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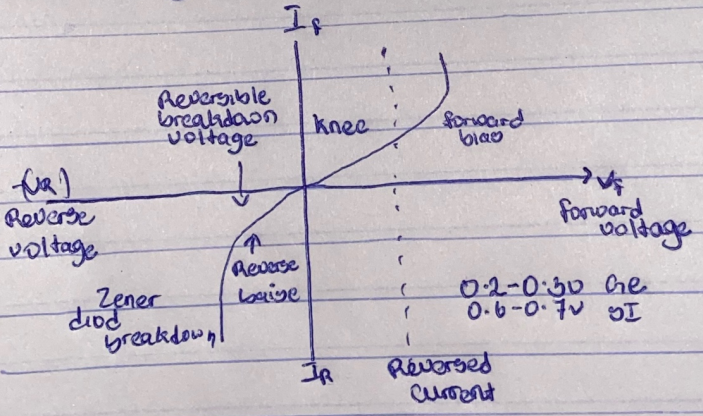
19/16NG06/095
Mechanical Engineering.

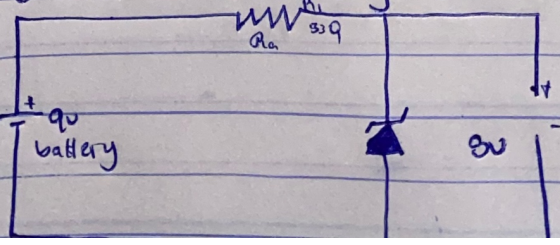
i) Describe zener diode regulator

This consists of a current limiting resistor R_s connected in series with the input voltage V_s with the zener diode R_L in the reversed biased condition. The stabilised output voltage is always selected to be the same as the breakdown voltage V_z of the diode. 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 or ~~the variation in the load~~ ~~Current in Parallel with it in spite of the~~ 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. There're two types of regulator such as line regulation and load regulations.

ii) Sketch the symbol and I-V characteristic curve



iii) Sketch and label the circuit diagram



2 $P_z = 5W$

$I_z = 500mA$

20v max

To convert Vmax to VDC

$V_{dc} = \frac{2V_{max}}{\pi}$

$V_S = \frac{2 \times 20}{\pi} = 12.73\ V_{DC}$

Recall that $P = IV$

$\therefore V_z = P_z / I_z = \frac{5}{500 \times 10^{-3}}$

$V_z = 10V$

Recall that $V_z + V_R = V_S$

$V_R = V_S - V_z$

$= 12.73 - 10$

$= 2.73V$

$\therefore V = IR$

$R = V/I = \frac{2.73}{500 \times 10^{-3}} = 5.46$

Since it's connected in series and same current flows

$I_S = I_z + I_L$

$I_z = I_S - I_L$

$I_L = V_z / R$

$= 10/500 = 0.02A = 20mA$

$I_z = 500mA = 20mA$

$= 480mA$ | $0.48A$