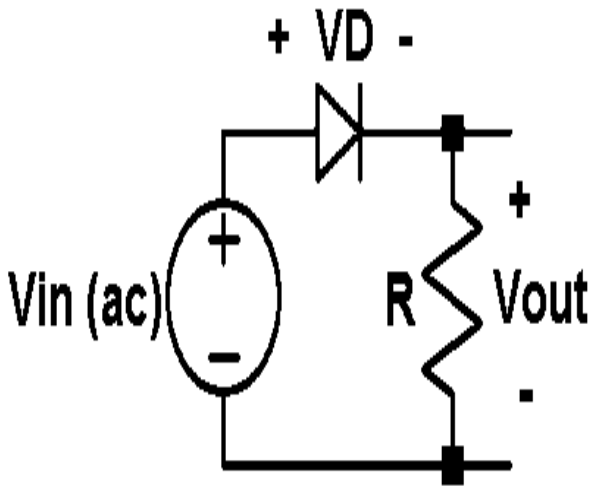
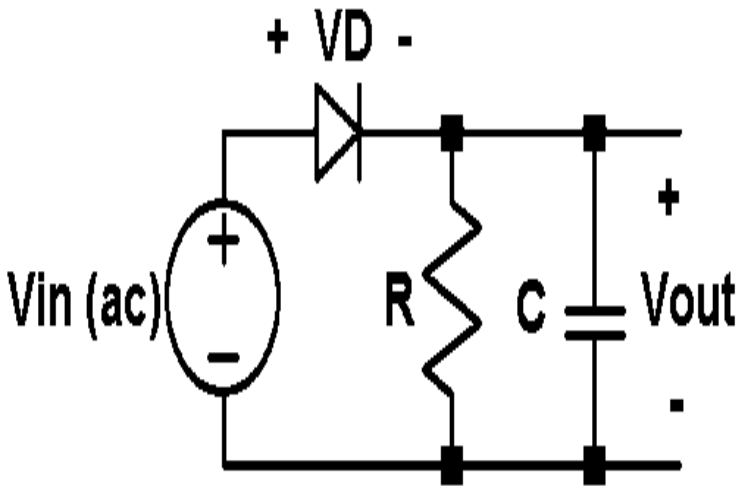
Lab1: Rectifier Circuits

Rectifier Circuits

a) Half Wave Rectifier with RC filter





- For this experiment consider diode to be a switch.
- For ideal diode

$V_d > 0$, the switch is closed and diode conducts like a short circuit

$V_d < 0$,the switch is open and diode does not conduct, just like an open circuit.

- Practical diode:

$V_d > V_{on}$ =0.7V (Silicon).After this voltage diode start conducting.

- Expected waveform without capacitor in the circuit
- Diode conducts in only positive half cycle and hence voltage appears at load resistance.

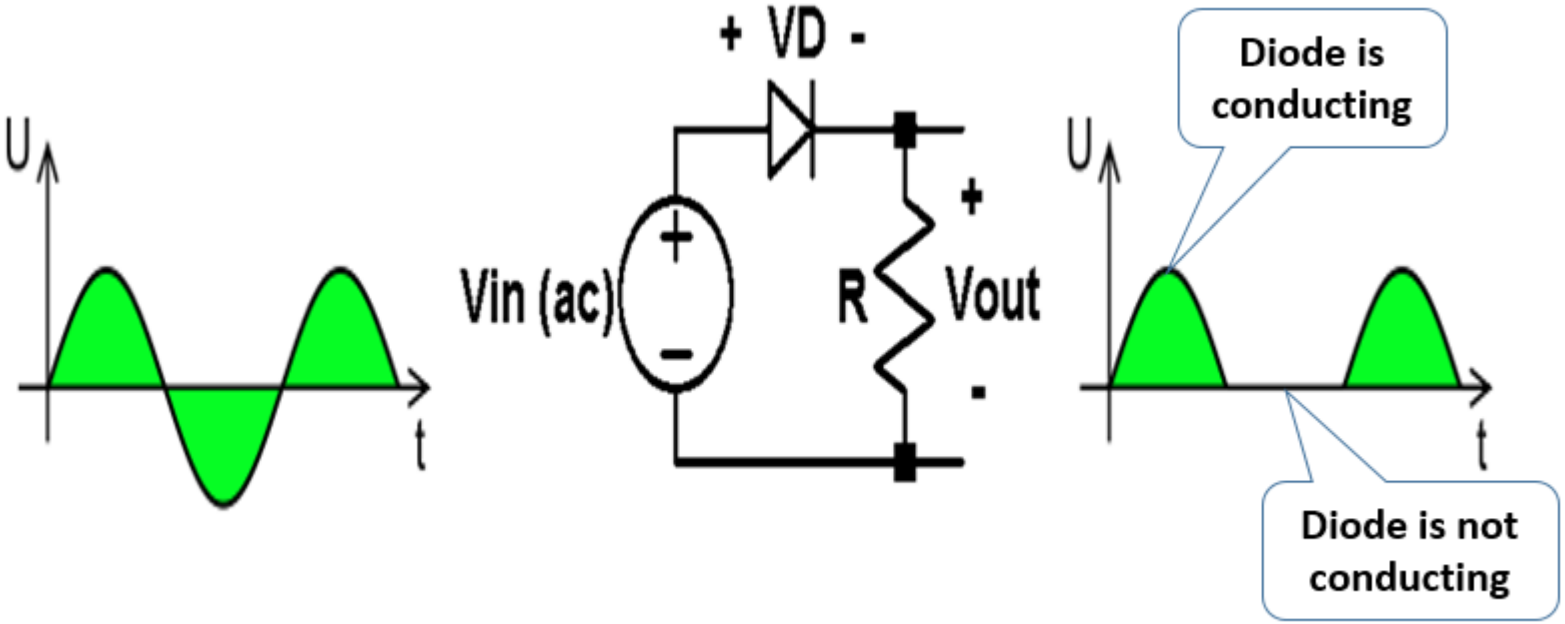


Fig. 1 Half wave rectifier

[Figure is taken from lab1 doc ECE-222]

- Adding capacitor to the previous circuit gives smoothing effect. It blocks DC and hence we get DC at load resistance.
- As value of capacitance increases, DC content will increase.
- Amount of AC present in DC is defined as ripple voltage, represented by ▲V.
- Less ripple voltage is good, ▲$V/V_p = T/RC$ [2]

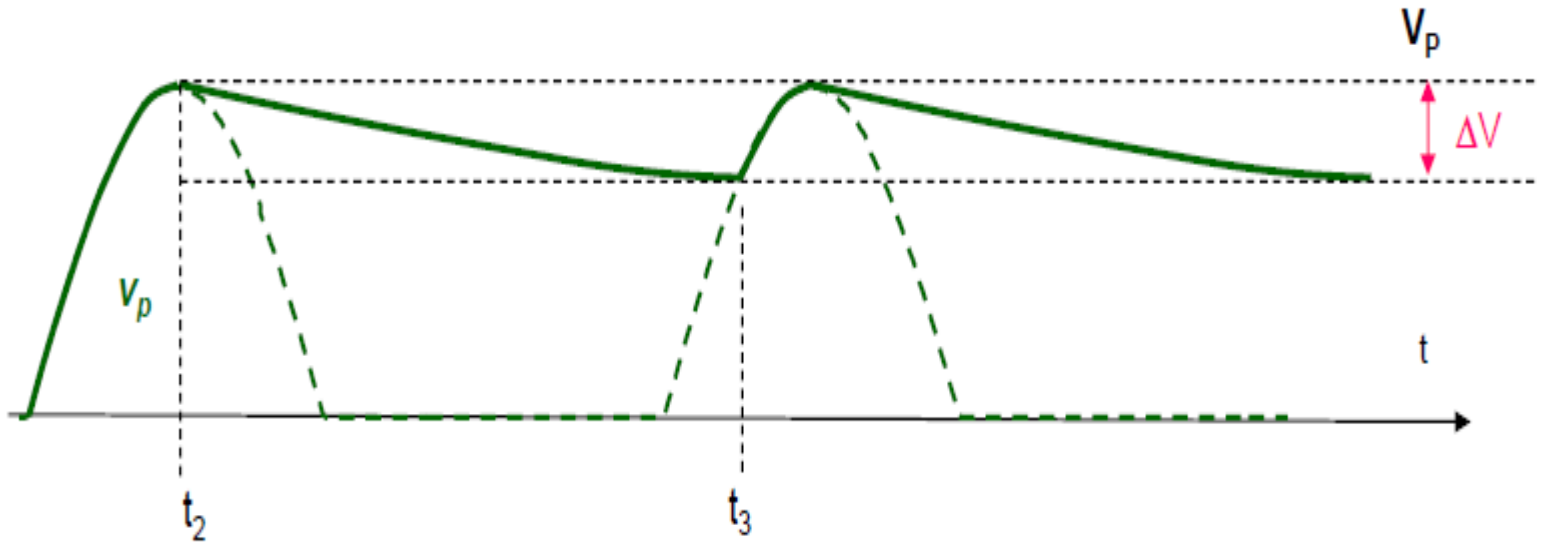


Fig. 2 Capacitor effect in Half-wave rectifier [2]

b) Full Wave Rectifier using Centered-Tapped Transformer

- Inductance is directly proportional to square of turns.

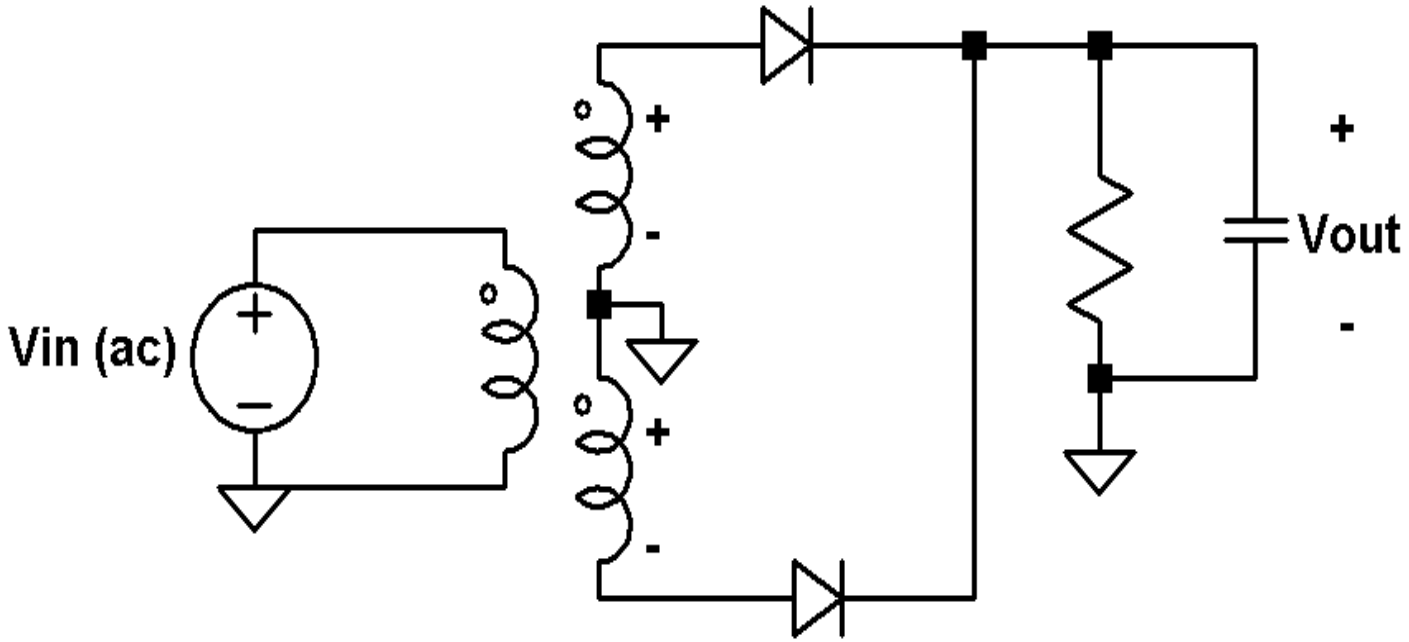


Fig. 3 Full wave Rectifier

[Figure is taken from lab1 doc ECE-222]

- In this experiment

  Primary winding has N1 turns.

  Secondary Winding has N1/2 turns each.

- For getting 10V at the output side, 20 V peak-to-peak is applied on the primary side.

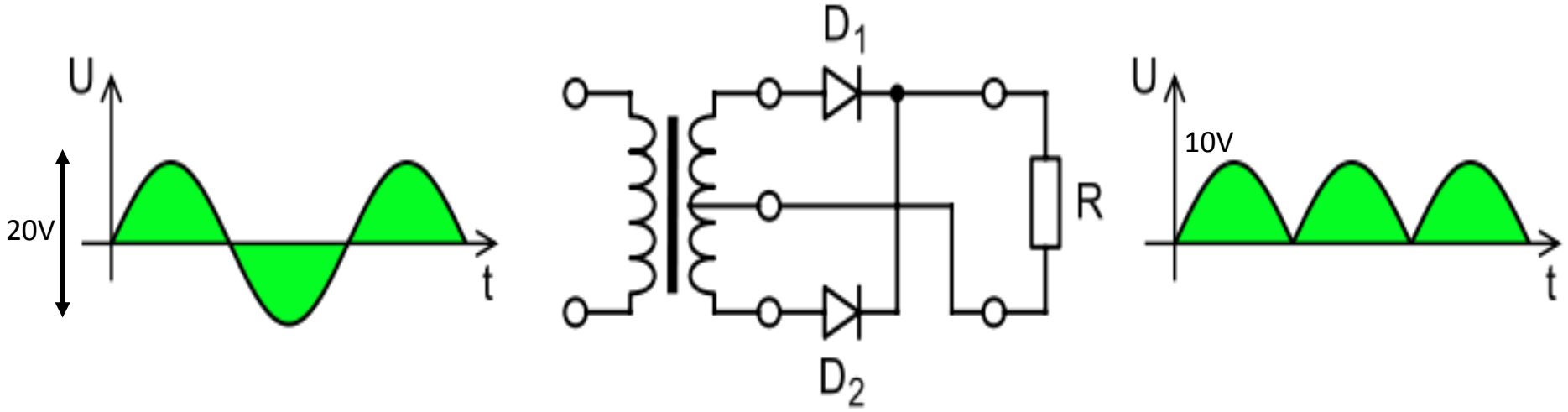


Fig. 4 Full wave rectifier [3]

References

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4. http://www-inst.eecs.berkeley.edu/~ee40/fa03/lecture/lecture13.pdf