

OKPODU JESSICA
18/ENG07/010
PETROLEUM ENGINEERING
ENGR 222

Question 1

Zener diode voltage regulator consists of a current limiting resistor (R_S) which is connected in series with a voltage (V_S) and a Zener diode (R_L) is in a reversed biased condition.

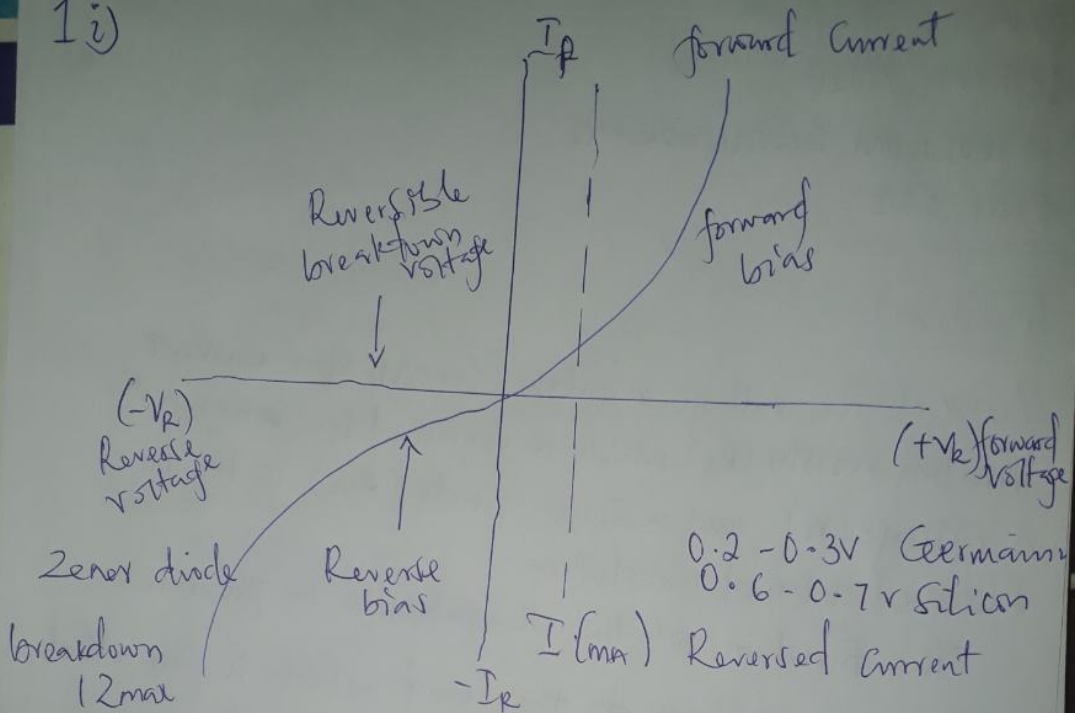
The function of the Regulator is to provide a constant voltage to the load which is parallel to the ripples in the voltage supply. In variation in the load current and the Zener diode will continue to regulate the voltage until the diode current falls below the minimum (I_Z) value.

They are majorly two types of regulators;

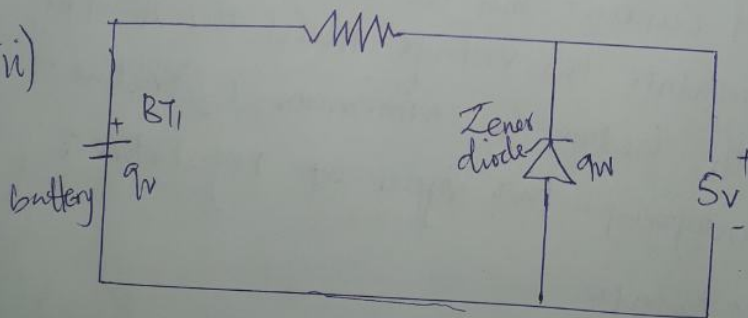
- Line regulator
- Load Regulator



1 i)



1 ii)



Question 2

$$2i) P_z = 5W$$

$$I_z = 500mA$$

$$20V_{max}$$

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

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

Recall that $P = IV$

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

$$V = 10V$$

$$V_z + V_R = V_s$$

$$V_R = V_s - V_z$$

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

$$= 12.73 - 10$$

$$= 2.73V$$

$$\therefore V = IR$$

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

$$R = 5.46$$

$$2ii) I_s = I_z + I_L$$

$$P_z = I_s - I_L$$

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

$$I_z = 500mA - 20mA \\ = 480mA = 0.48A //$$

High

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