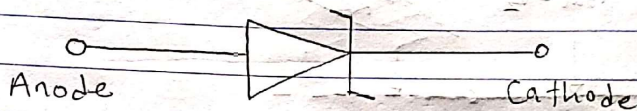


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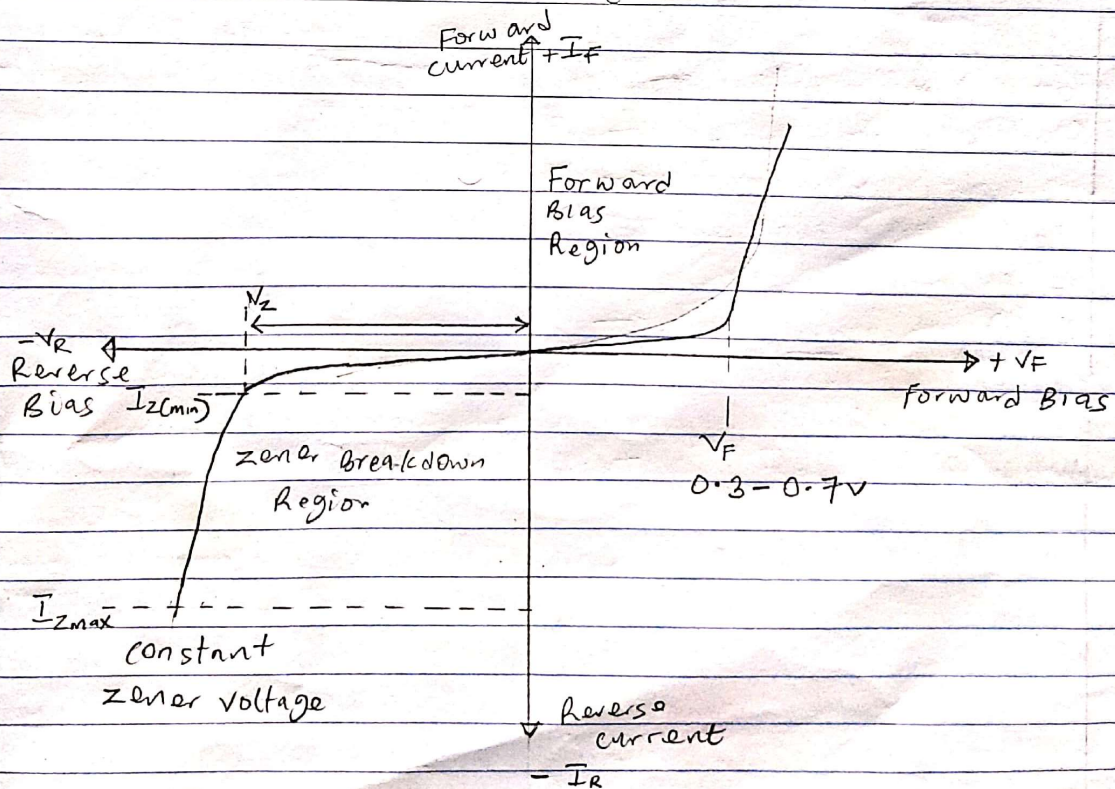
Question 1; Describe a Zener diode regulator and;
i) Sketch the symbol and I-V characteristic Curve
ii) Sketch and label the circuit diagram

Solution.

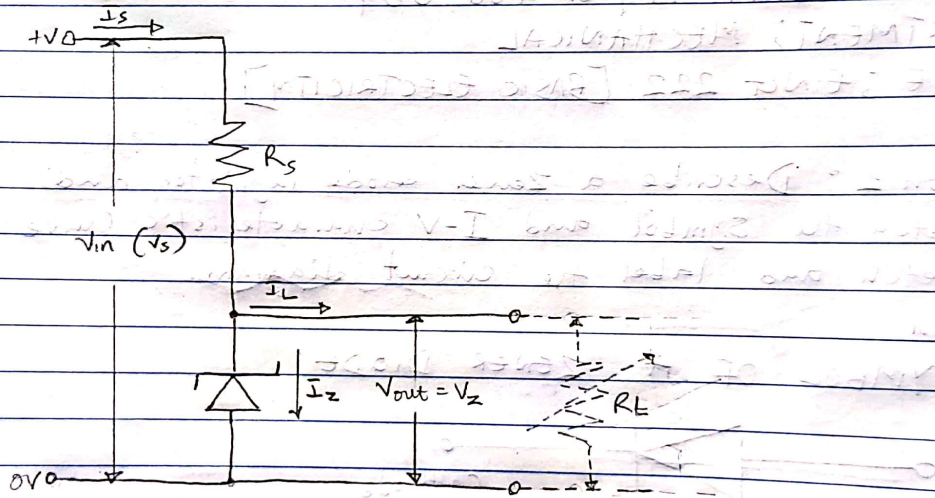
SYMBOL OF A ZENER DIODE



I-V CHARACTERISTIC CURVE



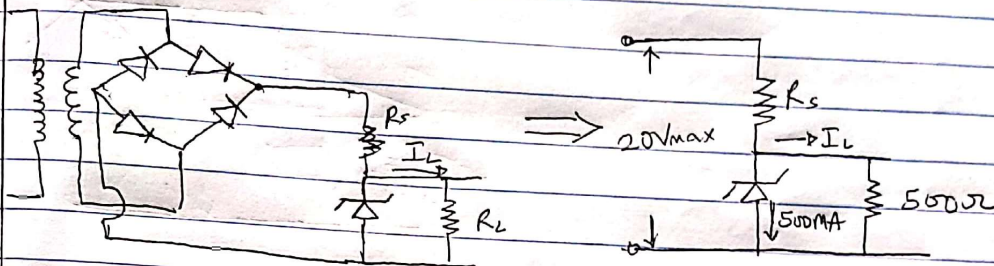
CIRCUIT DIAGRAM FOR A ZENER DIODE REGULATOR CIRCUIT



Question 2: A 5W maximum rated Zener diode has 500mA maximum current flowing through it. If a 20Vmax bridge rectifier circuit is connected as input to the regulator circuit calculate

- i) The minimum value of the series resistor to the zener diode
- ii) The current across the diode at full load of 500Ω

Solution



$$V_{dc} = \frac{2V_{max}}{\pi} = \frac{2 \times 20V_{max}}{\pi} = 12.732V$$

i) Minimum value of series resistor

$$R_s = \frac{V_s - V_z}{I_z} \quad V_s = 12.732V$$

$$V_z = 10V$$

$$I_z = 500mA = 500 \times 10^{-3}A = 0.5A$$

$$P_z = I_z V_z$$

$$5 = 0.5 \times V_z$$

$$V_z = \frac{5}{0.5} = 10V$$

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

$$\therefore R_s = \frac{12.732 - 10}{500 \times 10^{-3}} = \frac{2.732}{0.5} = 5.464\Omega$$

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

$$I_z = I_s - I_L =$$

$$I_L = \frac{V_z}{R} = \frac{10}{500} = 0.02A$$

$$I_z = (0.5 - 0.02)A = 0.48A$$