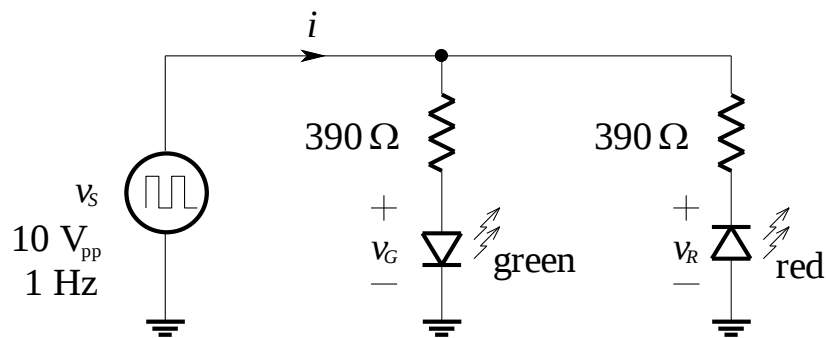


5 Diode Circuits

1.

The circuit below uses LEDs which can be modelled using the “constant voltage drop model” with $e_{fd} = 2.0\text{ V}$. The source voltage is a square wave with a 10 V peak-to-peak amplitude, centred around 0 V .

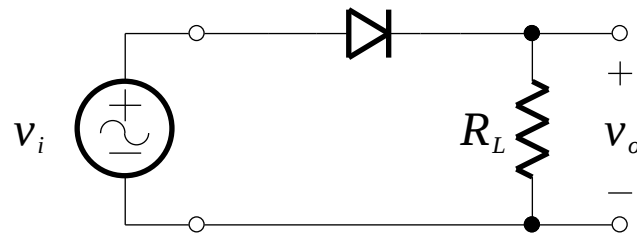


- (a) Sketch the voltage waveforms (vs. time) for v_G and v_R .
- (b) If you built the circuit, what would you see?

5.2

2.

Consider the circuit shown below:



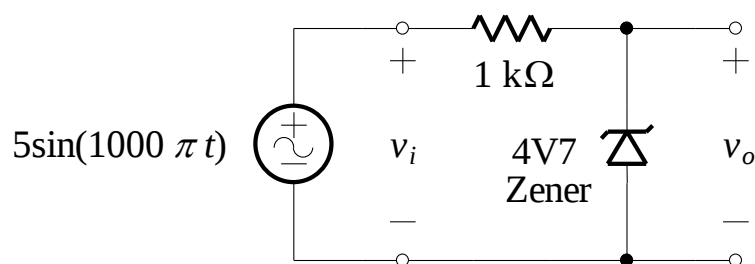
Assume that the diode can be modelled using the “constant voltage drop model” with $e_{fd} = 0.7 \text{ V}$.

Given that $v_i(t) = 5\sin(500\pi)t \text{ V}$ and load resistance $R_L = 1 \text{ k}\Omega$:

- (a) Plot $v_i(t)$ and $v_o(t)$ on the same graph.
- (b) What is the peak load current?

3.

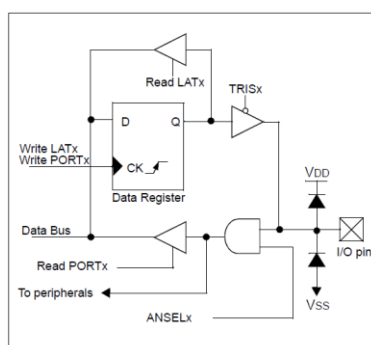
Consider the circuit shown below:



Assuming a Zener diode with a “constant voltage drop model” where $e_{fd} = 0.7 \text{ V}$ and $V_{ZK} = 4.7 \text{ V}$, sketch the output waveform, $v_o(t)$.

4.

The schematic shown below is taken from a microcontroller datasheet, and shows the generic input/output (I/O) port operation. V_{DD} is the digital logic positive supply, which can be taken as 2.5 V. V_{SS} is the common, or 0 V.



Explain the purpose of the two diodes which are attached to the external I/O pin.