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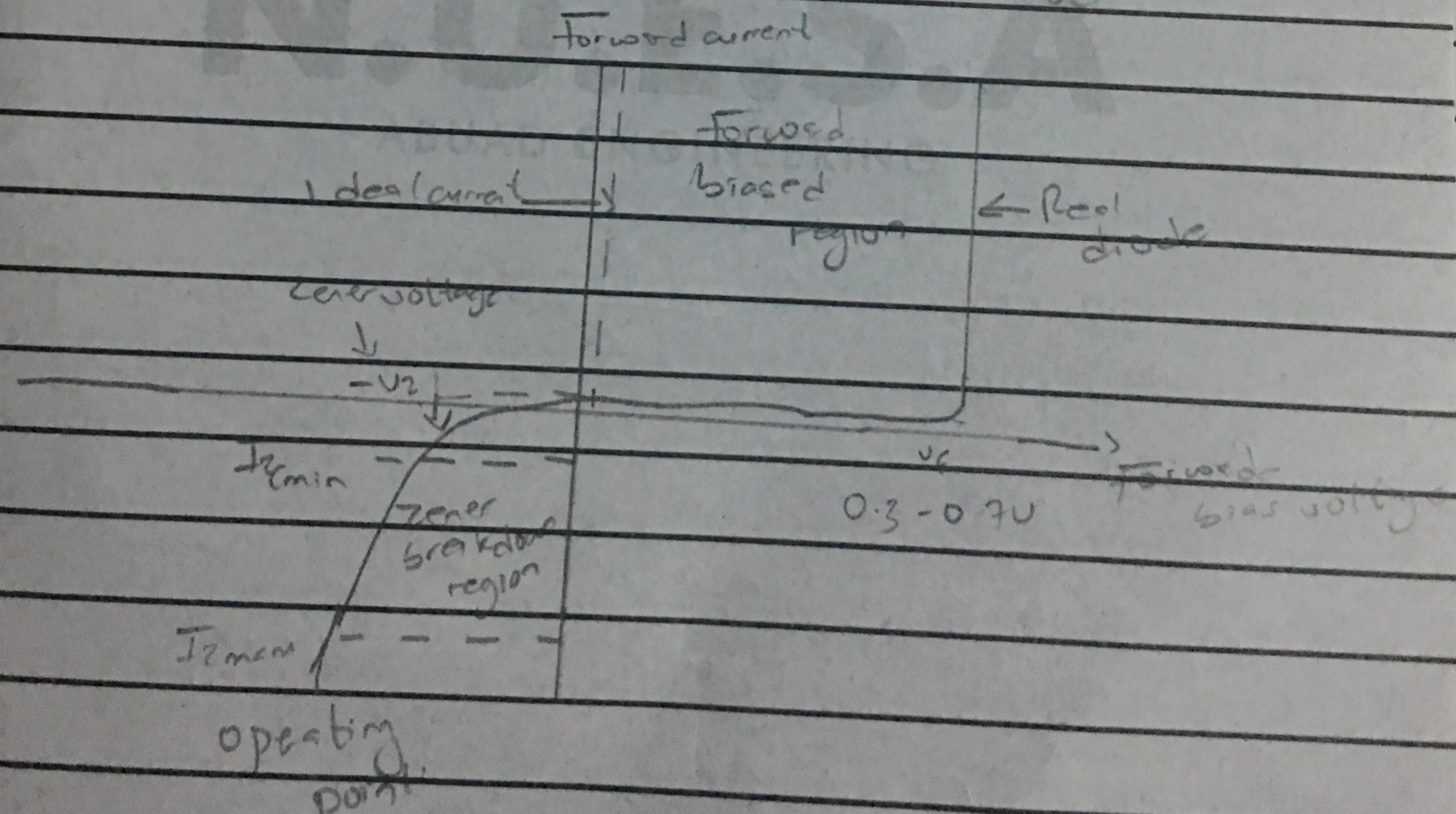
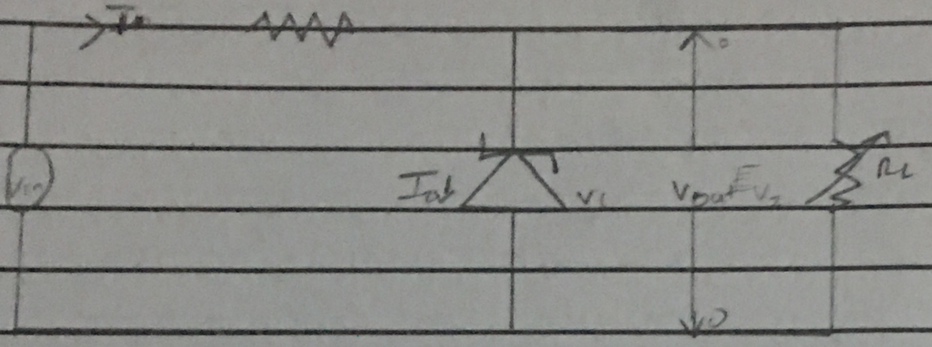
mechatronics

1. One of the most important characteristic of a zener diode is that it is used in the simplest types of voltag regulator applications. A Zener diode Voltage regulator is a device used to produced constant output voltage with low ripple under varying load current condition. It helps to get constant dc voltage with corresponding constant current. It finds a wide application in digital integrated circuit where it is required to provide a stable regulator voltage to the system.

ZENER I-V CHARACTERISTICS CURVE





ZENER REGULATOR

2. Data given

$P = 5W$ $I_{in} = 600mA = 600 \times 10^{-3} = 0.5A$

$V_{in} = 20V_{rms}$ $R_L = ?$ $I_L = ?$ $V_L = ?$

$= \frac{2 \times 20}{\pi} = 12.73V = V_{in}$

To find V_L

Recall $I_{in} = \frac{P}{V_L}$

$\therefore V_L = \frac{P}{I_{in}} = \frac{5}{0.5} = 10V$

$I_R = \frac{V_{in} - V_L}{R} = 0.5 = \frac{12.73 - 10}{R}$

$R = \frac{2.73}{0.5}$

$R_L = 5.46\ \Omega$

b. To get I_L at 500 Ω

Recall $V_L = V_L = I_L R_L$

$I_L = \frac{V_L}{R_L} = \frac{10}{500} = 0.02A$

$I_2 = I_m - I_1$

$I_2 = 0.5 - ~~1.832~~ \; 0.02$

$= 0.48$ amp

$I_2 =$ 480 mamp