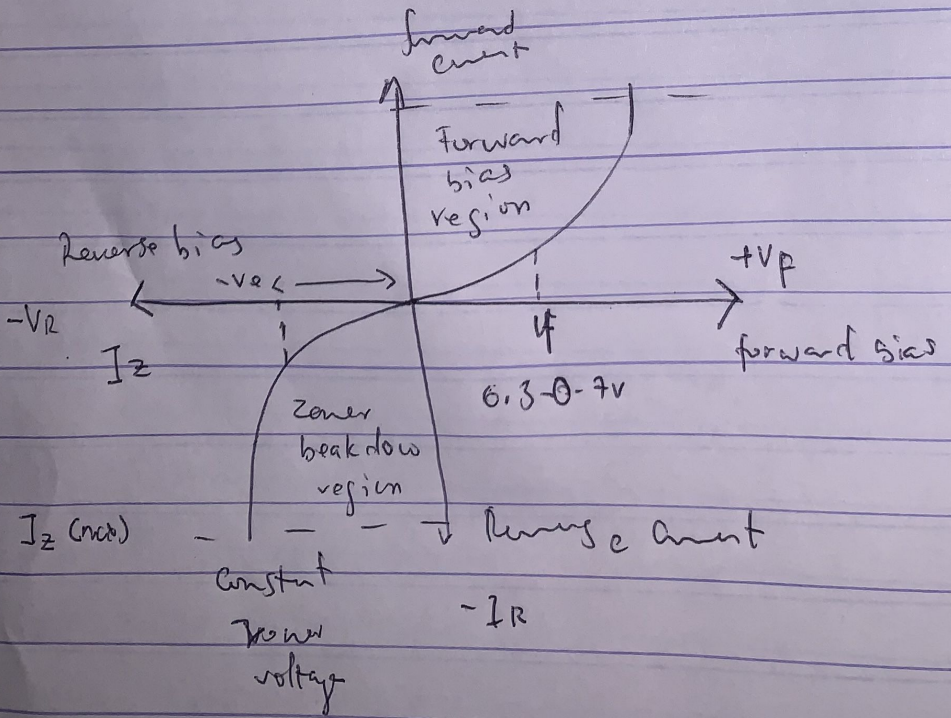
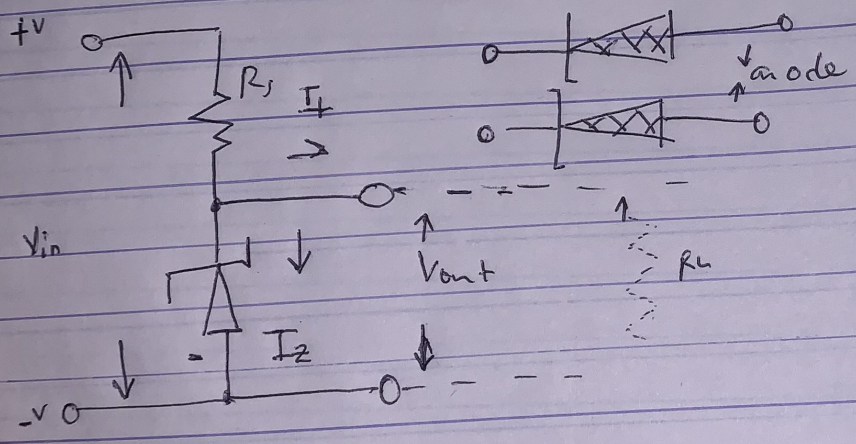


CIVIL ENGR

i) Zener diode Regulator is done by passing a small current through the diode from a voltage source, via a suitable current limiting resistor (R_s), the Zener diode will conduct sufficient current to maintain a voltage drop of v_{out} .

The voltage output v_{out} across the Zener diode is connected with its Cathode terminal, which is connected to the positive ~~terminal~~ rail of the DC supply so it is reverse biased, the resistor R_s is selected to limit the maximum current flowing in the circuit.

ii) Circuit diagram



$$P_z = 5W$$

$$I_z = 500mA = 0.5A$$

$$\text{max. current} = \frac{\text{max. Power}}{V}$$

$$0.5A = \frac{0.5W}{V}$$

$$0.5AV = 5W$$

$$V = \frac{5W}{0.5A}$$

$$V = 10V$$

$$V_{\text{avg}} = 0.637 V_{\text{max}} (\text{Full wave})$$

$$V_{\text{dc}} = 0.637 \times 20$$

$$= 12.74V_{\text{dc}}$$

$$\therefore \text{min. resistance} = \frac{V_s - V_z}{I_z} = \frac{12.74 - 0}{0.5}$$

$$= \frac{12.74}{0.5} = 25.48\Omega$$

(ii) Current across the diode (ii) full load of 500 Ω

$$I_c = \frac{V_z}{R_L} = \frac{10}{500} = \frac{1}{50} = 0.02A$$

2. Current across the diode at 500 Ω full load
 $= 20mA$ or $0.02A$