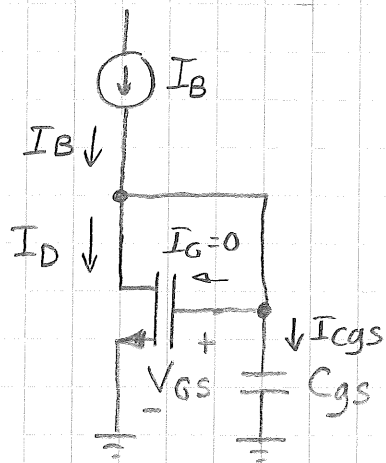


WHY DOES DIODE CONNECTED MOSFET
HAVE TO CARRY $I_D = I_B$?



SUPPOSE $I_D \neq I_B$

SAY V_{GS} IS TOO SMALL SO $I_D < I_B$

KCL AT GATE NODE

$$I_B = I_D + \underbrace{I_G}_0 + I_{cgs}$$

IF $I_D < I_B$, THEN I_{cgs} WILL BE POSITIVE
 $\Rightarrow$ CHARGING UP $C_{gs} \Rightarrow$ INCREASING I_D
 $\Rightarrow$ MOVES I_D CLOSER TO I_B

SIMILARLY, IF $I_D > I_B$, V_{GS} WILL DECREASE

EQUILIBRIUM WHEN $\frac{dV_{GS}}{dt} = 0 \Rightarrow I_{cgs} = 0 \Rightarrow \boxed{I_B = I_D}$