In programming we can't generate the experimental data. So to generate data we can use a sophisticated eq^n,

Shockley Eq^n:

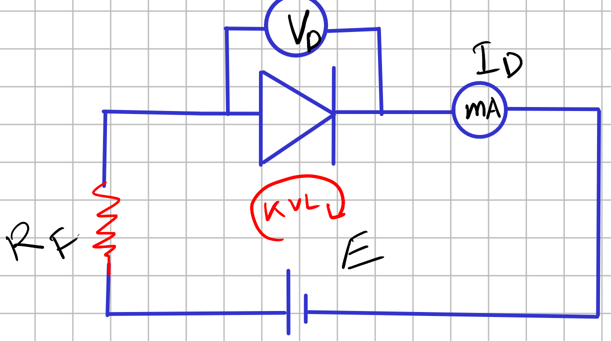
$$\boxed{I_D = I_S\left(e^{\frac{qV_D}{nK_bT}} - 1\right)}$$

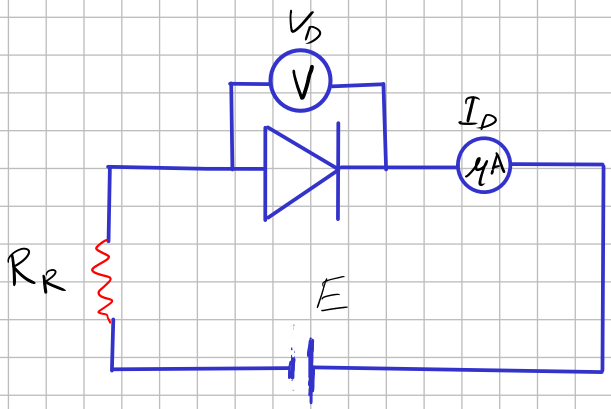
- I_S → Saturation current
- q → electronic charge 1.6×10^{-19}C
- K_b → Boltzman const.
- n → Ideality factor

$n = 1$ → Ge

$n = 2$ → Si

Your experimental setup:





$E = I_D R_F + V_D$

Forward Biased $\therefore I_D = \frac{E}{R_F} - \frac{V_D}{R_F}$

Reversed biased.

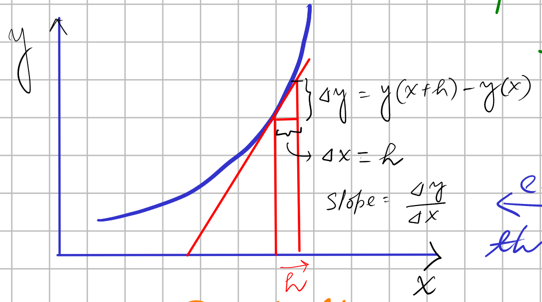
- For Si diode $(n=1)$ plot FB characteristics taking saturation current (1μA) and room temparature ($T = 300K$)
- Find the Q-point:

$R_F = 10K\Omega$

$V = 10$ volt

- Also find three dynamic resistance,

→ You will need numerical method for differentiation



exploit this eq^n

$$\frac{dy}{dx} = \lim_{h\to0}\frac{y(x+h) - y(x)}{h}$$

try to do it for $h = 0.001$

- Find the reverse baised characteristics

→ from that try to find "Reverse saturation current.