OYEBADE RAPHAEL FEM 18/ENG04/064 ELEC1/ELEC1

$P_z = 5W$

$I_z = 500mA$

$20V_{max}$

To convert V_{max} ~~to Vdc~~, to V_{dc}

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

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

Recall that $P = IV$

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

$V_z = 10V.$

Recall that $V_z + V_R = V_s$

$$V_R = V_s - V_z$$

$$\frac{2 \times 20}{\pi} - 10$$

$$= 12.73 - 10$$

$$= 2.73V$$

$\therefore V = IR$

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

$$R = 5.46$$

Since its connected in series, and same current flows

$$I_s = I_z + I_L$$

$$I_z = I_s - I_L$$

$$I_L = \frac{V_z}{R}$$

$$= \frac{10V}{500\Omega} = 0.02A = 20mA$$

$$I_z = 500mA - 20mA$$

$$= 480mA = 0.48A //.$$

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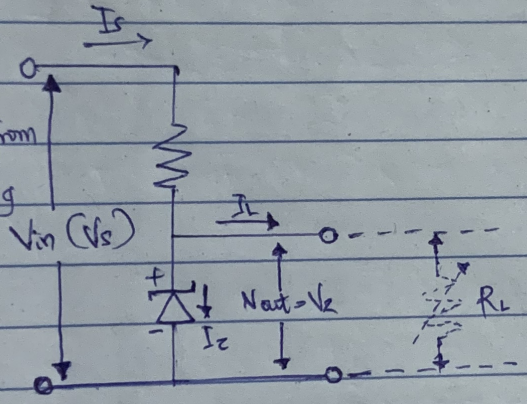
(1) Zener diode voltage regulator can be used to produce a stabilised voltage output with low ripple under varying load current conditions. By passing a small current through the diode from a voltage source, via a suitable current limiting resistor (R_s), the Zener diode will conduct sufficient current to maintain a voltage drop of V_{out}. The DC output voltage from the half or full-wave rectifiers contains ripple superimposed onto the DC voltage and that as the load value changes so does the average output voltage. By connecting a simple zener stabiliser circuit as shown below across the output of the rectifier, a more stable output voltage can be produced.

(i)



Symbol