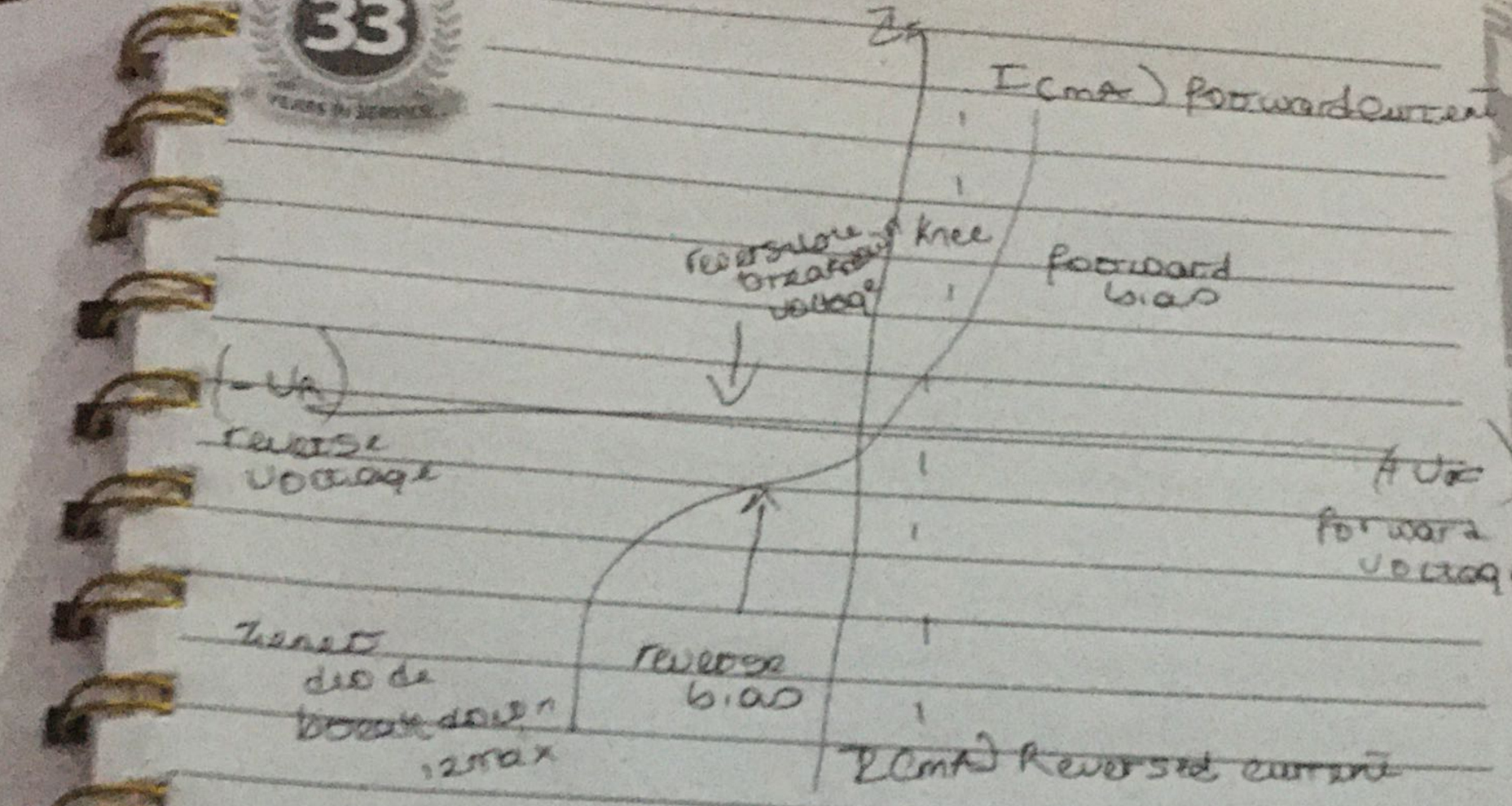
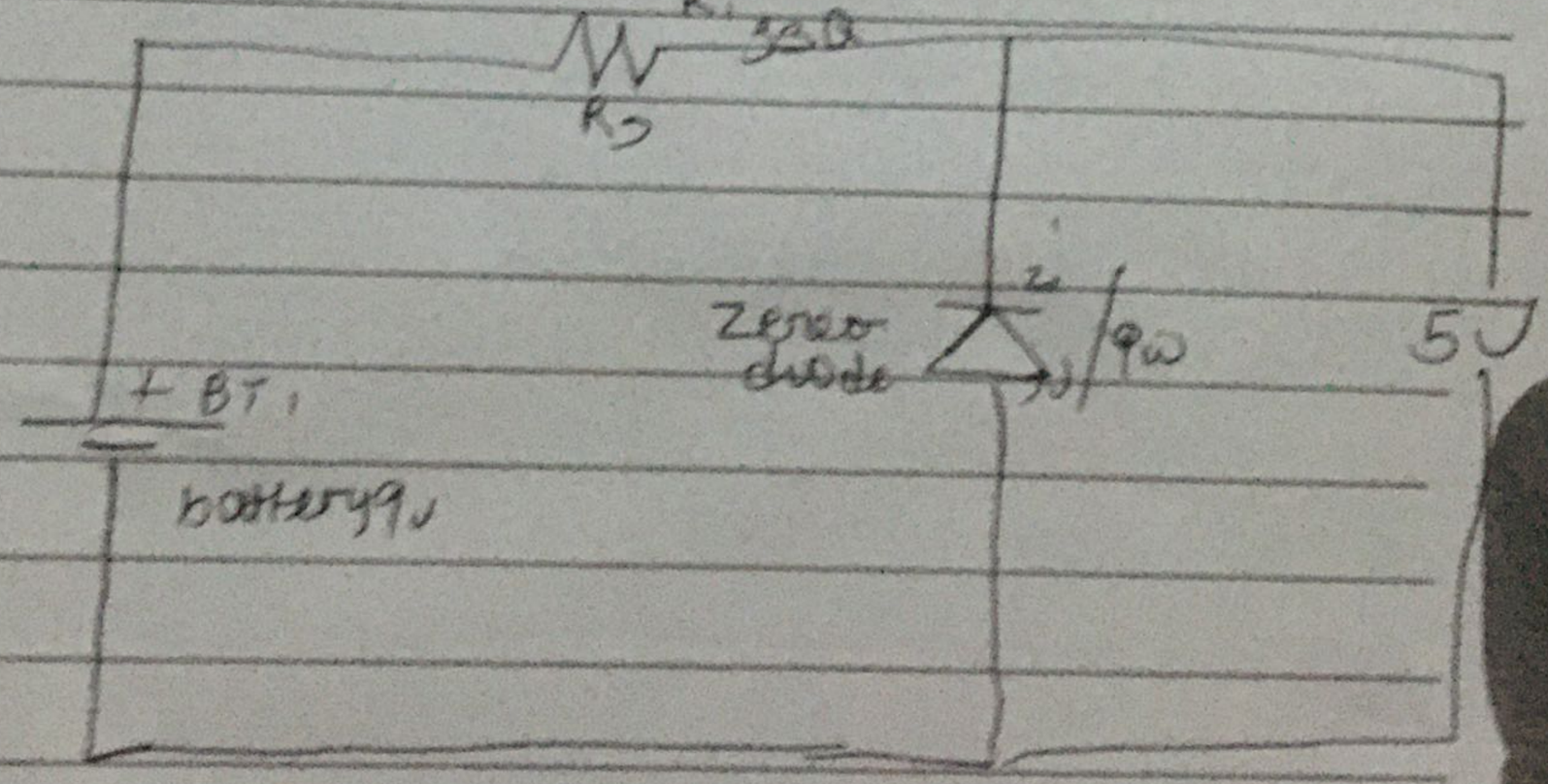
Olayiwola Zainab
18/eng02/078

1) Zener diode voltage regulator consists of a current limiting resistor R_s connected in series with the input voltage V_s with the zener diode R_L in the reverse biased condition. The stabilized output voltage is always selected to be the same as the breakdown voltage V_z of the diode. The function of a regulator is to provide a constant output voltage to a load connected in parallel with it in spite of the ripples in the supply voltage or the variation in the load current and the zener diode will continue to regulate the voltage until the diode current ~~to~~ falls ~~continue~~ below the minimum $I_{z(min)}$ value in the reverse breakdown region. There are two types of regulator such as line regulation and load regulation.



I-V characteristics Curve

ii) Zener diode regulator circuit



2) $P_z = 5W$

$I_z = 500mA$

$2 Vmax$

To convert Vmax to VDC

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

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

Recall that $P = IV$

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

$V_z = 10V$

Recall that $V_z + V_R = V_s$

$V_R = V_s - V_z$

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

$12.73 - 10 = 2.73 V$

$\therefore V = IR$

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

$R = 5.46 \Omega$

Since it's connected in series, and same current flow

$I_s = I_z + I_L$

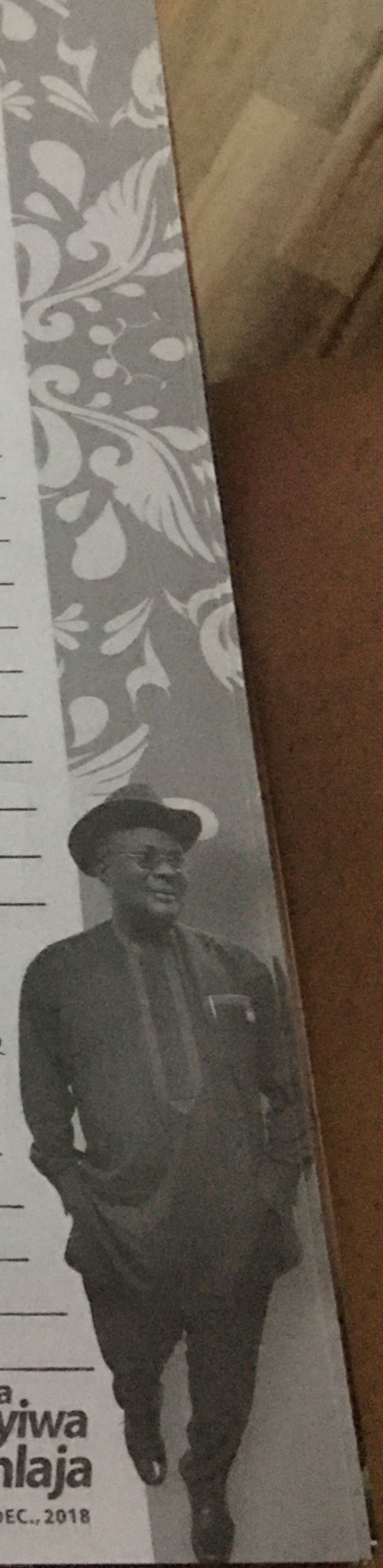
$I_z = I_s - I_L$

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

$10V / 500\Omega = 0.02A = 20mA$

$I_z = 500mA - 20mA$

$480mA = 0.48A$



Otunba Olumuyiwa Ogunlaja

MONDAY 10TH DEC., 2018

COURTESY: WIFE & CHILDREN