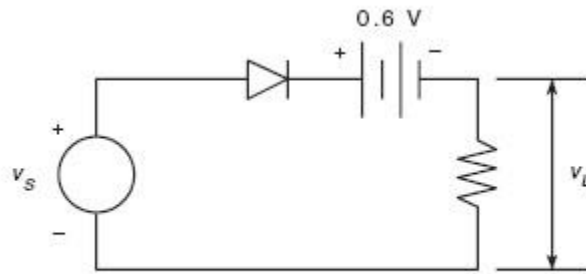An accurate model of the diode's behavior is given by the offset diode model, which accounts for the offset voltage inherent in semiconductor diodes. The offset model contains an ideal diode and a battery whose voltage equals the offset voltage (which is approximately 0.6 V for silicon diodes). The half-wave rectifier using this model is shown in Figure (b). For this circuit,

(b)

$$v_L = \begin{cases} v_L - 0.6 & if \ v_s > 0.6 \\ 0 & if \ v_s \leq 0.6 \end{cases}$$

Suppose the supply voltage is

$$v_s(t) = 3e^{-\frac{t}{3}} \sin(\pi t) \ V$$

Where time t is in seconds.

half-wave-rectifier.m is a MATLAB program to plot the voltage v_L versus t for $0 \leq t \leq 10$.