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DEPARTMENT: **BIOMEDICAL ENGINEERING**
COURSE CODE: **ENG 222**
COURSE TITLE: **ELECTRICAL ENGINEERING II**

QUESTION

1. Describe a Zener diode regulator, and:

- i. sketch the symbol and I-V characteristics curve,
- ii. sketch and label the circuit diagram

2. A 5W maximum rated Zener diode has 500mA maximum current flowing through it. If a 20Vmax bridge rectifier circuit is connected as input to the regulator circuit. Calculate:

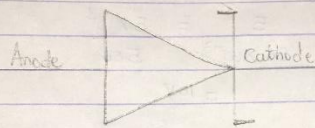
- i. The minimum value of the series resistor to the Zener diode
- ii. The current across the diode at full load of 500Ω

NOTE: Whoever submit an already-submitted solution (File) will be cancelled. Your evidence of personal solution will only be graded.

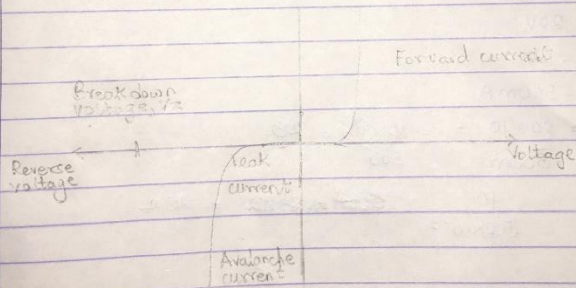
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1 A zener diode regulator is a ~~regulated~~ diode used to regulate voltage across small loads. It is designed to work in zener breakdown region. It acts ~~and~~ like normal P-N junction diodes under forward biased condition. And when this is applied to the diode, it allows large amount of electric current and blocks only small amount of current.

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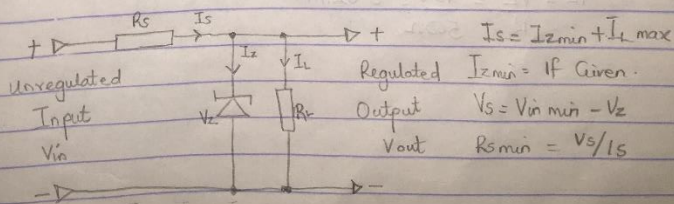


Symbol



I-V characteristics curve -

11



2. Given,

Zener diode

Power = 5W max

Current = 500mA max

Bridge rectifier circuit

Voltage = 20V max

i Calculate the minimum value of resistance.

$$P = IV$$

$$V = \frac{P}{I} = \frac{5W}{500mA} = \frac{5}{500 \times 10^{-3}} = \frac{5 \times 10^3}{500} = 10V$$

R_s (Resistor of series)

$$R_s = \frac{V_s - V_z}{I_z}$$

$$V_s = 20V$$

$$V_z = 10V$$

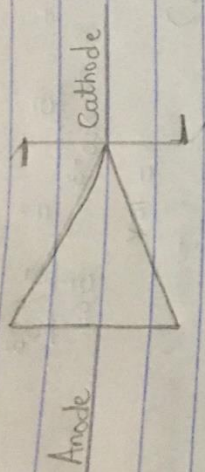
$$I_z = 500mA$$

$$R_s = \frac{(20 - 10)V}{500mA} = \frac{10}{500 \times 10^{-3}} = 20\Omega$$

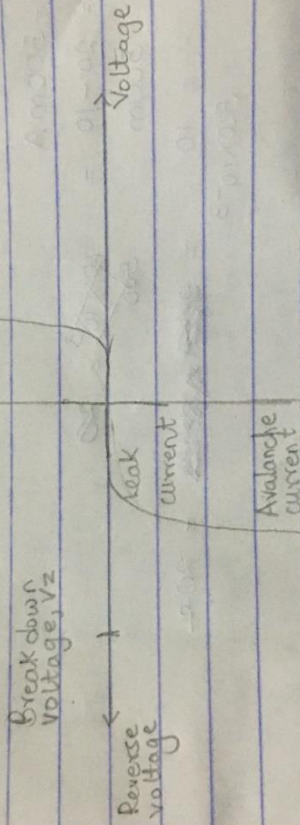
ii The load current I_L if a load resistor of 500 Ω

$$I_L = \frac{V_z}{R_L} = \frac{10V}{500\Omega} = 0.02mA$$

amount of current.



Symbol



I-V character

