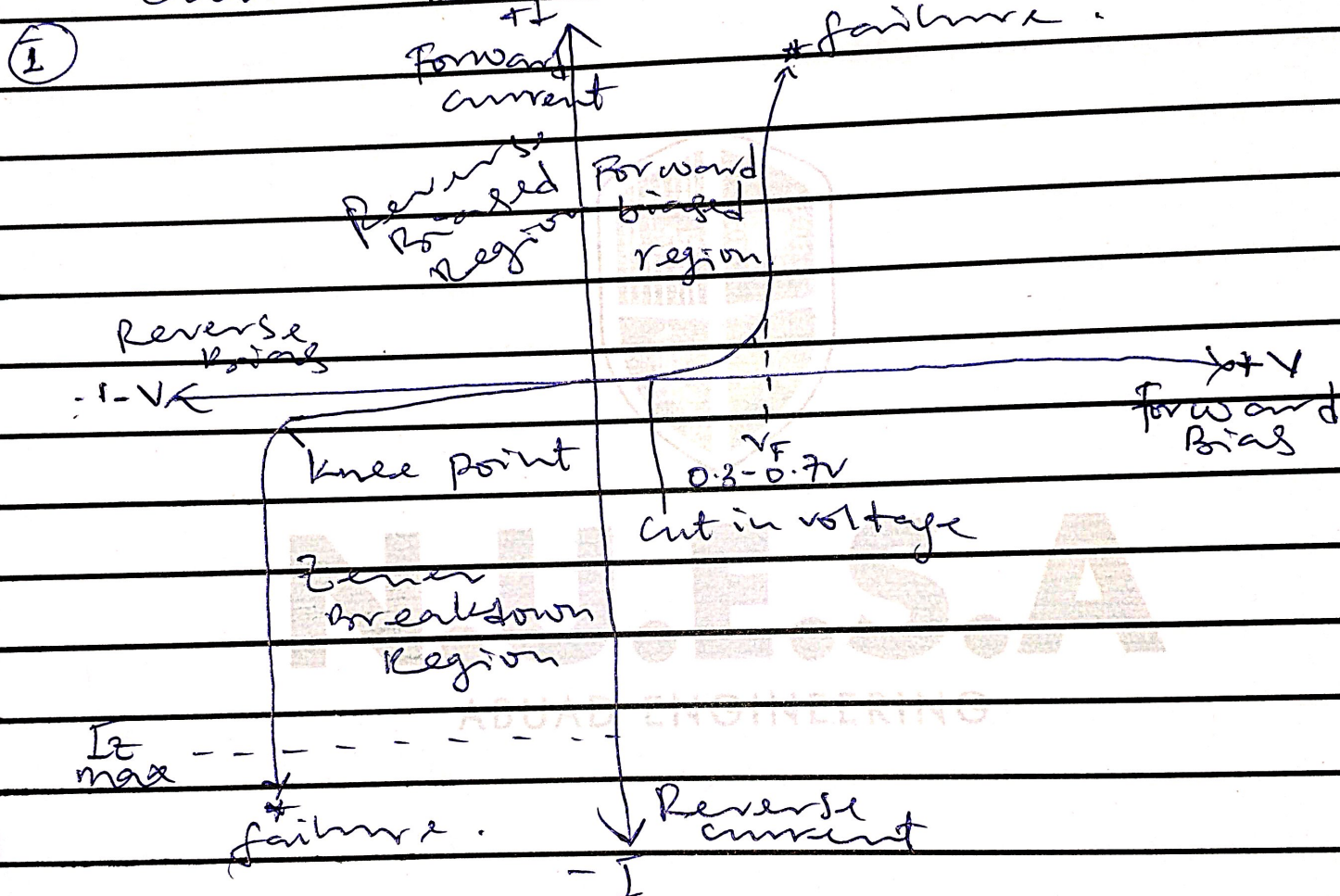
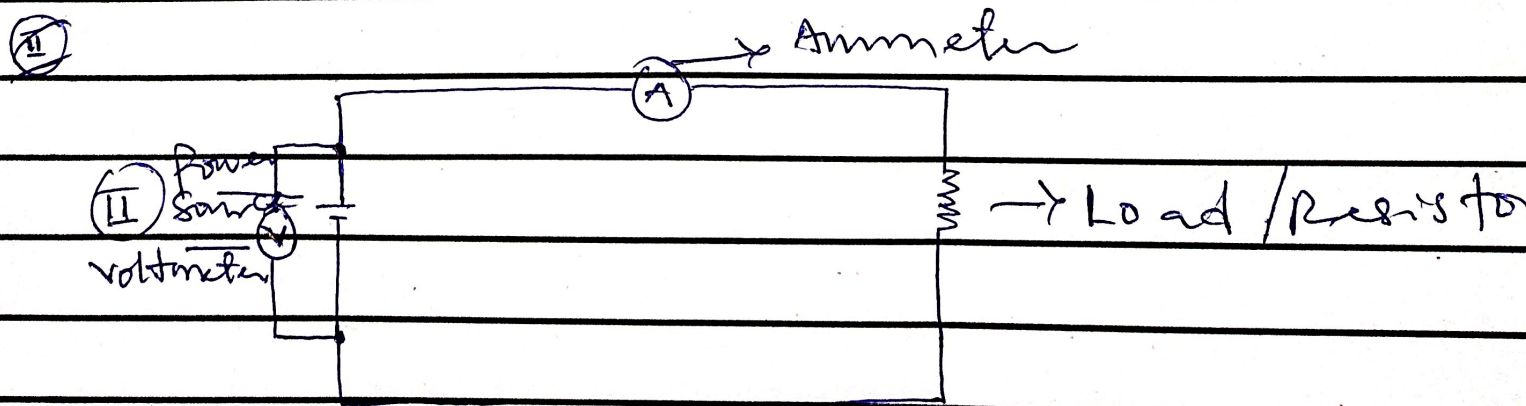


① Zener Diodes are widely used as simple voltage regulators to regulate voltage across small loads. Zener diodes have a sharp reverse breakdown voltage and breakdown voltage will be constant for a wide range of currents.



I-V characteristics curve.



Circuit Diagram.

$$(2) P = 5W.$$

$$I = 500mA = 500 \times 10^{-3} A.$$

20V max.

$$V_{max} = 20$$

$$V_{dc} = (0.318) V_{max}.$$

$$V_{dc} = 0.318 (20).$$

$$V_{dc} = 6.36V.$$

$$(I) \frac{V_z}{I_z} = \frac{P_z}{I_z} = \frac{5}{500 \times 10^{-3}} = 10V.$$

$$\therefore V_z = 10V.$$

$$R_s = \frac{V_s - V_z}{I_z} = \frac{20 - 10}{500 \times 10^{-3}}$$

$$= \frac{10}{500 \times 10^{-3}} = 20\Omega.$$

$$\therefore R_s = 20\Omega.$$

$$(II) I_z = I_s - I_L.$$

$$I_L = \frac{V_L}{R_L} = \frac{10}{500} = 0.02A.$$

$$= 20mA.$$

$$= 20mA.$$

$$\therefore I_z = 500 - 200$$

$$I_z = 480mA.$$

$$I_z = \underline{\underline{480 \times 10^{-3} A}}.$$