

Peany 1-061 Peany 1
18/06/2028

Mechanical

Basic Electrical Engineering II

Question 1

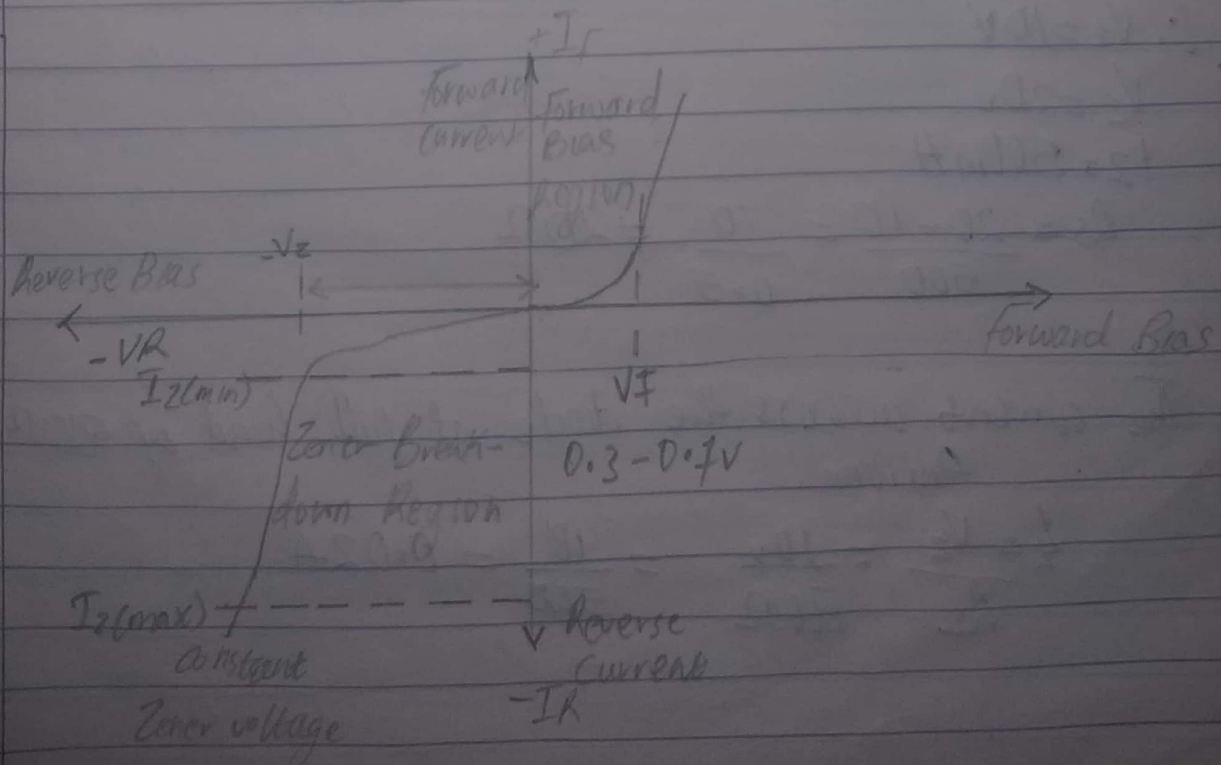
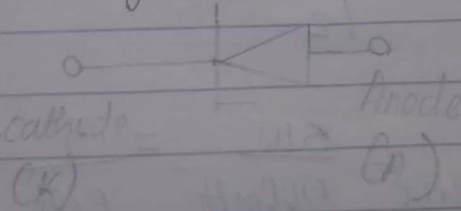
1 Describe a Zener diode regulator

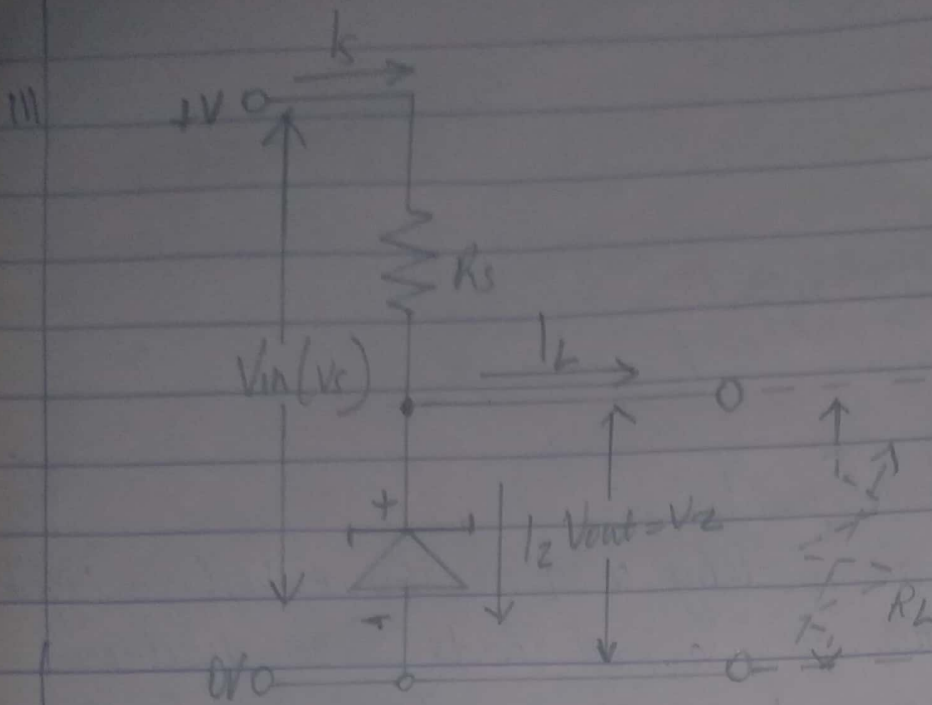
Zener diodes are widely used as shunt voltage regulators to regulate voltage across small loads. Zener diodes have a sharp reverse break down voltage and breakdown voltage will be constant for a wide range of currents.

This we will connect the zener diode parallel to the load such that the applied voltage will reverse bias it.

ii

Symbol





2a The minimum value of the series resistor to the Zener diode

Answer

$$R_s = \frac{V_s - V_z}{I_z}$$

~~$I_z = \frac{P_z}{V_z}$~~

$$V_z = \frac{\text{Watts}}{\text{maximum current}} = \frac{5W}{500mA} = \frac{5}{0.5} = 10V$$

$$\therefore V_z = 10V$$

$$V_s = 20V$$

$$I_z = 500mA$$

$$R_s = \frac{20 - 10}{0.5} = \frac{10}{0.5} = 20\Omega$$

2b The current across the diode at full load of 500Ω

Answer

$$I_L = \frac{V_z}{R_L} = \frac{10V}{500\Omega} = \frac{10}{500} = 0.02A$$