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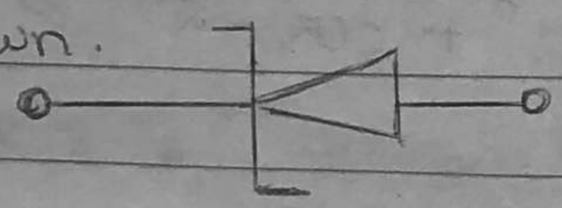
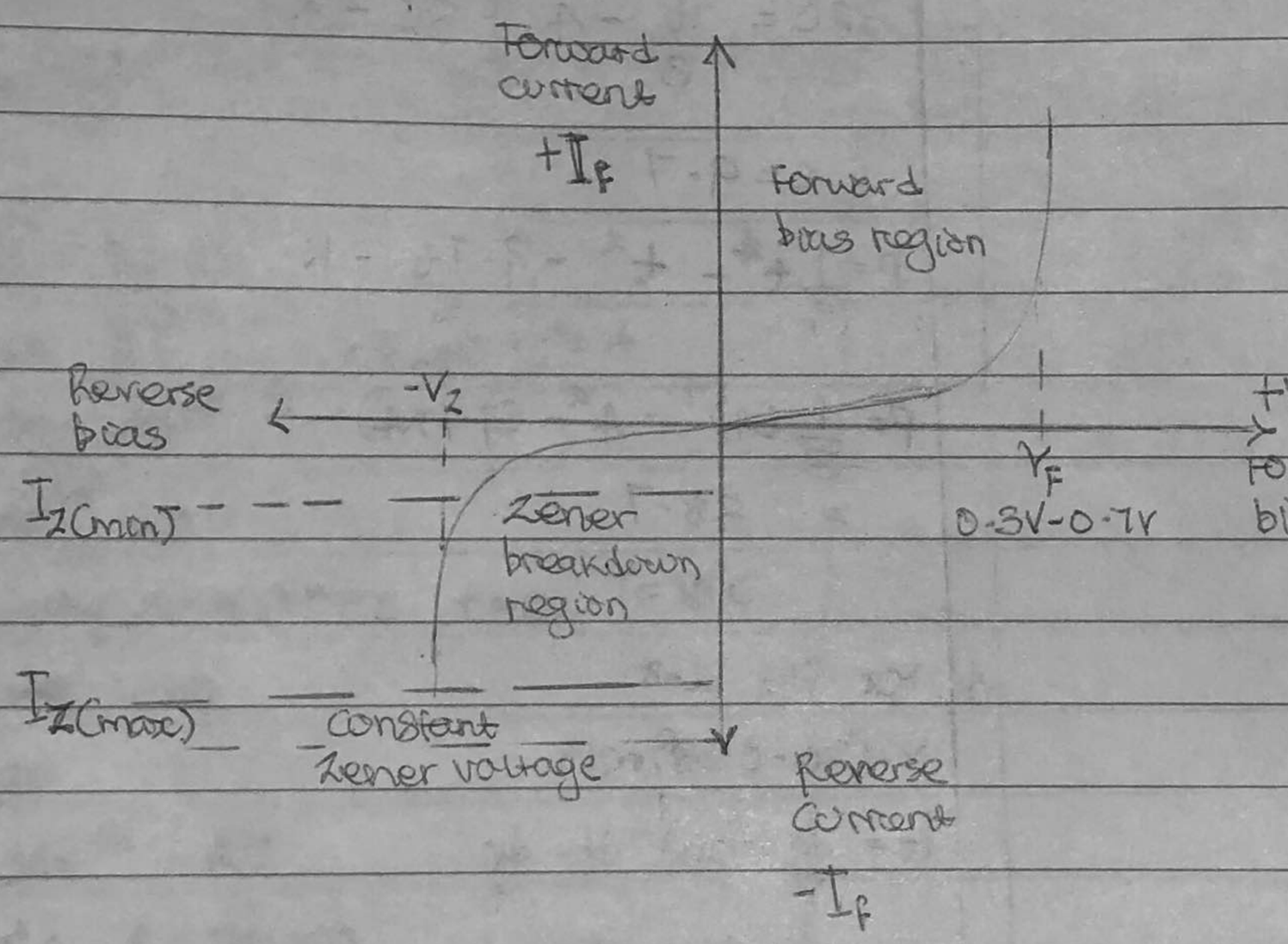
18/ENG08/045
CIVIL ENGINEERING

1 - A zener diode is a type of diode somwar to the standard PN junction diode It is a form of semiconductor diode in which at a critical reverse voltage, a large reverse current can flow. In a zener diode, current flow in a conventional manner - from its anode to its cathode (ie when anode is positive with respect to cathode). They are designed to have a low & specified reverse voltage breakdown.

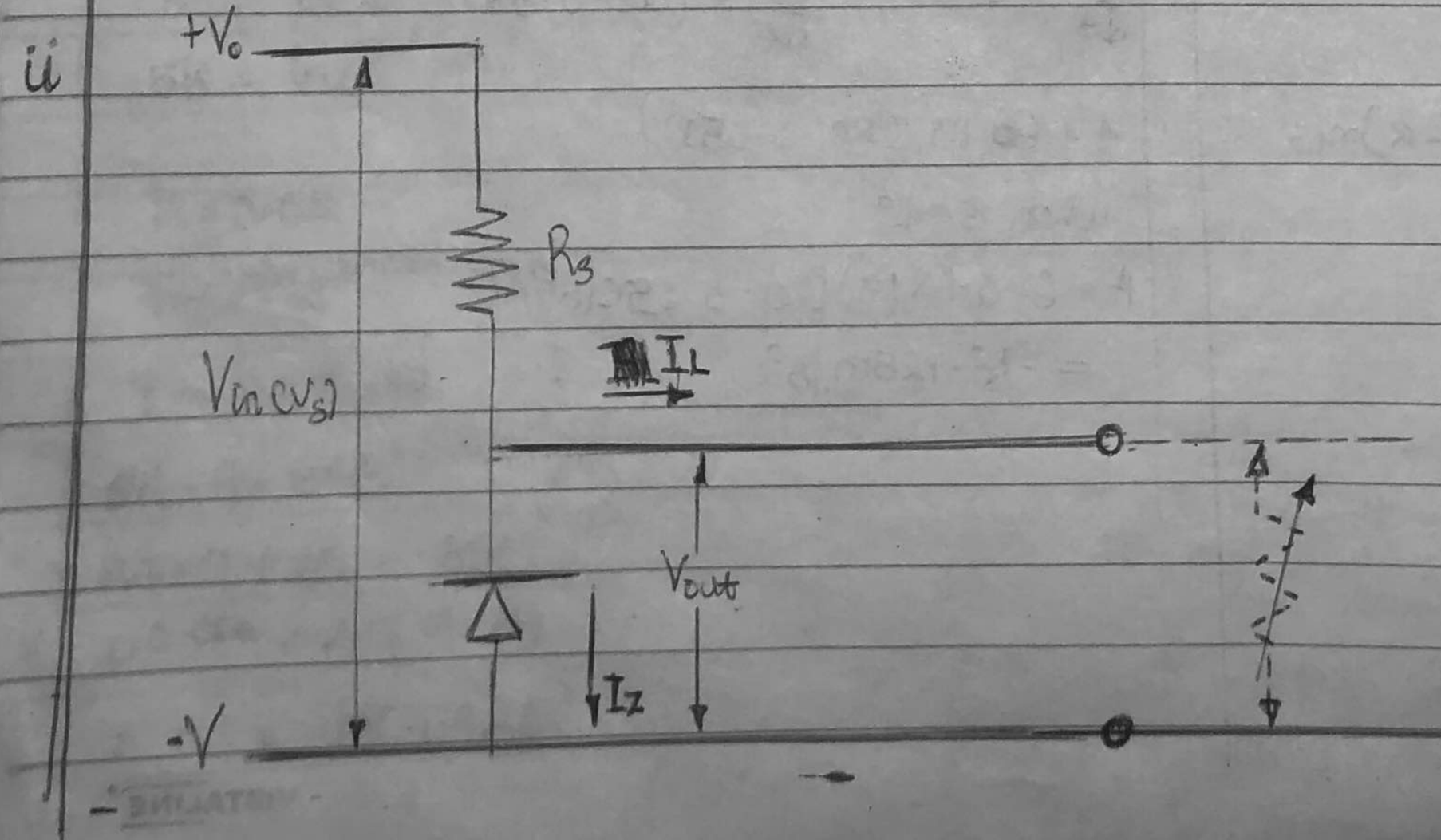


i



I-V Characteristic curve.

ii



I_L = load current

R_S = Resistor

V_S = Voltage source

V_{out} = Stabilised output voltage

R_L = Load resistance

I_Z = load current across Zener diode

2 Maximum power = 5W

Load current across diode (I_Z) = 500mA = 0·5A

Voltage source (V_S) = 20V_{max}

V_2 = 10 volts

Minimum resistance = $\frac{V_S - V_2}{I_Z}$

where V_{dc} = 0·637(V_{max})

= 0·637 × 20

= 12·74V_{dc}

$\therefore$ min resistance = $\frac{12·74 - 10}{0·5}$ = 5·48Ω

$I_L = \frac{V_Z}{R_L} = \frac{10}{500}$

= 0·02A

= 20mA