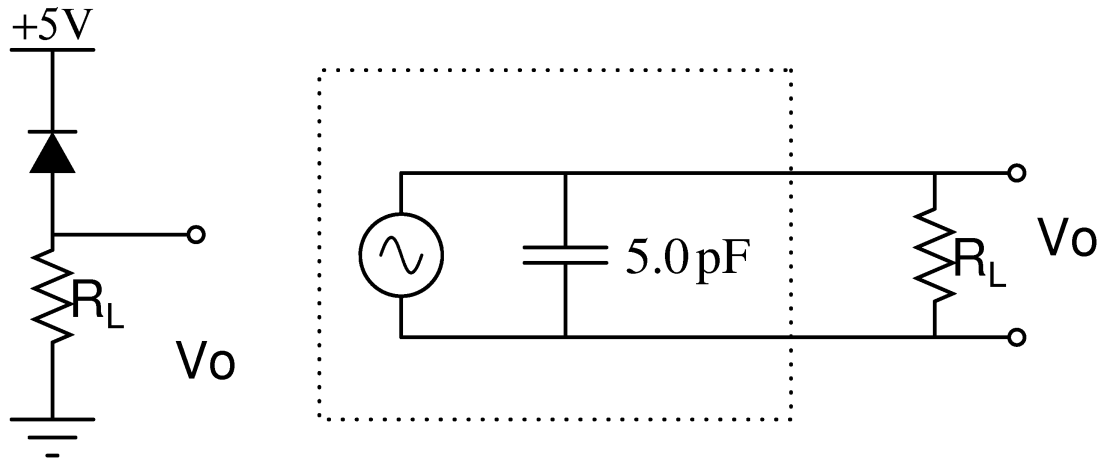


Optical Communications: You will see this problem in a more complex form in ELEN 462



The above circuit on the left represents a receiver on a fiber optic line. The diode here is in fact a light detector connected to the fiber line. The circuit on the right is the equivalent circuit with the parts in the dotted box representing the diode. The alternating source is a current source where the output is dependant on the light input. It ranges from 0mA to 100mA. The bandwidth that this receiver can handle is inversely proportional to the rise time of the RC circuit where the rise time is the time required for V_o to go from 10% to 90% of the maximum when supplied with a step function.

It has been determined that the bandwidth of the fiber line and light source is 175Mbits/sec. In order for the receiver to keep up with this value, the rise time must be less than 0.5ns. Set R_L such that the rise time is met. Keep R_L as high as possible because the lower it is, the lower the output signal at V_o and the more errors will show up. At the max output for the current source, will V_o exceed 5V? If it does, lower R_L so that it doesn't.