

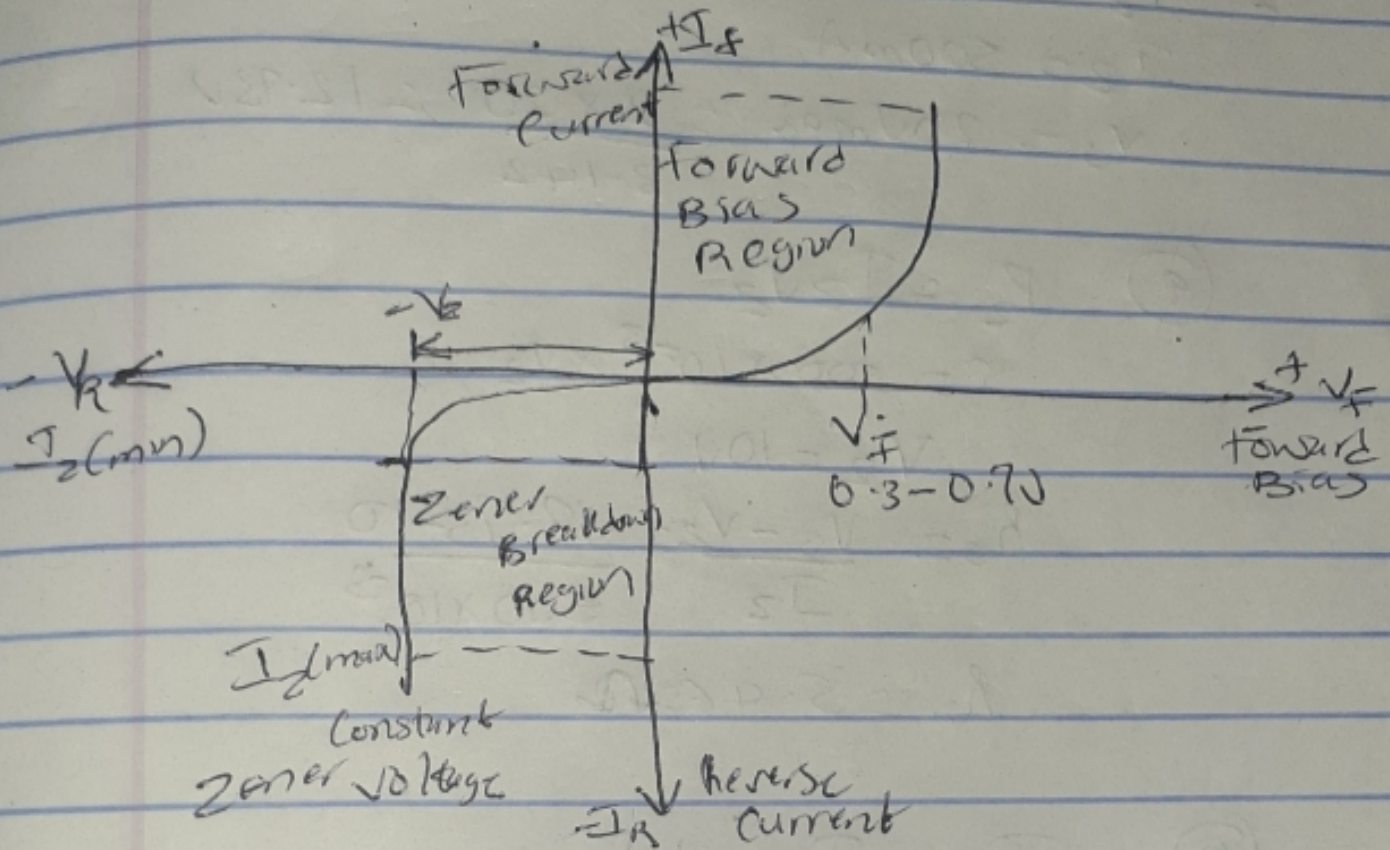
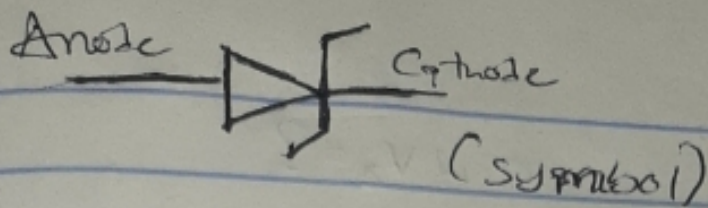
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18/ECE605/047 Mechatronics Engineering
Assignment.

1 Zener diode is a type of diode that allows current to flow in the conventional manner from its anode to its cathode.

For Zener diode regulator, the resistor R_s is connected in series with Zener diode to limit the current flow through the diode with the voltage source, V_s being connected across the combination.

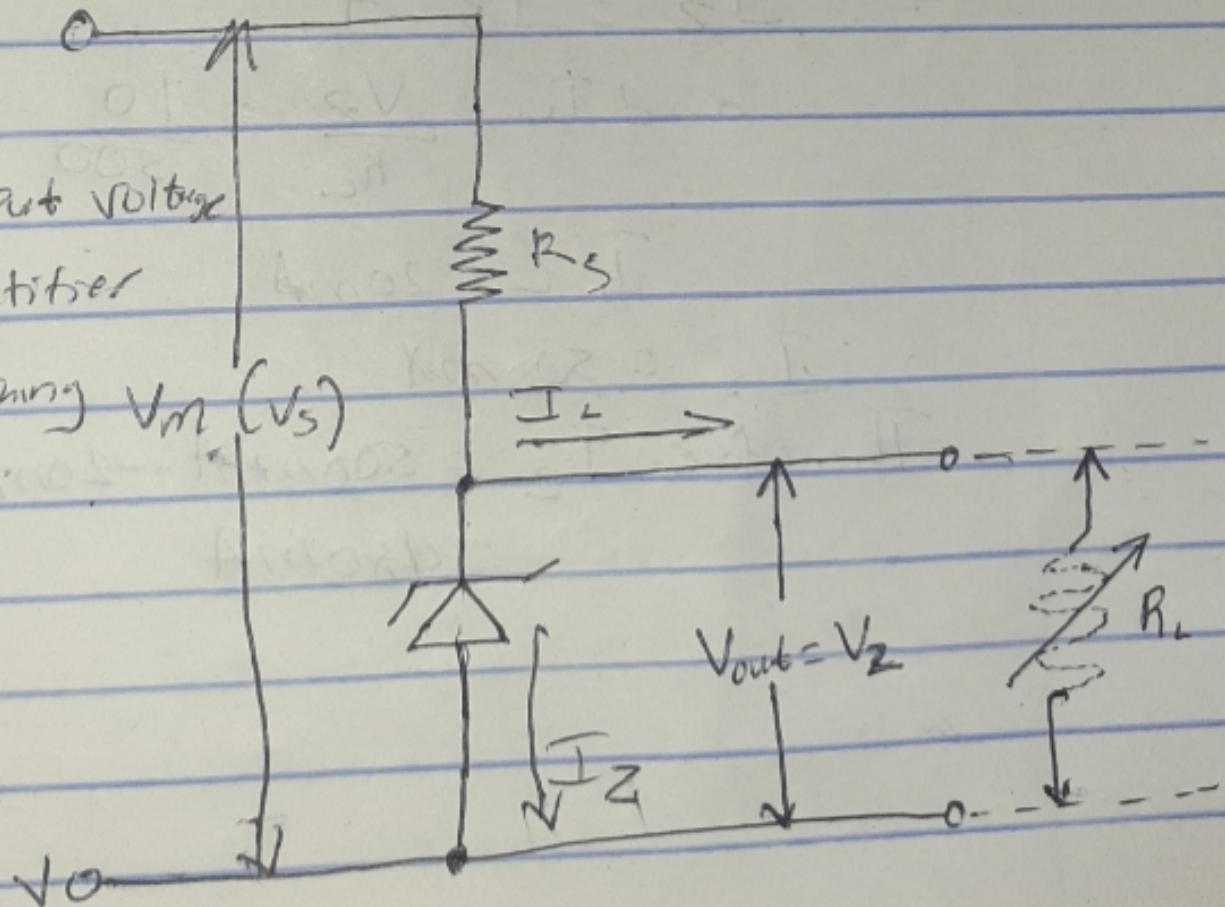
The stabilised output voltage V_{out} is taken from across the Zener diode and the Zener diode is connected with its cathode terminal connected to the positive rail of DC supply so it is reverse biased and will be operating in its breakdown condition. The resistor R_s is selected so to limit the maximum current flowing in the circuit.

When there is no load connected to the circuit, the load current will be zero ($I_L = 0$) and all the current passes through the Zener diode which in turn dissipates its maximum power.



(ii)

DC input voltage
from rectifier
or smoothing V_m (V_S)
circuit



$$2 \quad P_2 = 5W \quad \text{and } V_2 = ?$$

$$I_2 = 500mA$$

$$V_s = 20V_{max} = \frac{2 \times 20}{3.142} = 12.73V$$

(9)

$$P_2 = I_2 V_2$$

$$5 = 500 \times 10^{-3} \times V_2$$

$$V_2 = 10V$$

$$R_s = \frac{V_s - V_2}{I_2} = \frac{12.73 - 10}{500 \times 10^{-3}}$$

$$R_s = 5.465 \Omega$$

(6)

$$I_s = I_2 + I_L$$

$$\therefore I_2 = I_s - I_L$$

$$\text{and } I_L = \frac{V_2}{R_L} = \frac{10}{500}$$

$$I_L = 20mA$$

$$I_s = 500mA$$

$$\text{Therefore } I_2 = 500mA - 20mA \\ = 480mA$$