

Name: Harding - Udoh Titania B.

Matric No: 18/ENG08/007

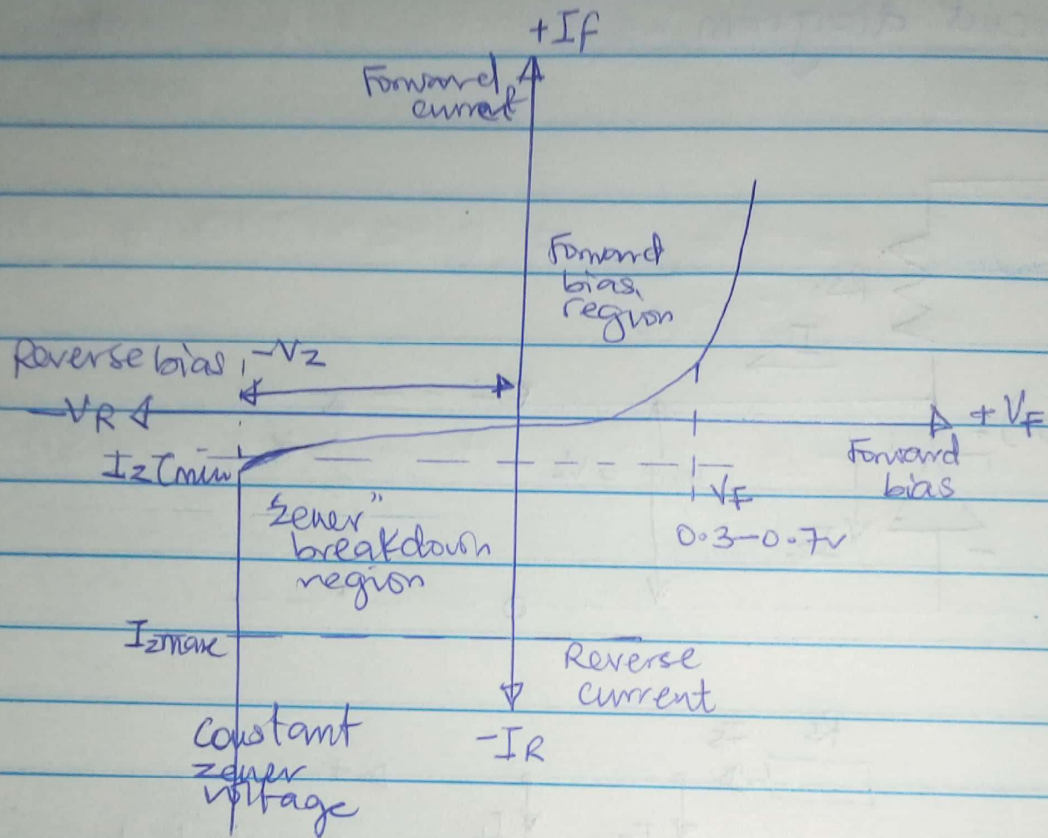
Department: BIOMEDICAL ENGINEERING

1 Zener Diodes are used as shunt voltage regulators across small loads. Zener Diodes have a sharp reverse breakdown voltage and breakdown voltage will be constant for a wide range of currents.

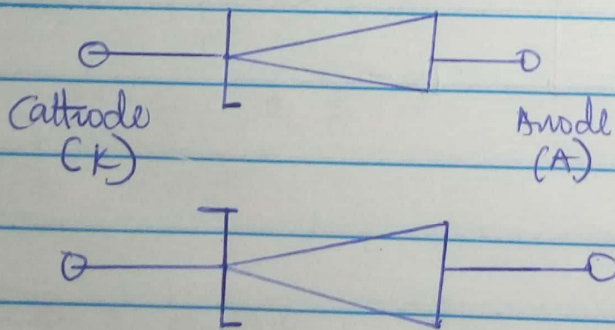
The function of a regulator is to provide a constant output voltage to a load connected in parallel with it in spite of the ripples in the supply voltage for the variation in the load current and the zener diode will continue to regulate the voltage until the diodes current falls below the minimum value in the reverse breakdown region.

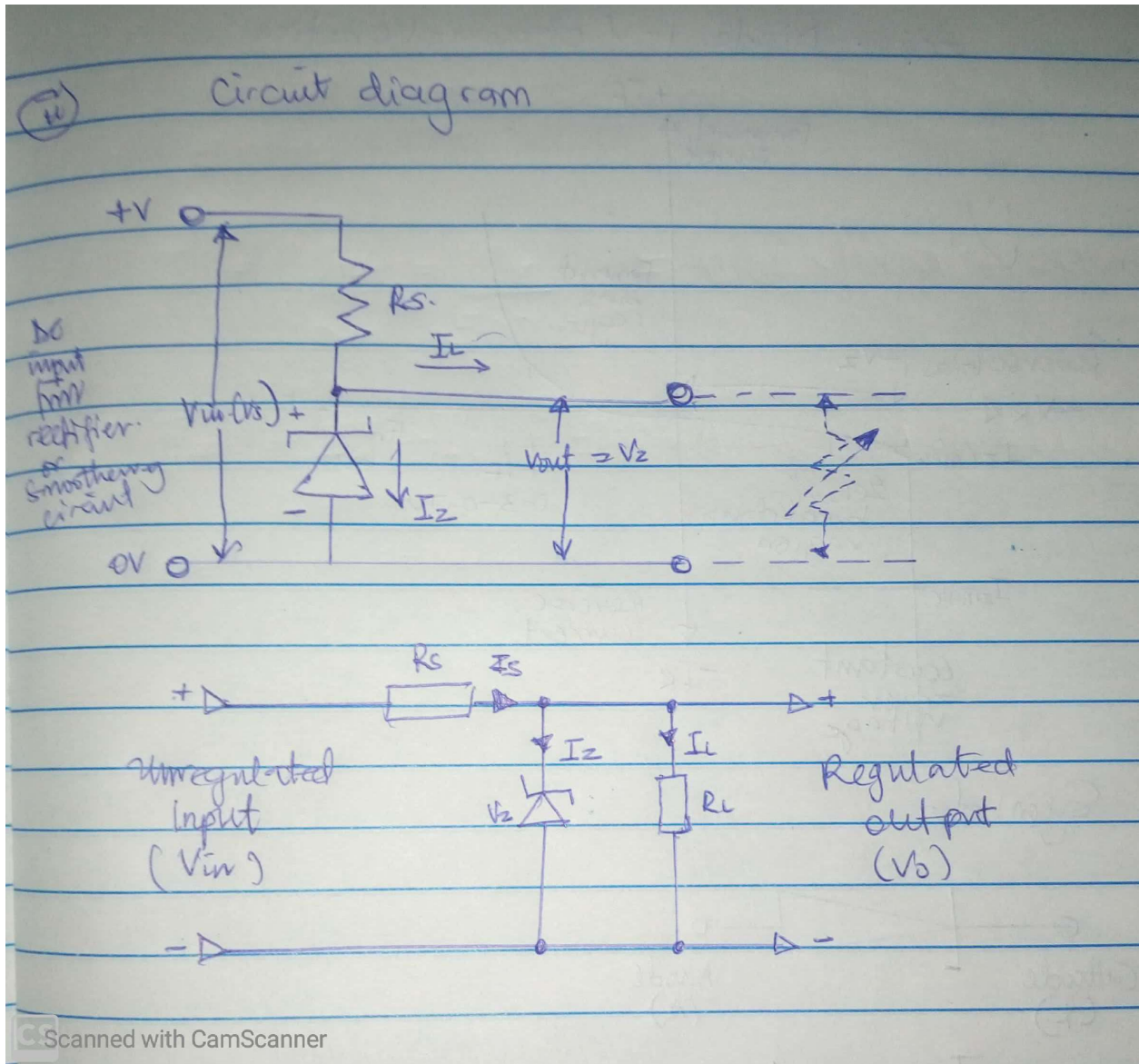
zener Diode I-V characteristics

(1)



Symbol





$$2. \text{ Power} = 5W$$

$$(I_z) \text{ maximum current} = 500mA$$

$$V_s = 20$$

$$V_z = ?$$

$$I_z = \frac{\text{Watts}}{\text{Voltage}}$$

$$500mA \times \frac{5}{x}$$

$$5 = \frac{500mA \times 5}{500}$$

$$\therefore x = 0.01$$

$$\therefore V_z = 0.01 \times 1000 = 10V$$

① minimum value of the series Resistor, R_s .

$$R_s = \frac{V_s - V_z}{I_z} = \frac{20 - 10}{500mA} = 0.02 \times 1000 = 20\Omega$$



(ii) The current across the diode at full load of 500Ω

$$I_L = \frac{V_Z}{R_L} = \frac{10V}{500\Omega} = 0.02 \times 1000 = 20mA$$

$$\therefore I_Z = I_S - I_L = 500mA - 20mA = 480mA$$