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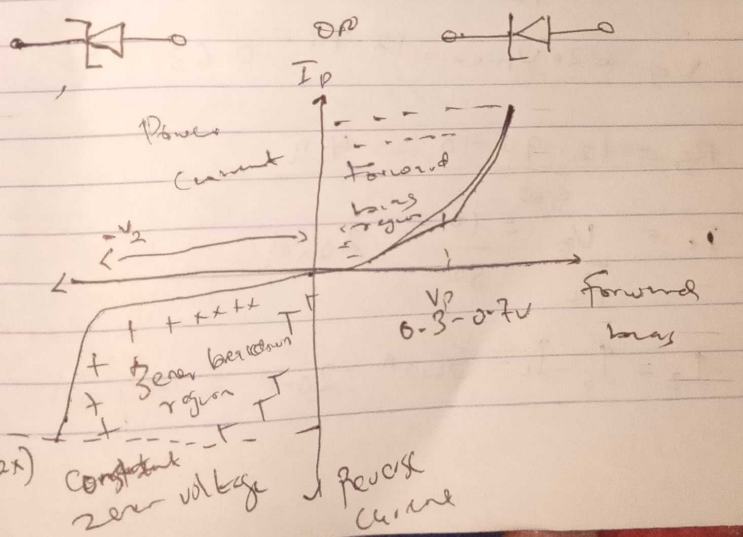
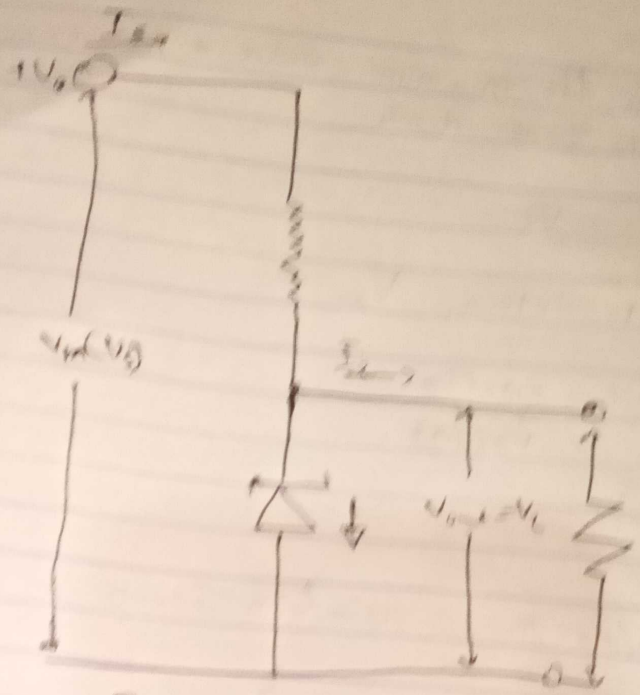
18/ENG03/044

1 Zener diode as a voltage regulator. They are widely used as voltage regulators to regulate voltage across small loads. Zener diodes have a sharp reverse breakdown voltage and breakdown voltage is constant across a wide range of currents. Therefore ~~in this~~ the Zener diod will be connected such that the applied voltage will reverse bias it. Therefore if the reverse bias voltage across the Zener diode exceeds the voltage across the ~~Zener diode~~ load will be constant

DIAGRAM



(11)



Zener diode Regulator Circuit

2 To determine the minimum value of the series resistor in the zener diode

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

We need to determine V_z

Max current = $\frac{\text{watts}}{\text{Voltage}}$

$$\frac{500}{x} = \frac{5}{x}$$

$x = 10$

$V_s = 20 V_{max} = 12.74 = 0.637 \times 20$

$$R_s = \frac{12.74 - 10}{500} = 4\ \Omega$$

$$I_L = \frac{V_z}{R_L} = \frac{10}{500} = 20mA$$

$I_z = I_s - I_L = 500mA - 50mA = 480mA$