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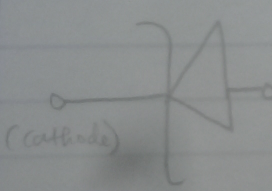
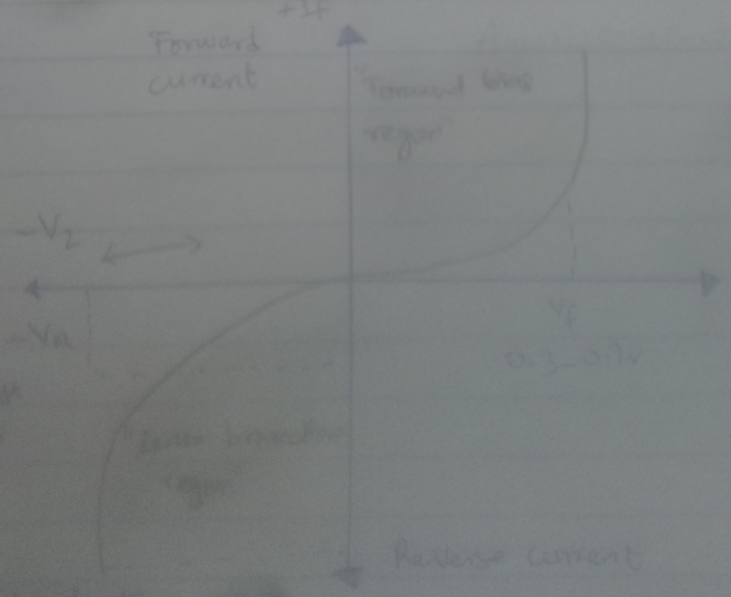
(1) Zener diodes are widely used as voltage regulators and a shunt regulators to regulate the voltage across small circuits. When connected in parallel with a variable voltage source so that it is reversed biased, a Zener diode conducts when the voltage reaches the diodes rexease breakdown voltage

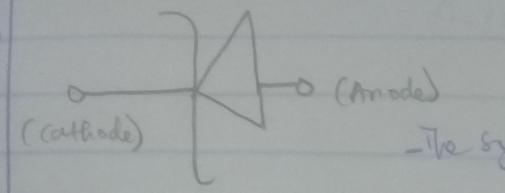
(i)



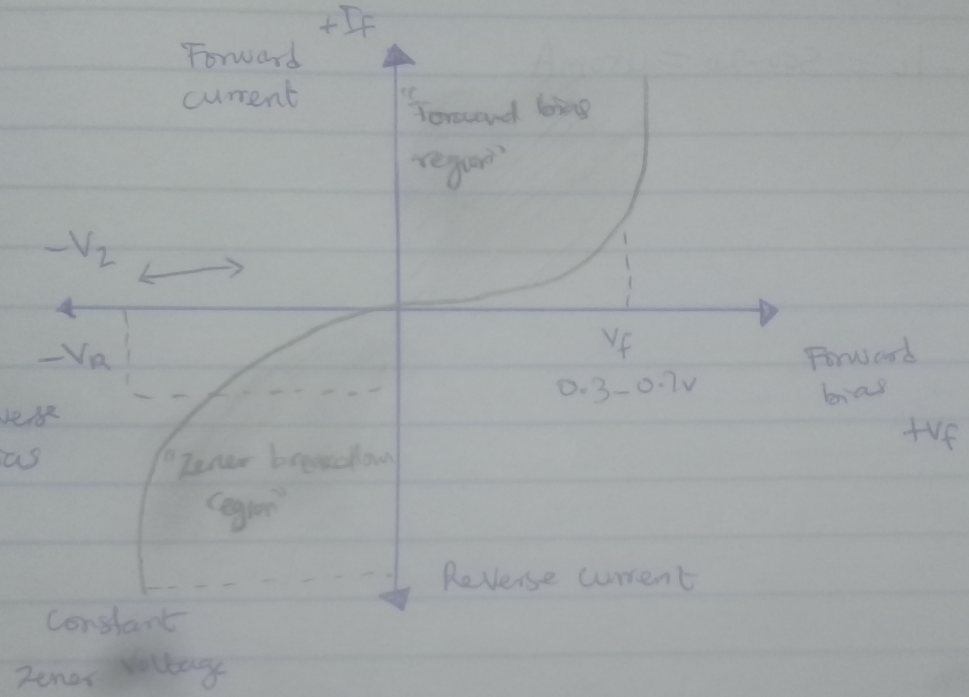
-The symbol



(ii)

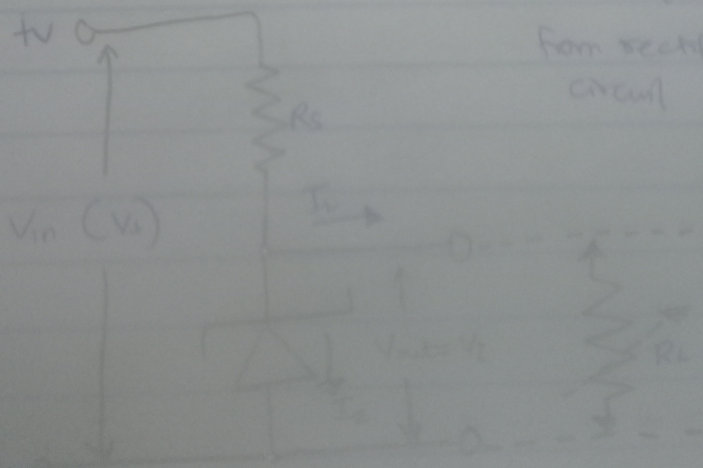


-The symbol



(iii)

D.C input voltage from rectifier or smoothing circuit



(2) Max Power = 5W

$I_z = 500mA \simeq 0.5A$

$V_s = 20V_{max}$

1) Max current $= \frac{5W}{10} = 0.5A$ $\therefore I_z = 0.5A$, so $V_z = 10$

Minimum resistance $= \frac{V_s - V_z}{I_z}$

$V_{dc} = 0.637 V_{max}$

$= 0.637 \times 20 = 12.74 V_{dc}$

so

minimum resistance $= \frac{12.74 - 10}{0.5} = 5.48\Omega$

$I_L = \frac{V_L}{R_L} = \frac{10}{500} = 20mA$

$I_z = I_s - I_L = 500 - 20 = 480mA$