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REG.NO.: 21BAI1660

BRANCH: BTECH - CSE AND SPEC IN AI/ML – VITCHENNAI

BECE101P_SLOT-L5+L6_EXPERIMENT – 03

FACULTY: PROF. SASITHRADEVI MA'AM

HALF WAVE RECTIFIER

**AIM: To understand and simulate half wave rectifier using LT-spice software and to also find the V_{avg}.**

SOFTWARE REQUIRED: LT-Spice

Apparatus used in LT-Spice: Diode, voltage source, resistors and wires.

THEORY:

Half Wave Rectifier is a diode circuit which is used to transform Alternating Voltage (AC Supply) to Direct Voltage (DC Supply). A single diode is used in the HWR circuit for the transformation of AC to DC.

Half Wave Rectifier circuit allows the one – half cycle of the AC Supply waveform to pass and blocks the other half cycle.
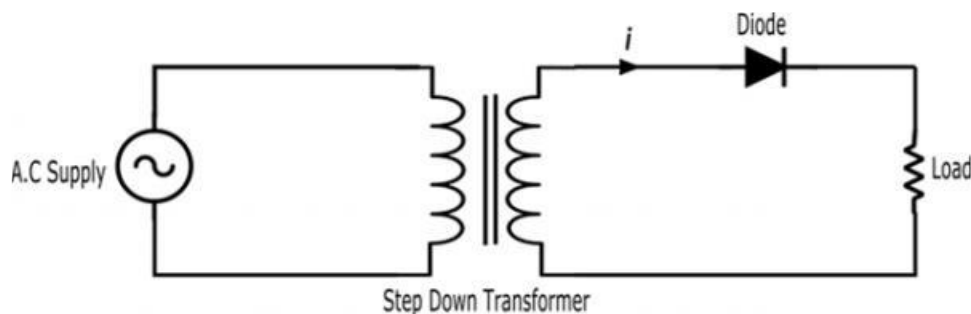

WORKING OF HWR CYCLE:

POSITIVE HALF CYCLE

The AC high voltage is applied to the primary of step down transformer and the obtained secondary low voltage is applied to the diode, the diode is forward biased during positive half cycle and act as a short circuit.
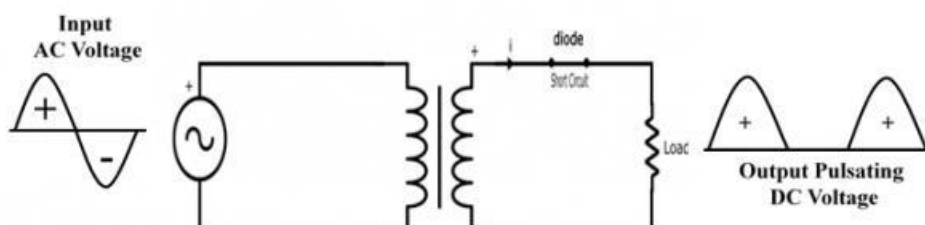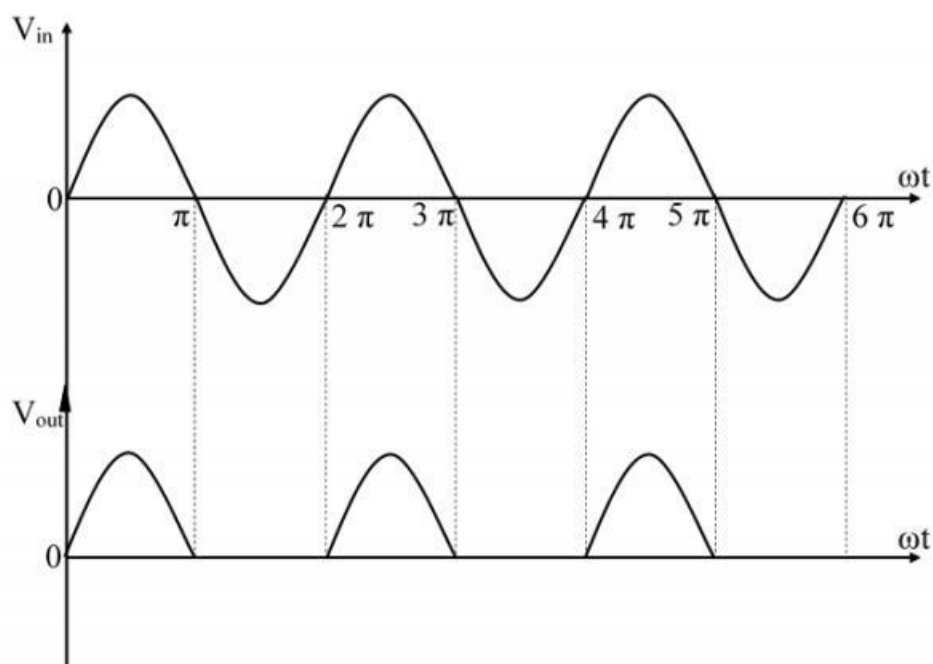
NEGATIVE HALF CYCLE

During the negative half cycle, the P – terminal of the diode is connected with the negative supply which reverse biases the diode, the diode behaves like an open circuit and does not produce the output across the load.
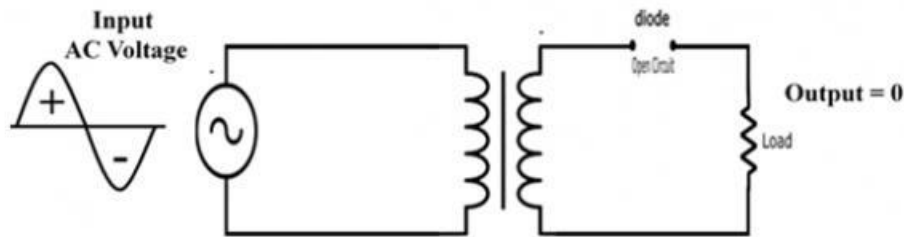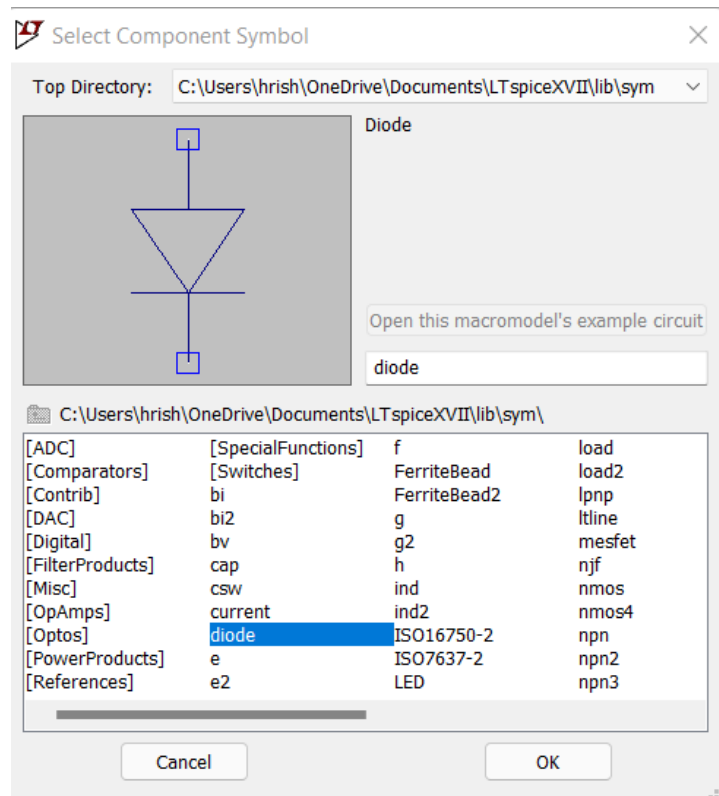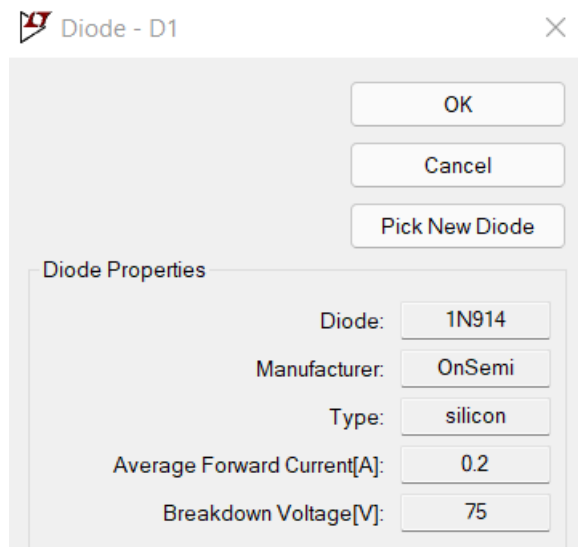

HWR WAVEFORM:

STEPS:

- Open LT-Spice and click new schematic
- Using test write name of the experiment and reg.no.
- Using toolbar above, draw the circuit shown later in this document.
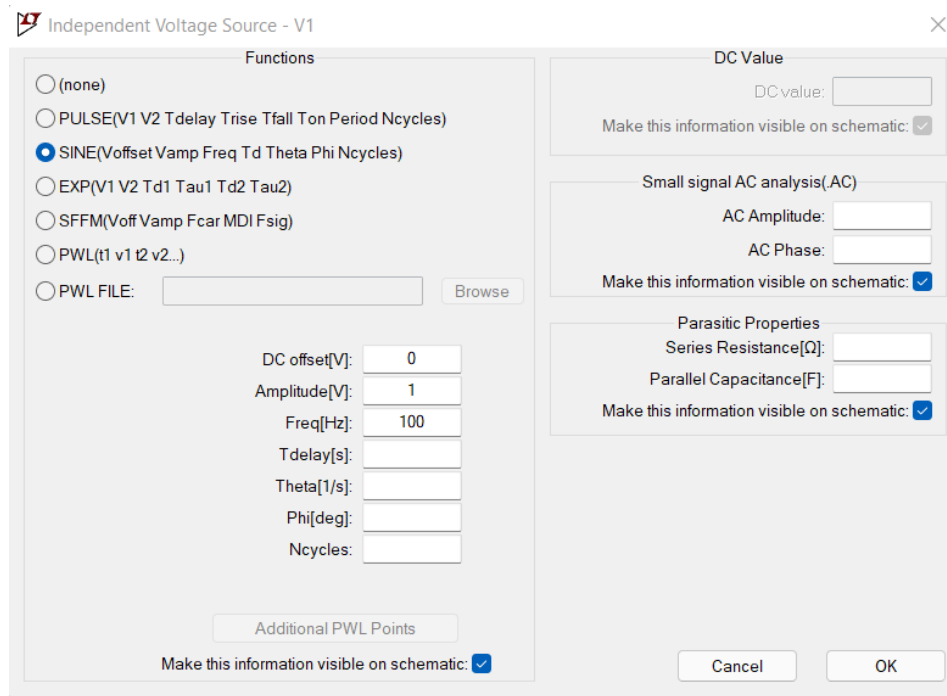

- Using wires, resistor, voltage source and find diode in the component button on the tray to draw the circuit.
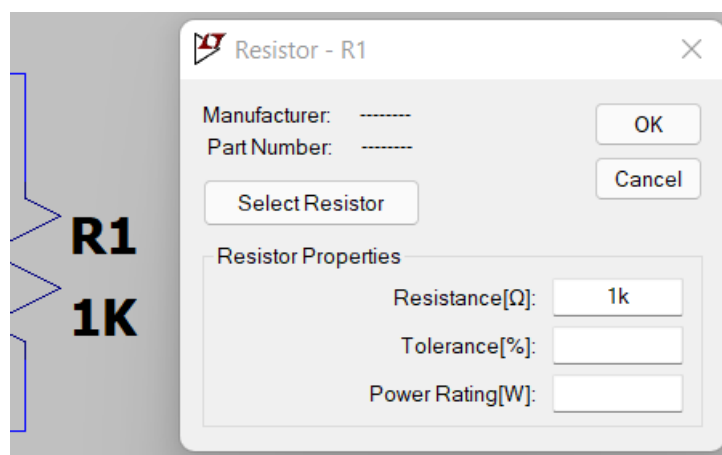
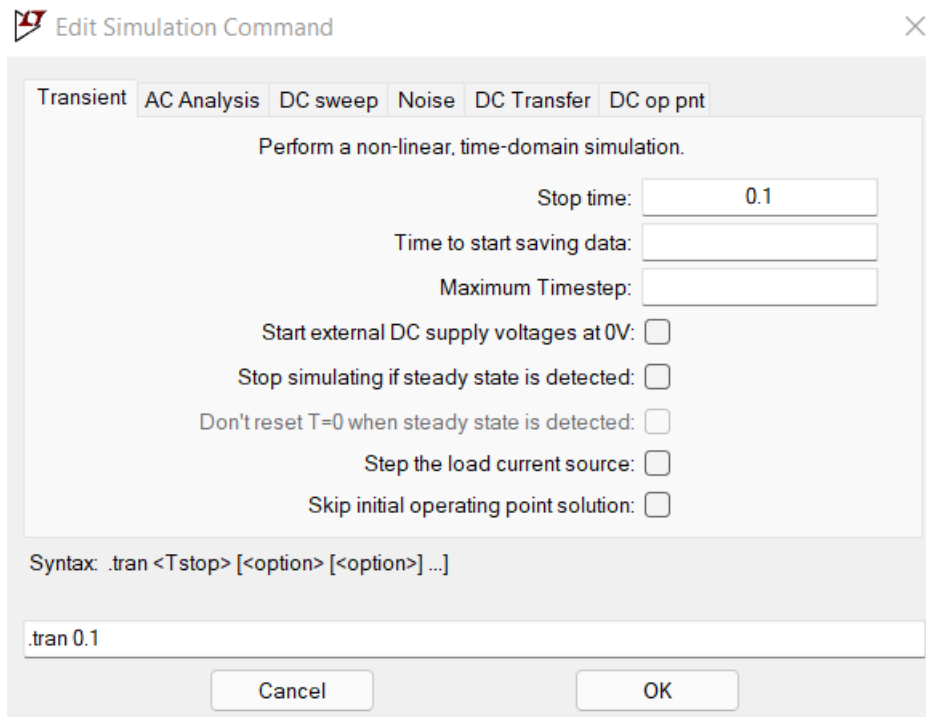- Right click on diode then Click on pick diode and choose 1N914 diode.

- Right click on voltage source and click advanced and then SINE wave and do the settings as shown below.

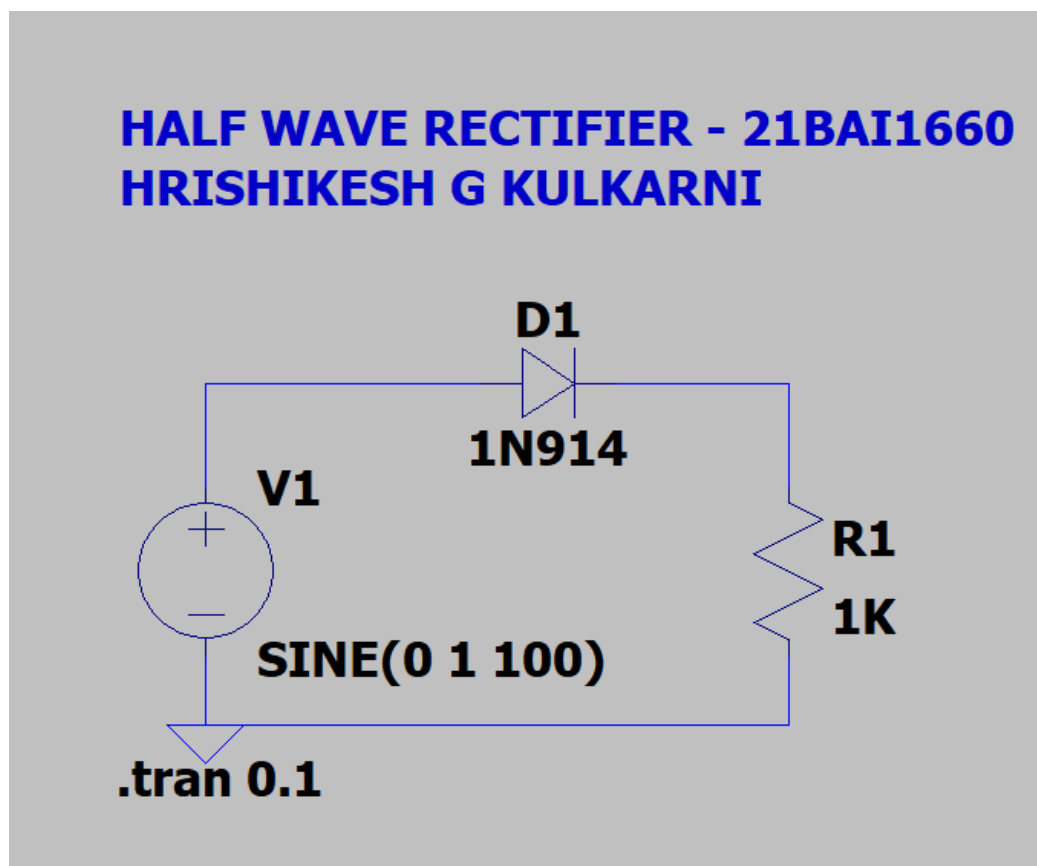- Right click on the resistor and then give 1k ohm value to it.

- Connect a grounding wire as well.
- After this we can go under edit simulation command and then under transient, we can set the stop time as 0.1 as shown below.
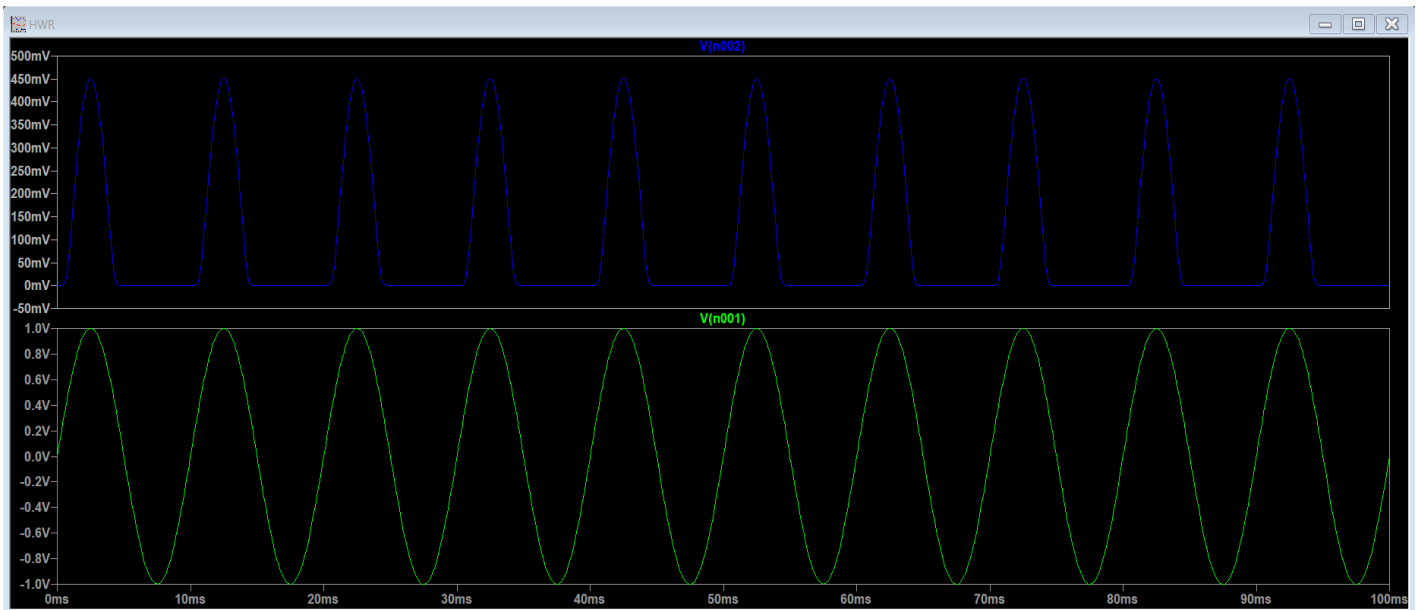
- Then click on the run button and click run.
- Click on the wire which is positive side of the voltage source and before the diode to get source voltage ac plot
- Next, click add plot pane on the graph, then, click on right side to the diode and before the resistor to get rectified plot.

CIRCUIT DIAGRAM:

HALF WAVE RECTIFIER - 21BAI1660
HRISHIKESH G KULKARNI

D1

1N914

V1

R1

1K

SINE(0 1 100)

.tran 0.1

OUTPUT:

RESULT AND INFERENCE:

From this experiment we are able to understand and simulate Half wave rectifier in LT-SPICE software.

We shall do the V average calculation below.

We can hover over one of the peaks of the rectified graph and then we can see the Y-value, it gives us the Vpeak or Vm value. We take it for calculation. Vpeak or Vm is about 450mV.

Formula: $V_{avg} = V_m/(pi)$

V_{PEAK} OR V_m = 450mV (SEEN IN GRAPH)

Vavg = Vm / (pi) = 450mV/3.14 = 143.3121019mV

Final result/Conclusion: A half wave rectifier, rectifies or converts A.C voltage to D.C voltage, it only converts for half cycle of the alternating current into the direct current.

-----THE END-----