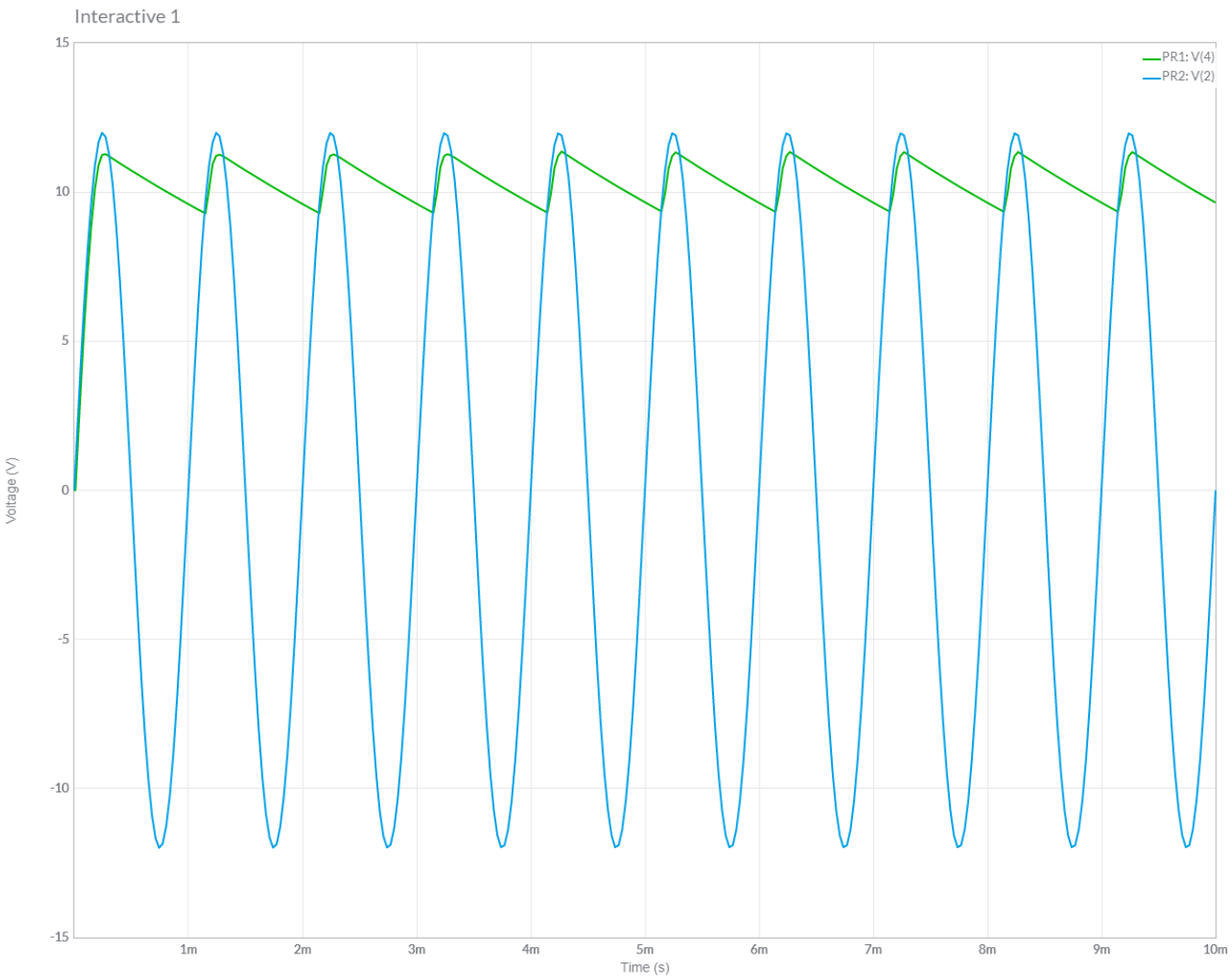
Graphical Representation of the Voltage :



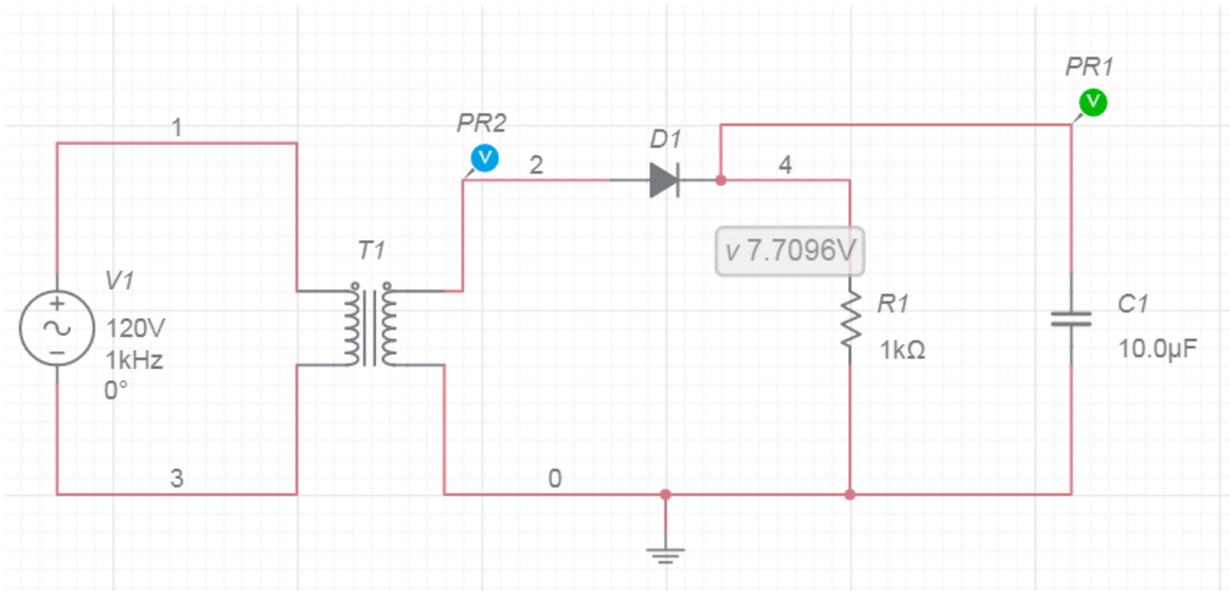
Circuit Simulation : [For Capacitance of 4.5μF]



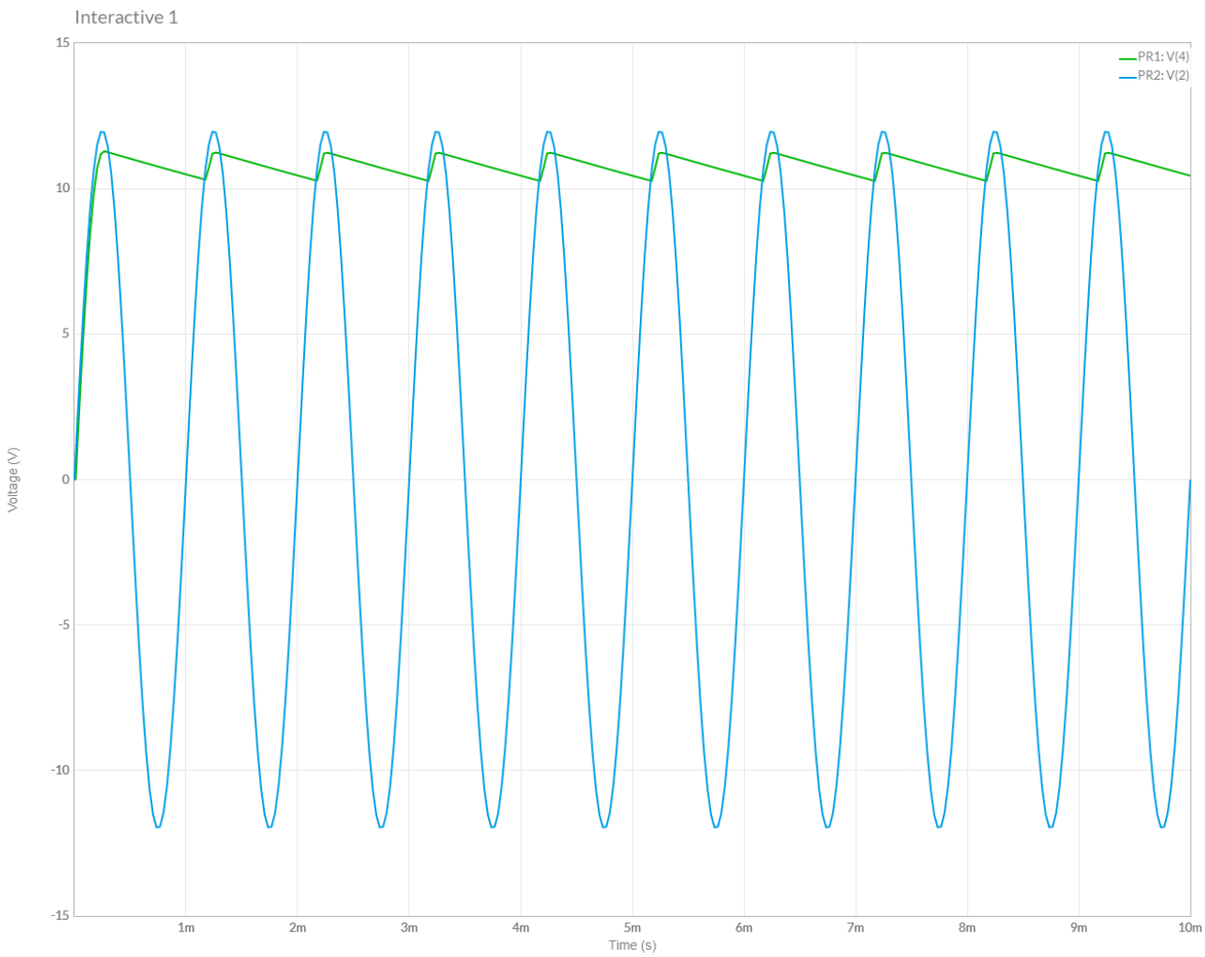
Graphical Representation of the Voltage :



Circuit Simulation : [For Capacitance of 10μF]



Graphical Representation of the Voltage :



Observation :

As the capacitance values increase, the AC voltage gets more bypassed by the capacitor and the resistor is having the pure DC voltage through the line. That's why the graph is considering to be like that and the voltage becomes more DC rather tends to be pure DC.

■ Section C :- Full wave rectifier without using capacitor.

Apparatus Required :-

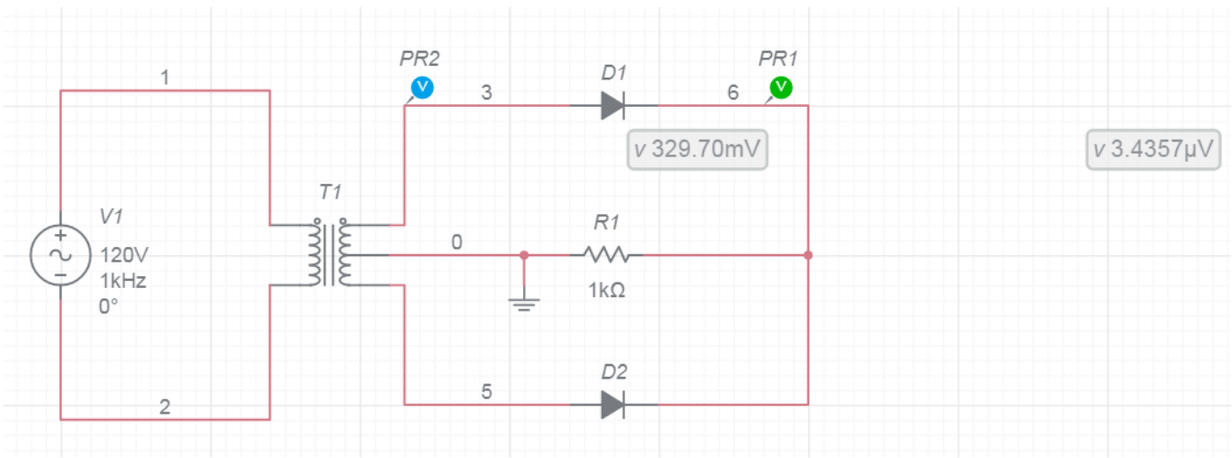
(i) AC power source (120 V).
(ii) Diodes
(iii) Resistor (1 kΩ).
(iv) Transformer (1P1S center tapped).
(v) Ground.
(vi) voltmeters.

Procedure :-

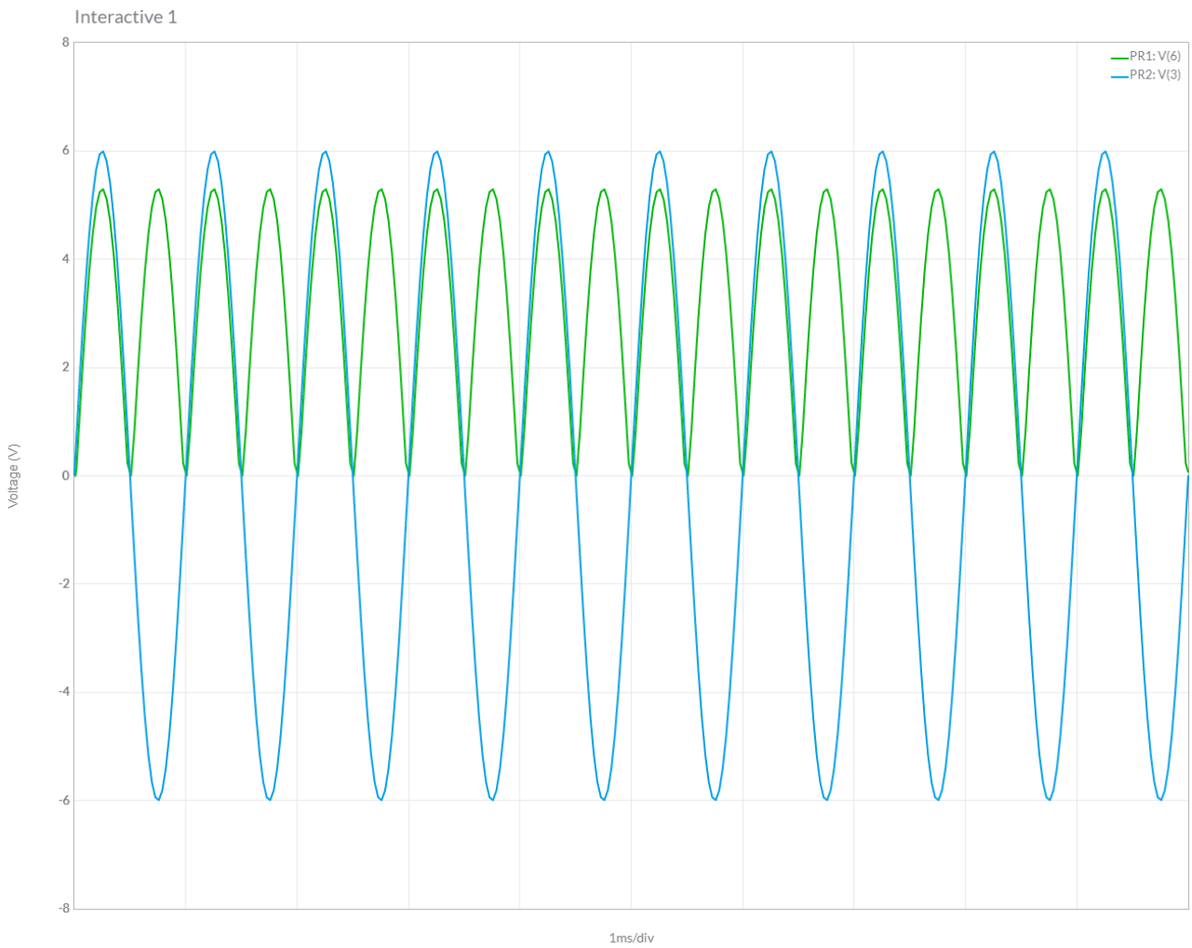
1. Open Multisim live simulator in your browser and click on new circuit for creating a new circuit.
2. Place the apparatus accordingly and connect them using the connecting wires.
3. place the voltmeters for taking the required readings.
4. Save the circuit and Run the simulation
5. From the split graph option take the graph and analyze it accordingly.

Circuit Diagram of Full wave rectifier without using Capacitors

Circuit Simulation :



Graphical Representation of the Voltage :



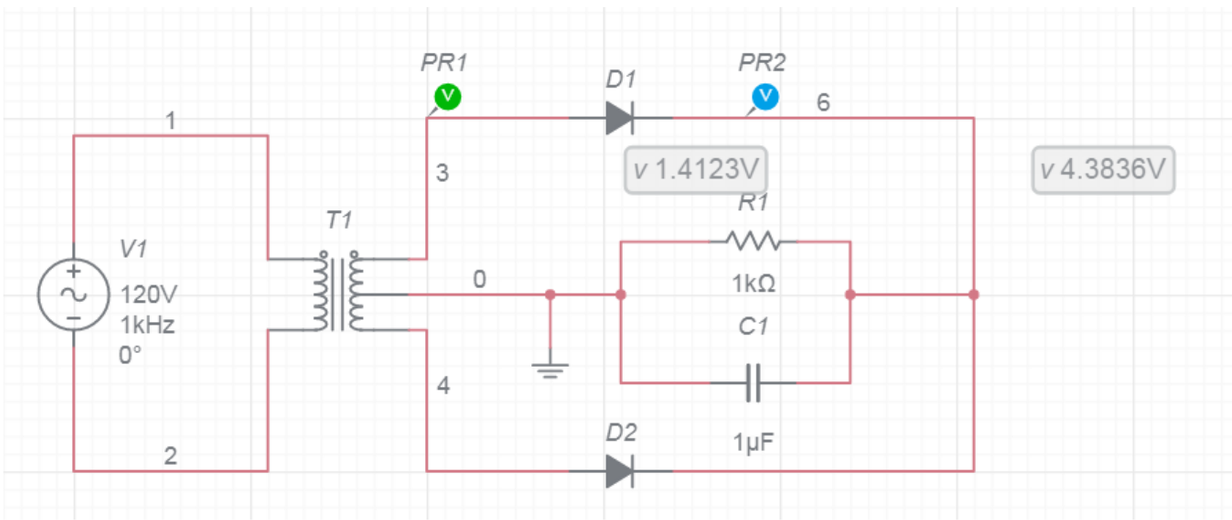
■ Section D: Full wave rectifier with a capacitor of different values (1 μF, 4.5 μF and 10 μF).

Apparatus Required:-
(a) AC power source (120 V).
(b) Transformer (1P1S center tapped).
(c) Resistor (1 kΩ).
(d) Diodes
(e) Ground
(f) voltmeters.
(g) capacitors (1 μF, 4.5 μF and 10 μF).

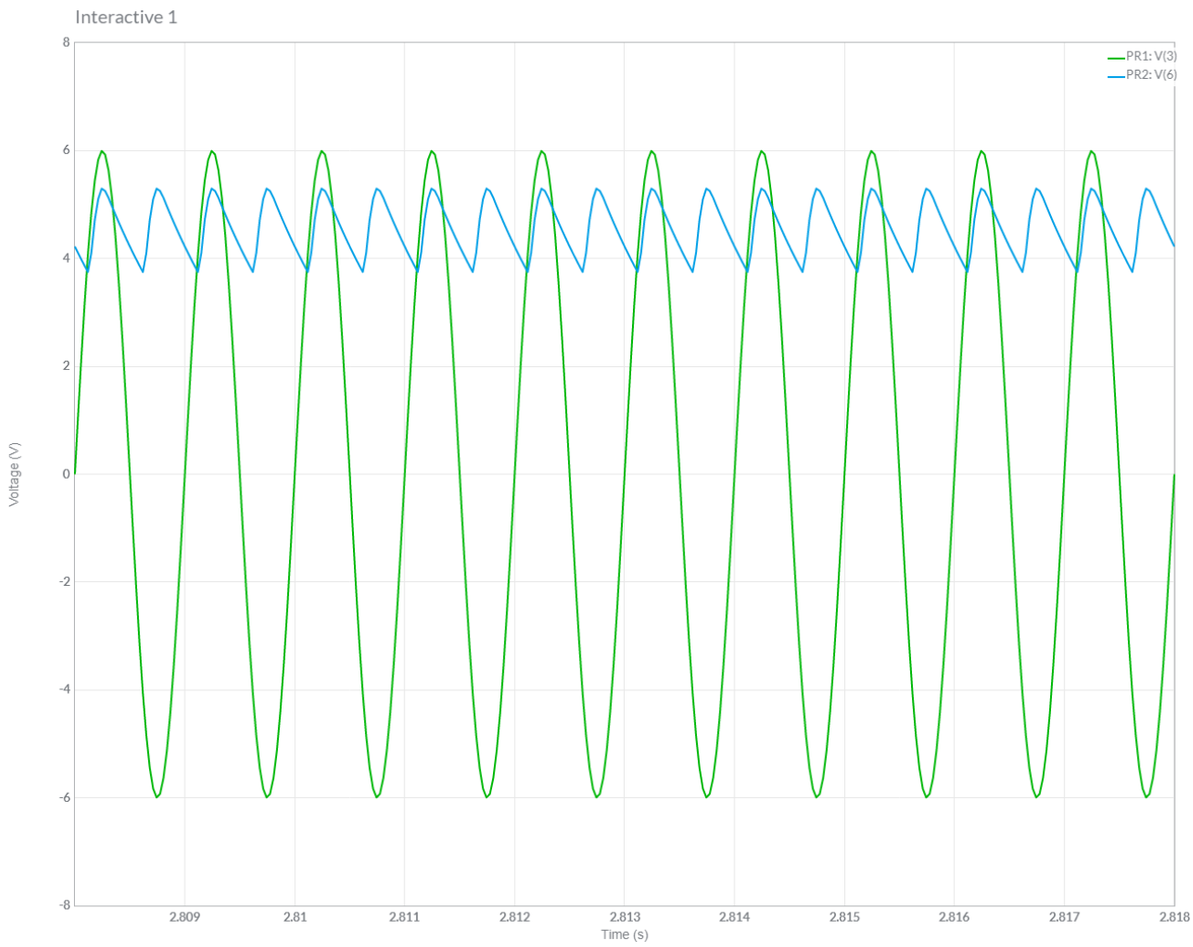
Procedure:-
(a) Open Multisim Live Simulator in your browser and click on new circuit for creating a new circuit.
(b) Place all the apparatus accordingly and connect them using the connecting wires.
(c) Add voltmeters to take the readings from the circuit.
(d) From the split graph section find out the graphs based on the different values of the capacitor and then analyze them for the observation.

Circuit Diagram of Full wave rectifier using different values of Capacitors

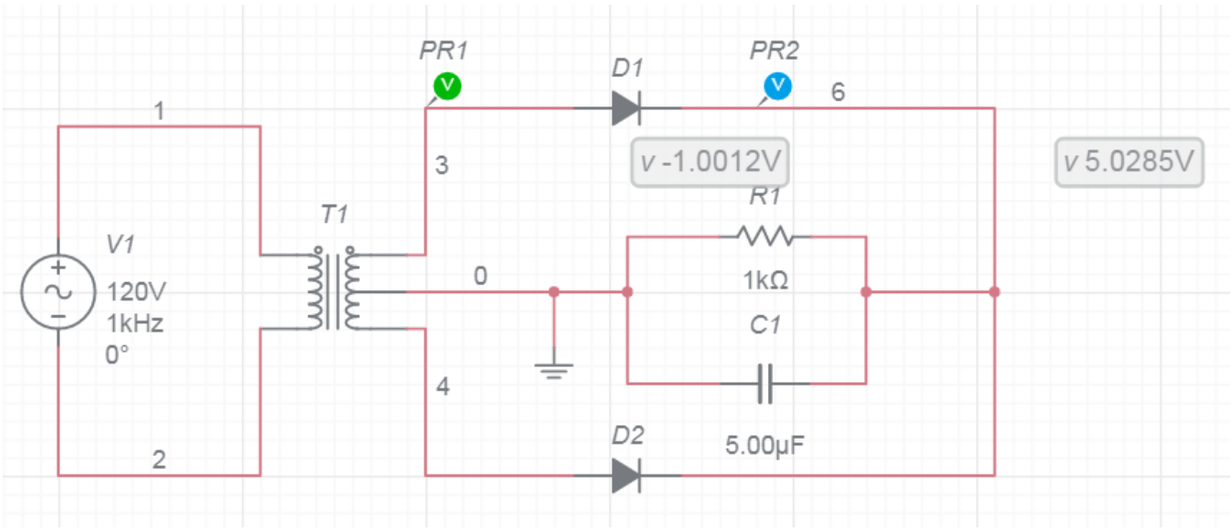
Circuit Simulation : [For Capacitance of 1μF]



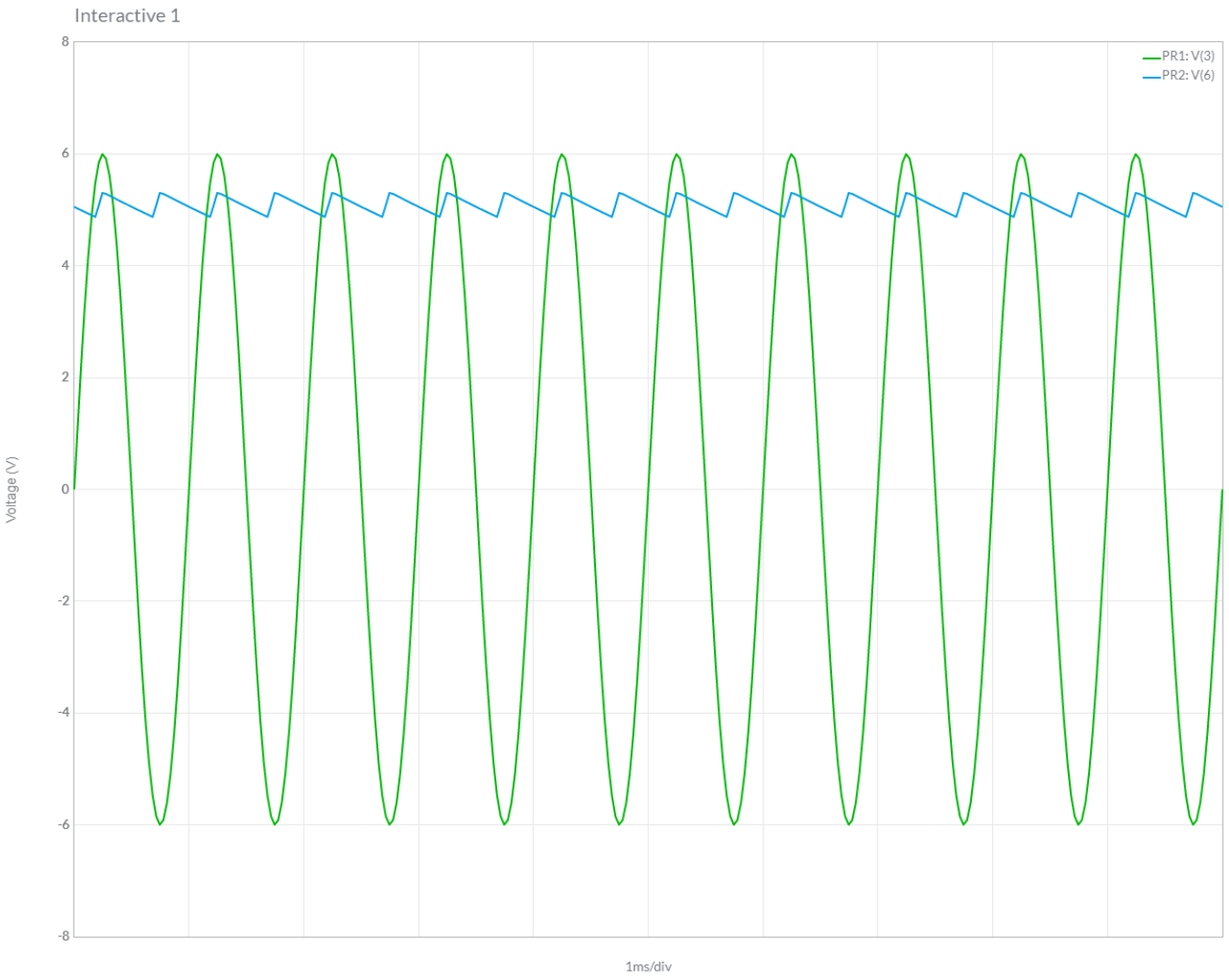
Graphical Representation of the Voltage :



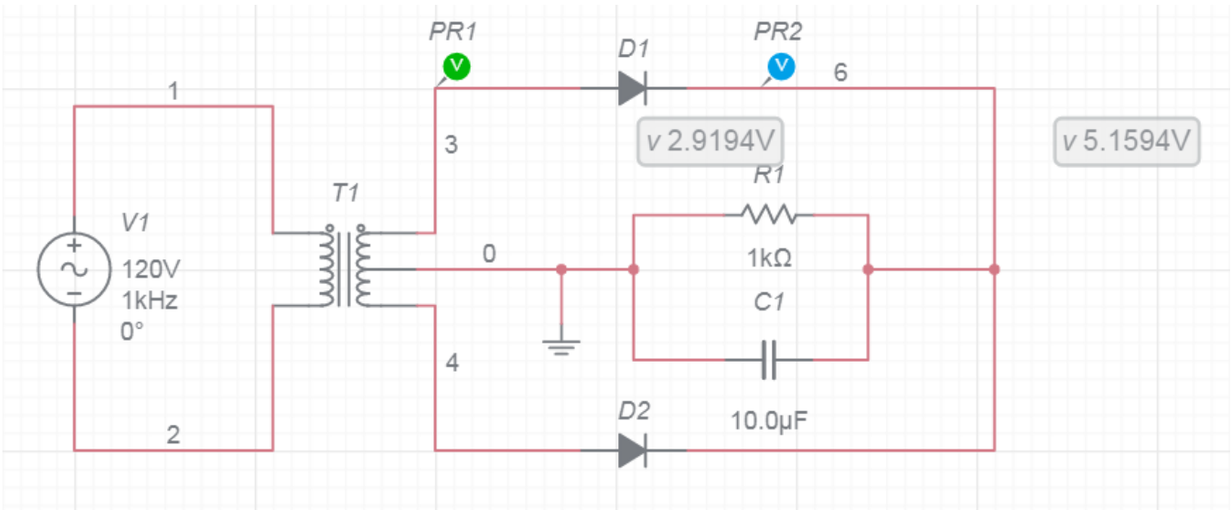
Circuit Simulation : [For Capacitance of 5μF]



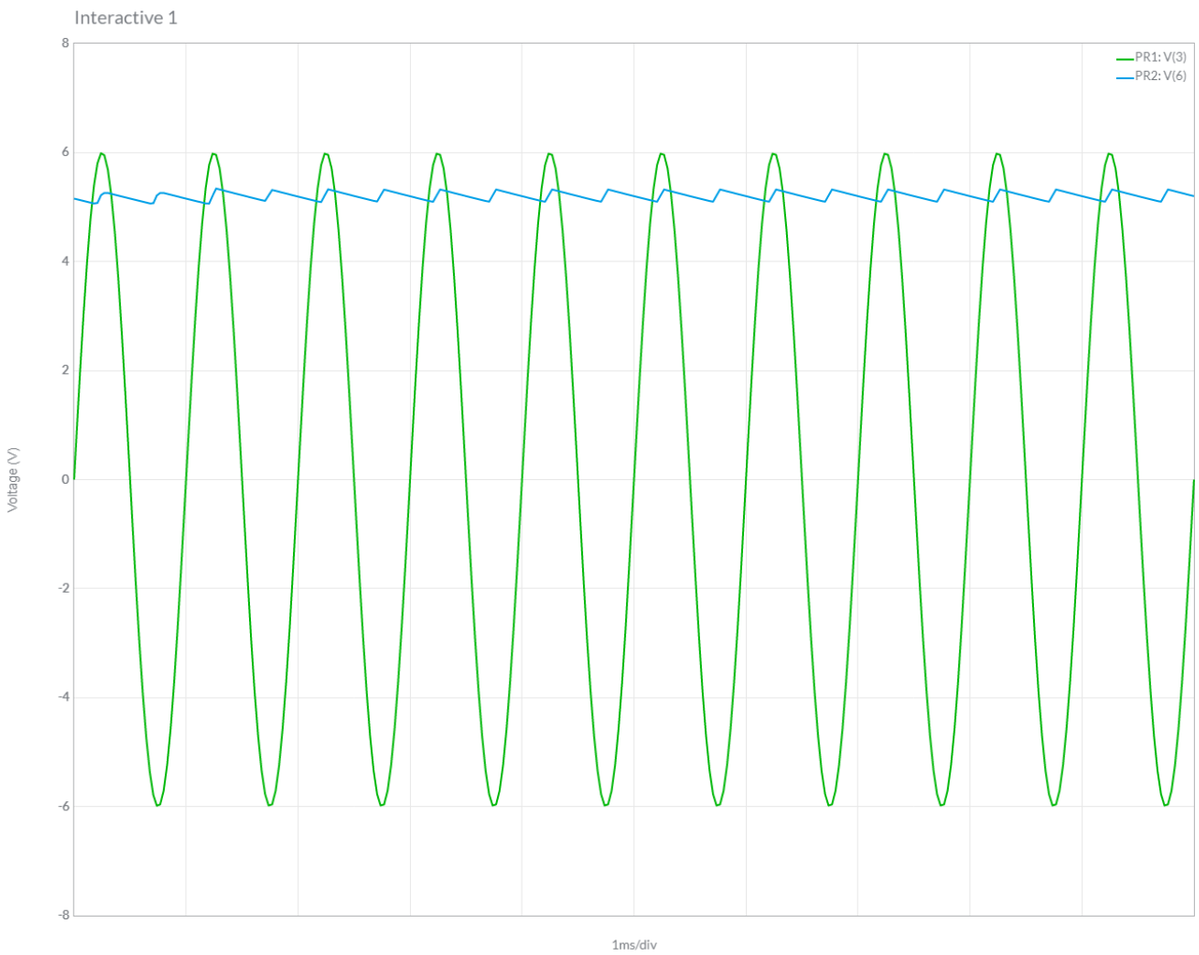
Graphical Representation of the Voltage :



Circuit Simulation : [For Capacitance of 10µF]



Graphical Representation of the Voltage :



Observation :

As the capacitance values increase, the AC voltage gets more bypassed by the capacitor and the resistor is having the pure DC voltage through the line. That's why the graph is considering to be like that and the voltage becomes more DC rather tends to be pure DC.

For both the half and full wave rectifiers we have seen that capacitance decreased the ripple factor and make the voltage tends to be pure DC by increasing the value of the C.

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