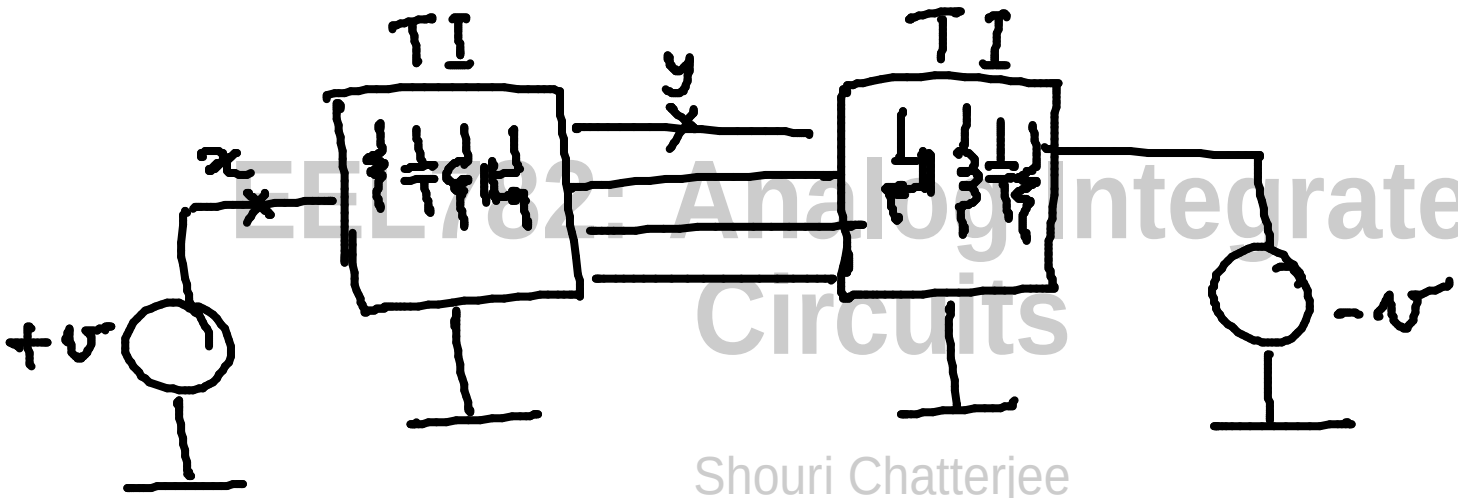
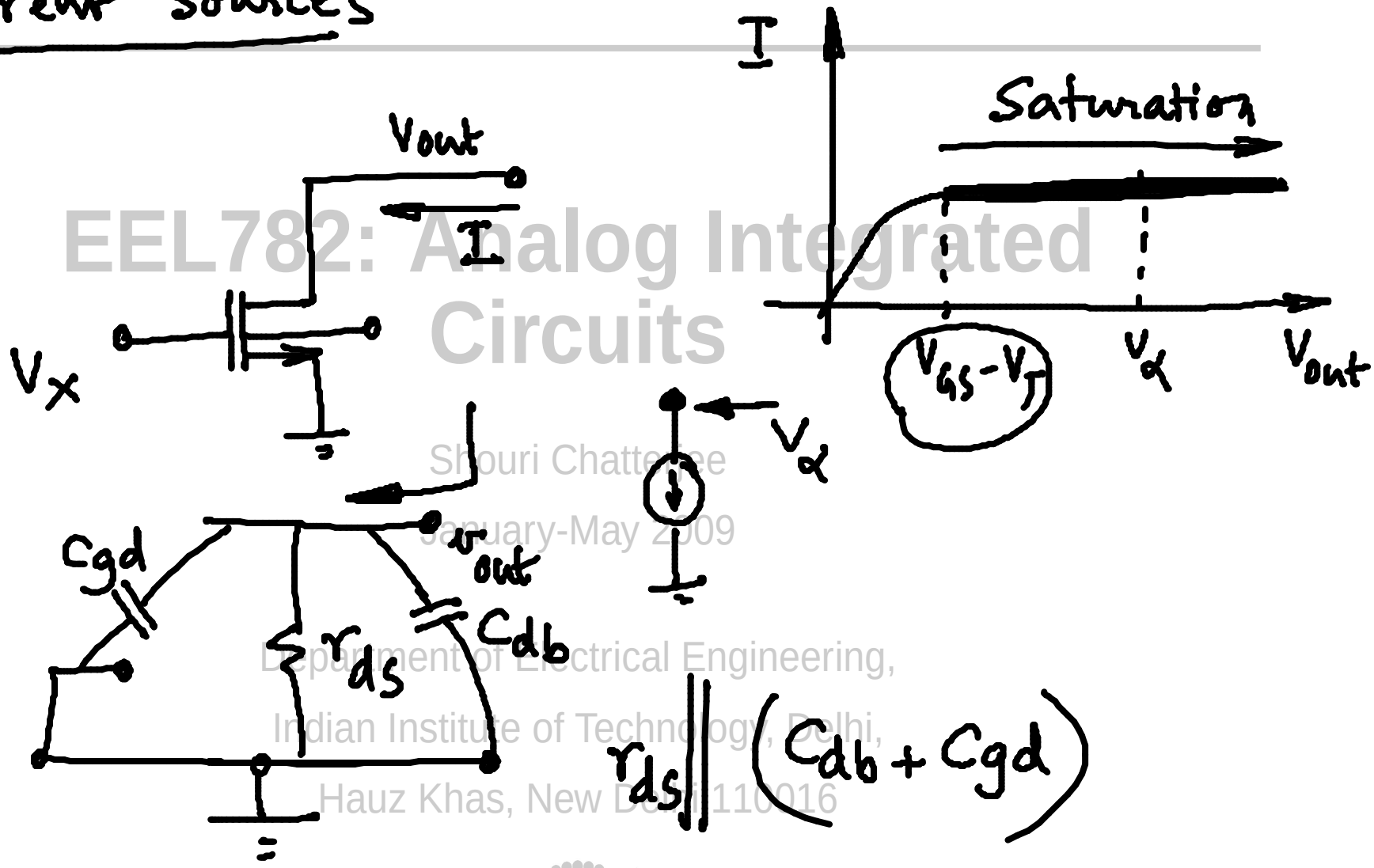
Balanced networks



$$y = f(x) = a_0 + a_1 x + a_2 x^2 + \cdots\cdots a_n x^n + \cdots$$

Inputs	Voltages	Currents
$+V, -V$	No odd harms, No fund	No even harms, No DC
$+V, +V$	No even harms, No DC	No odd harms, No fund

Current Sources



$$r_{ds} \Big\| \frac{1}{s(C_{gd}+C_{db})} = \frac{r_{ds}}{1+s(C_{gd}+C_{db})r_{ds}}$$

Pole at $-\dfrac{1}{r_{ds}(C_{gd}+C_{db})}$

$g_m r_{ds} \longrightarrow$ not going to exceed 20

$$I_{DS} = \frac{\mu C_{ox}}{2}\frac{W}{L}(V_{GS}-V_T)^2 \quad \left| \begin{array}{ll} SI & V_{GS}-V_T > \frac{6kT}{q} \\ Sat & V_{DS} > V_{GS}-V_T \end{array} \right.$$

$$g_m = \frac{\partial I_{DS}}{\partial V_{GS}} = \mu C_{ox}\frac{W}{L}(V_{GS}-V_T)$$

$$= \frac{2I_{DS}}{V_{GS}-V_T} = \sqrt{2I_{DS}\mu C_{ox}\frac{W}{L}}$$