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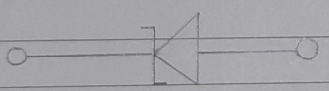
i) Describe a Zener diode regulator

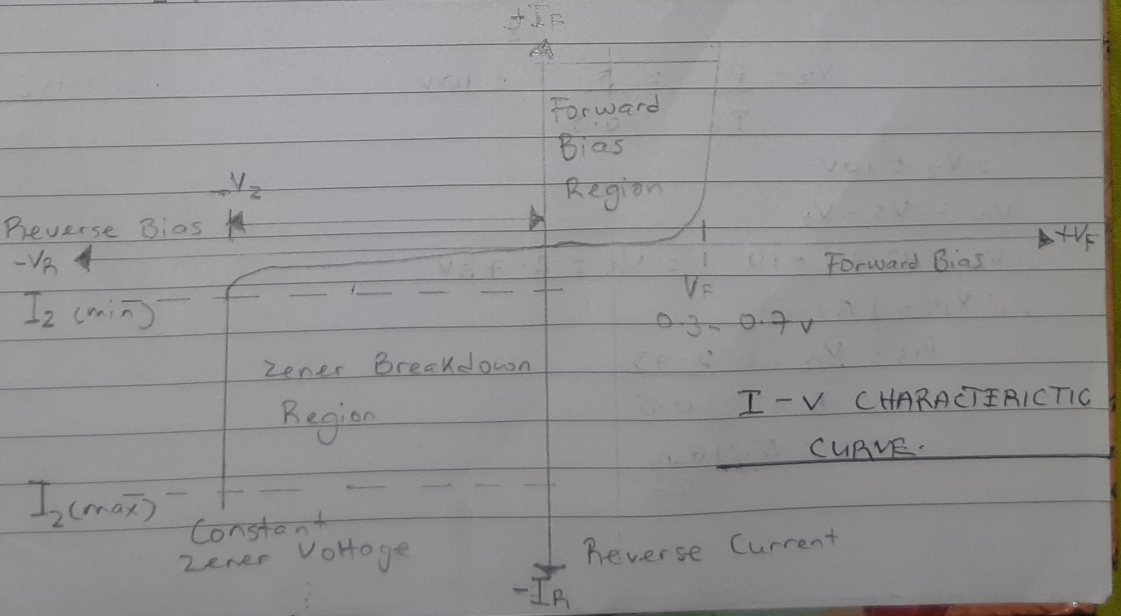
A regulator provides a constant output voltage to a load connected in parrallel with it in spite of the ripples in the supply voltage or the variation in the load current and the zener diode will continue to regulate the voltage until the diodes current falls below the minimum $I_{Z(min)}$ value in the reverse breakdown region.

ii) Sketch the symbol and I-V characteristics curve.


SYMBOL.

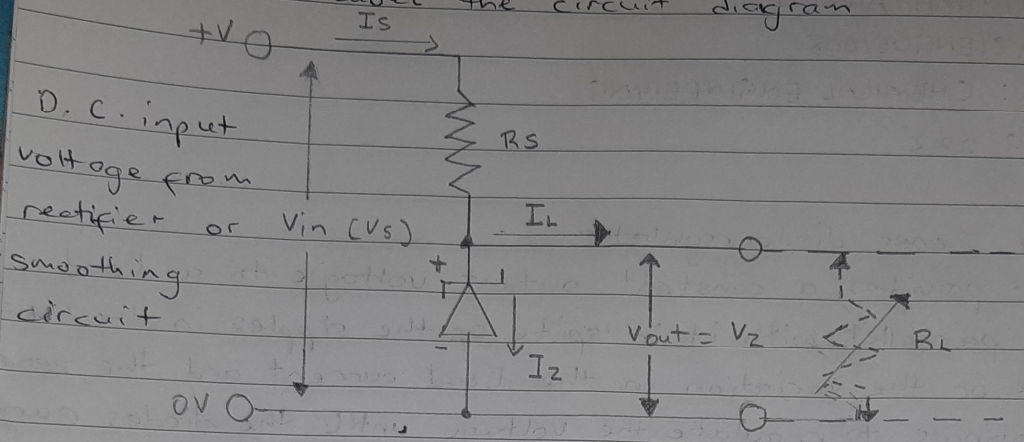
OR






I-V CHARACTERISTIC CURVE.

ii) Sketch and Label the circuit diagram




2) Max power = 5W

$I_s = 500mA = 0.5A$

$V_{max} = 20V_{max}$

$V_{max}$ to D.C $= \frac{2V_{max}}{\pi}$

$V_s = \frac{2 \times 20}{\pi} = 12.73V$

$I_s = (Max\ current) = \frac{P}{V_z}$

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

$\therefore V_z = 10V$

$V_R = V_s - V_z$

$V_R = 12.73 - 10 \quad \therefore V_R = 2.73V$

$\because V_R = IR_s$

$R_s = \frac{V_R}{I} = \frac{2.73}{0.5}$

$R_s = 5.46\Omega$

ii) $I_L = \frac{V_2}{R_L}$

$V_2 = 100$

$R_L = 500$

$I_L = \frac{100}{500} = 0.02A = 20mA$

$I_2 = I_S - I_L$

$= 500 - 20 = 480mA$