NAME : SULE MUBARAK A.
DEPT : CIVIL ENGINEERING
MAT. NO. : 18/ENG03/055
COURSE : BASIC ELECT ENG.
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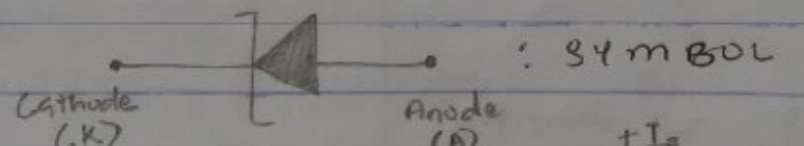
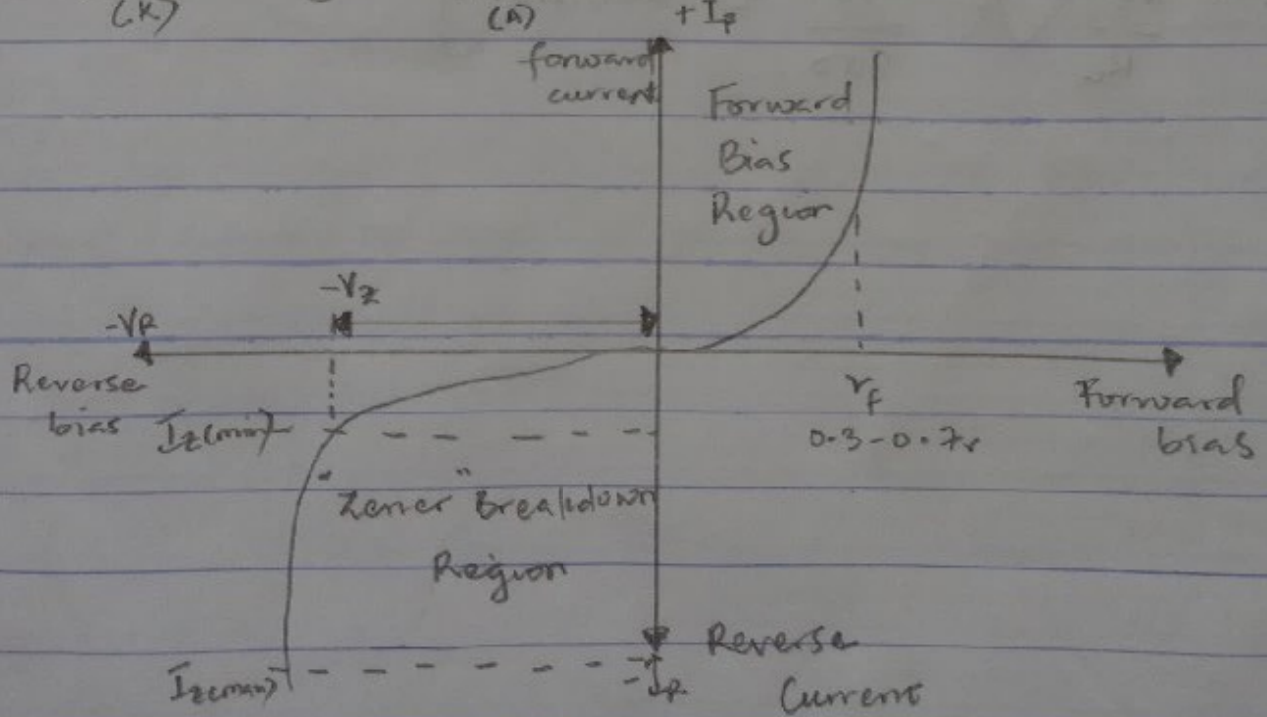
ASSIGNMENT.

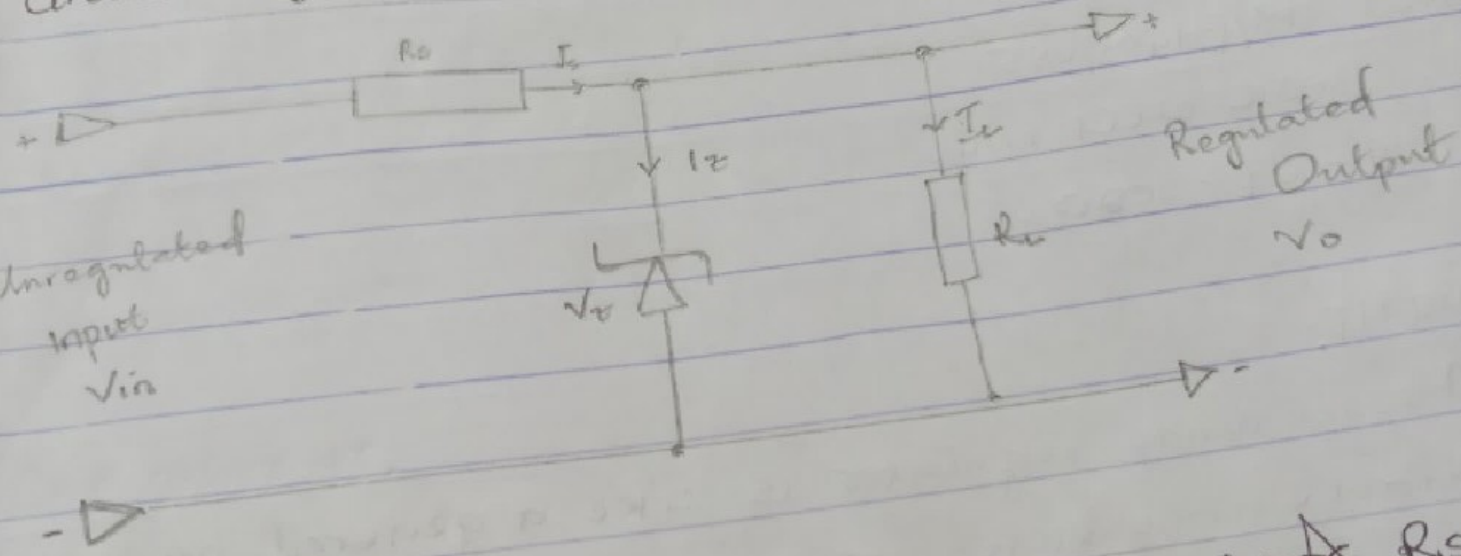
1.> A zener diode regulator is like a general purpose signal diode consisting of a PN junction. When biased in the forward direction it behaves just like a normal signal diode passing the rated current but as soon as a reverse voltage is applied across, the zener diode exceeds the rated voltage of the device, the diodes breakdown voltage is reached at which point a process called "Avalanche Breakdown" occurs in the semiconductor depletion layer and a current starts to flow through the diode to limit this increase in voltage.

(i)





(ii) Circuit diagram for zener diode regulator.



(2) (i) Minimum value of the series resistor, Rs

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

$I_z = 500mA$

$V_s = 20V$

Since Maximum current = $\frac{\text{Watts}}{\text{Voltage}}$

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

$= 10V$

$20\ \Omega$

(2)

Minimum value,

current = 500 mA

power = 5w

V_{max} = 20 v

max current = watts / voltage

500 mA = 5/V

V = 5/500 x 10^{-3} = 10 volts

$V_{dc} = \frac{2V_{max}}{\pi} = \frac{5}{500 \times 10^{-3}} \text{ but } \frac{2 \times 20}{\pi} = 12.732 V$

$R_S = \frac{V_S - V_z}{I_z} = \frac{12.732 - 10}{500 mA} = 5.46 \Omega$

R_S = 5.46 ohms.

b) V = IR

$I = V/R = 10/500 = 20 mA$

$I_R = I_L + I_z$

500 mA = I_z + 20 mA

I_z = 500 mA − 20 mA = 480 mA.