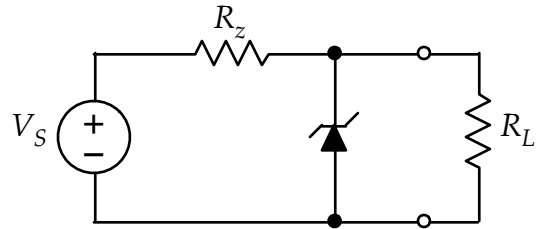


In the circuit shown at right, the Zener has $V_Z = 10\text{ V}$ and is serving as a regulator to keep the voltage across R_L constant.



- a) If $V_S = 15\text{ V}$ and $R_L = 10\ \Omega$, calculate the value of R_Z needed in order to have 20 mA of current in the Zener.

$R_Z =$ _____.

- b) With the value of R_Z , how much power is being delivered by the source, how power is being consumed in the combination of R_Z and the Zener, and how much power is being delivered to the load resistor?

$P_S =$ _____ . $P_{R_Z} + P_Z =$ _____ . $P_{R_L} =$ _____ .

- c) What value of R_L will lead to the Zener diode coming out of the breakdown mode. (i.e. What value of R_L will cause $i_Z \rightarrow 0$?)

$R_L (\text{min}) =$ _____.

- d) If R_L is removed from the circuit — meaning that $i_L \rightarrow 0$ — how much power will be dissipated in the zener diode?

$P_Z =$ _____.