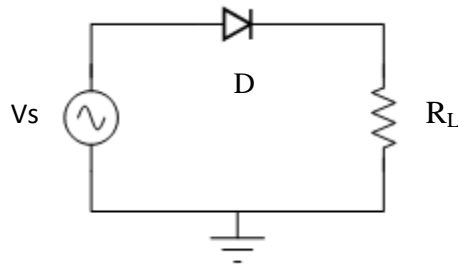


Simulation exercise

Q1. Write ngspice netlist for the following half wave rectifier circuit shown below.



Run the simulation and observe input and output voltage waveforms and diode current waveform for $V_s = 16V_{pp}$, 50Hz sinusoidal signal, $R_L = 1K$ and for 1N914 diode.

Q2.

a) Now connect a capacitor of 4.7 μF across the load resistor R_L . Modify the netlist and again run the simulation to observe the input and output voltage waveform and also observe the waveform of the current through diode.

b) Comment on these waveforms. Why does the diode not conduct continuously when the capacitor filter is connected?

c) Vary the value of capacitor to 10 μF , 47 μF , and 100 μF and see the effect. Repeat for $R_L = 10K$. Tabulate the readings in each case to estimate the ripple factor.

Note: V_{rpp} is peak-to-peak value of ripple voltage.

$$r = \frac{V_{rms}}{V_{DC}} = \frac{V_{rpp} / 2\sqrt{3}}{V_p - 0.5V_{rpp}}$$

Sr. No	R_L K Ω	C μF	V_{rpp} Volts	V_{DC} Volts	r
1	1	4.7			
2		10			
3		47			
4		100			
5	10	4.7			
6		10			
7		47			
8		100			

Q3. Repeat the above exercises (Q1 and Q2) for full wave centre tapped and bridge rectifier with and without capacitor filter.

Note: In full wave rectifier, the frequency of the pulsating DC is twice the frequency of AC mains. (Why?)

Q4. What is the PIV of the diode in each Half wave, and full wave rectifiers? Why is it an important consideration?