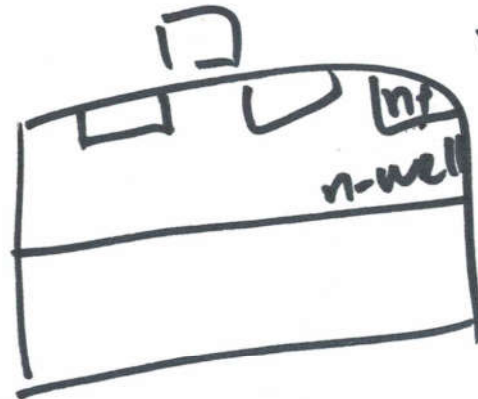


PDK
Process
Design
Kit

TSMC
180 nm

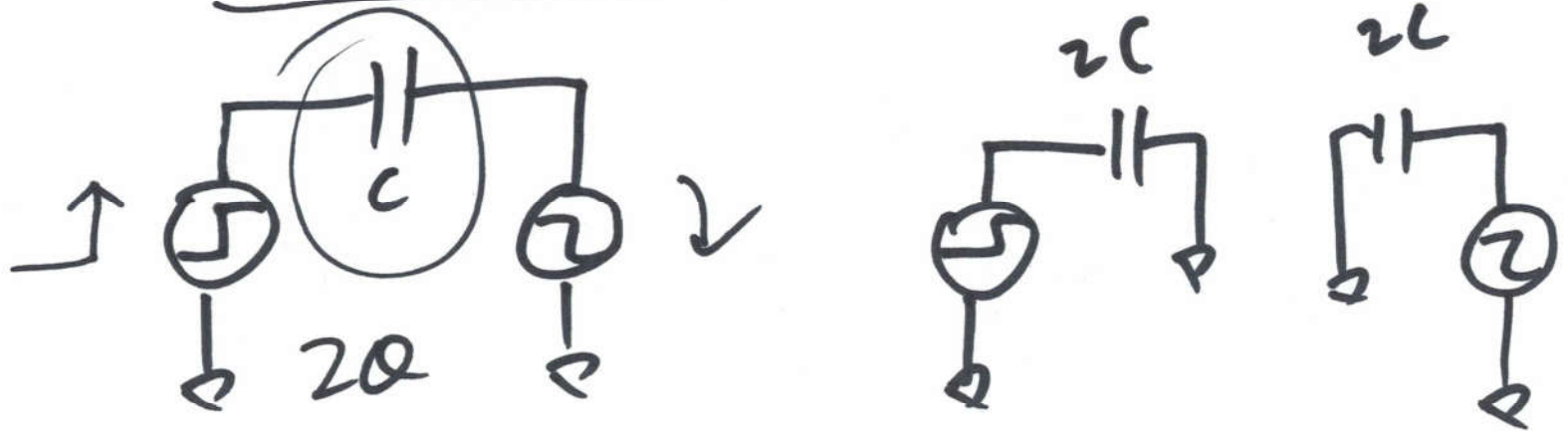
Sum



nAcp

n-tap

Miller Effect



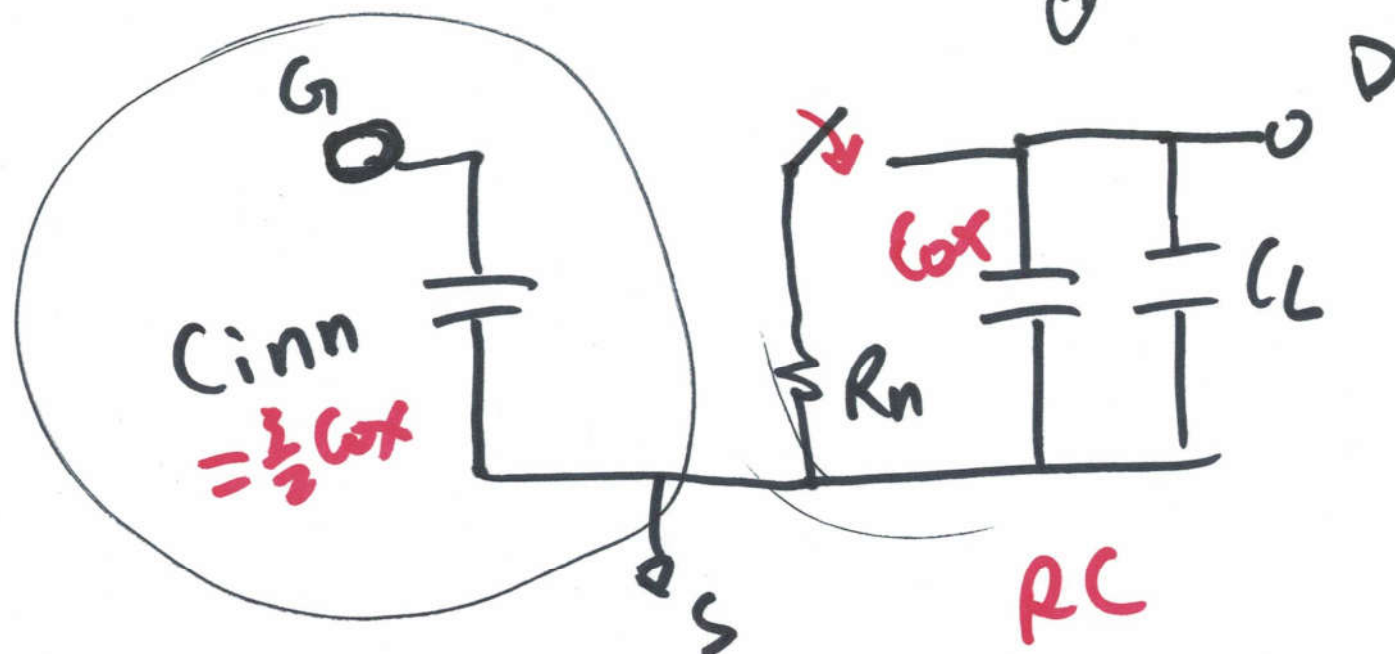
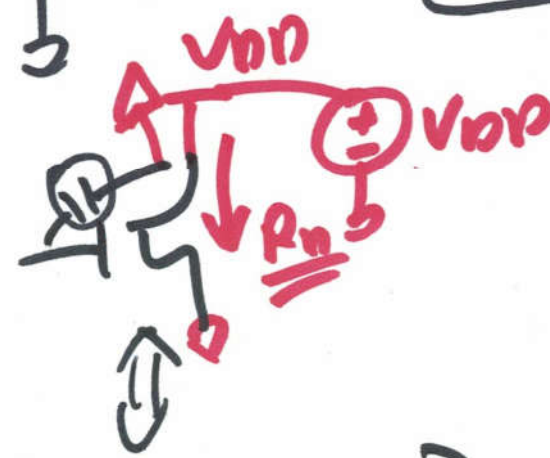
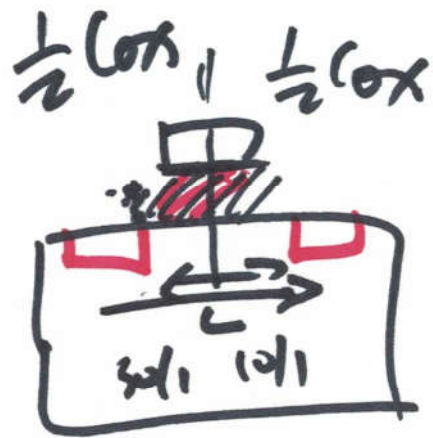
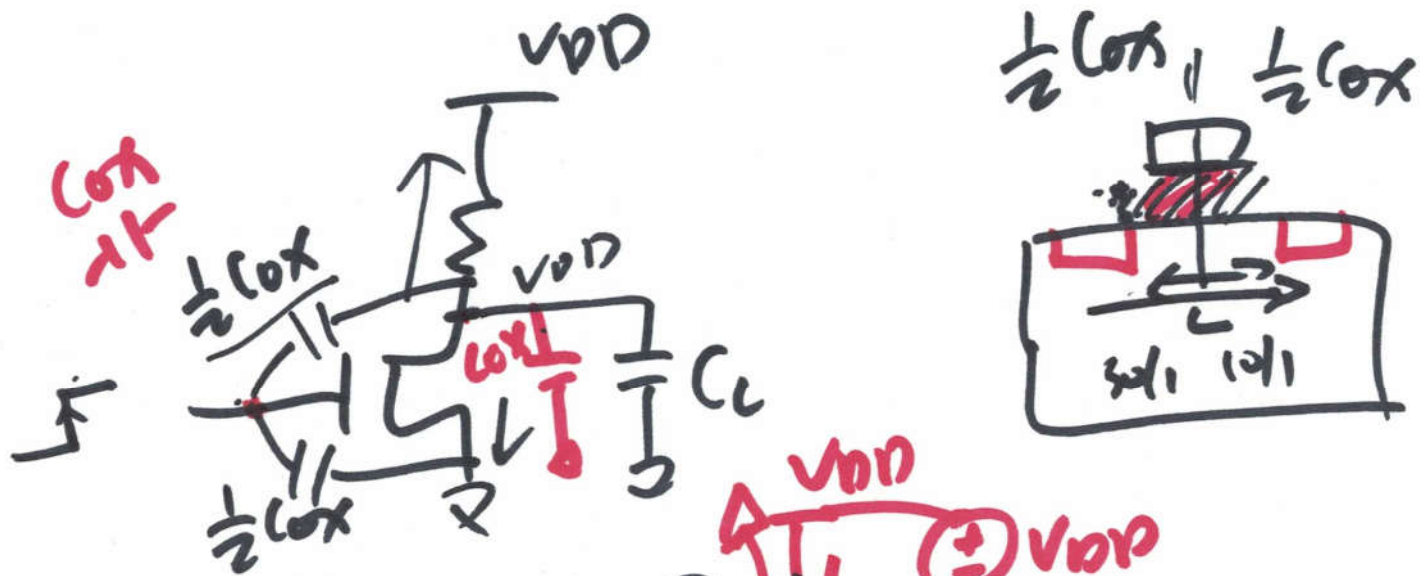
$$= \frac{Q}{V_{dd}}$$

$$C_{eff} = \frac{2R}{V_{dd}}$$

$$\frac{Q}{V_{dd}} = C$$

$$\underline{C_{eff} = 2C}$$

②



$C_{inn} = \frac{3}{2} C_{ox}$

RC

3



look at the output

P: propagation delay

H: High
L: Low

t_{pHL}
 t_{pLH}

Example: P320

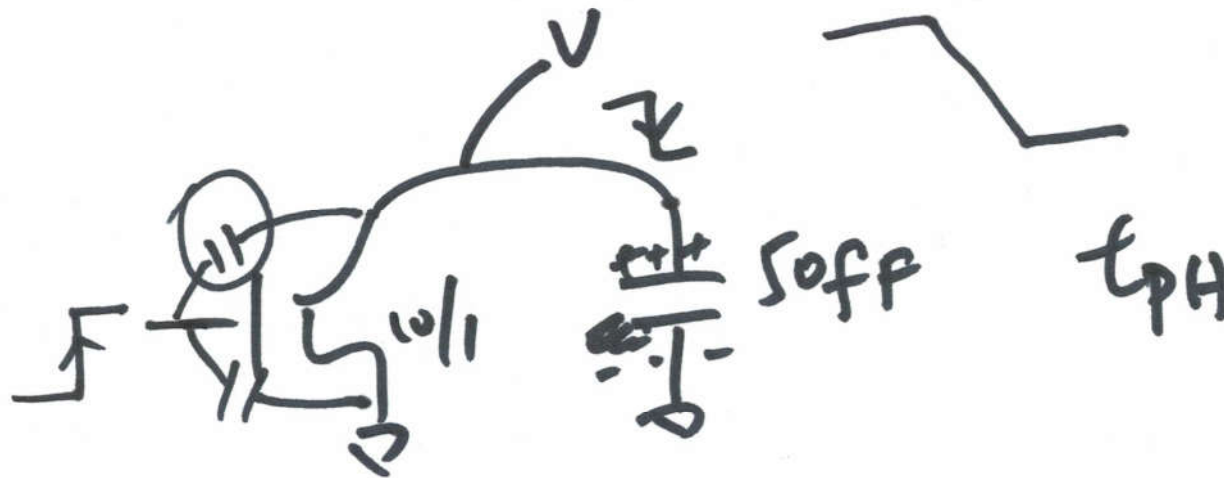
	size	$R_{n,p}$	$C_{oxn,p}$
NMOS	$10\mu/1\mu$	1.5K	17.5 fF
PMOS	$30\mu/1\mu$	1.5K	52.5 fF

$\underbrace{\quad\quad\quad}_W \quad \underbrace{\quad\quad\quad}_L$

30μ
 1μ

$$C = \epsilon \frac{A}{d}$$

$$R = \rho \frac{L}{A}$$

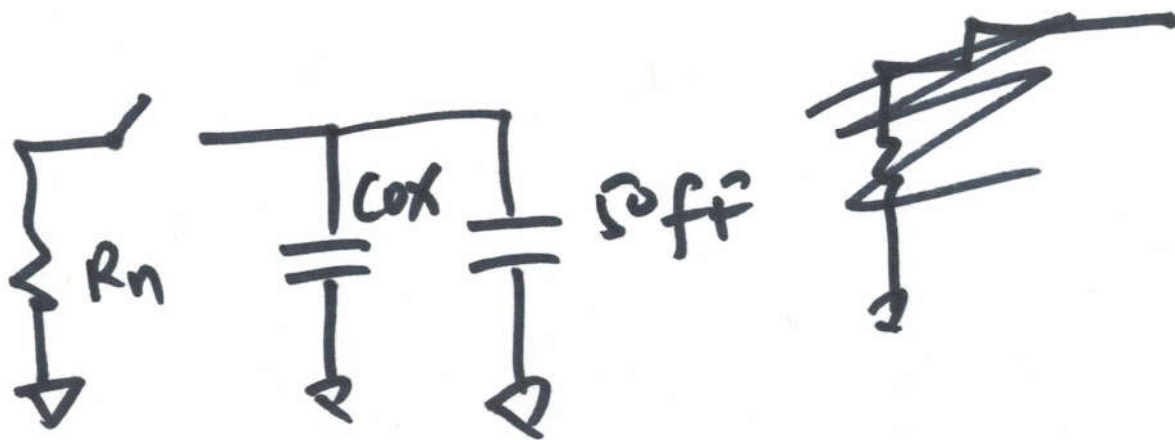


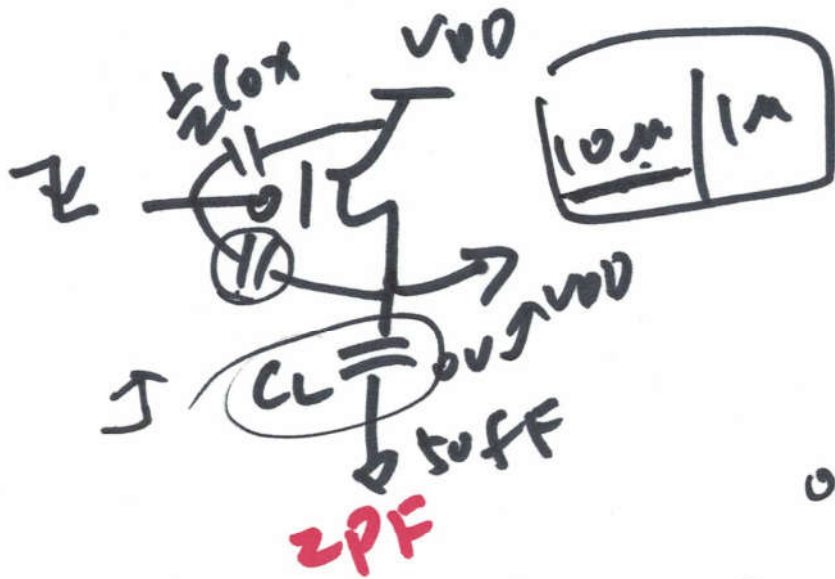
$$t_{pHL} = 0.7RC$$

$$= 0.7 \cdot R_n (C_{ox} + 50f)$$

$$= 0.7 \times 1.5K \cdot (17.5f + 50f)$$

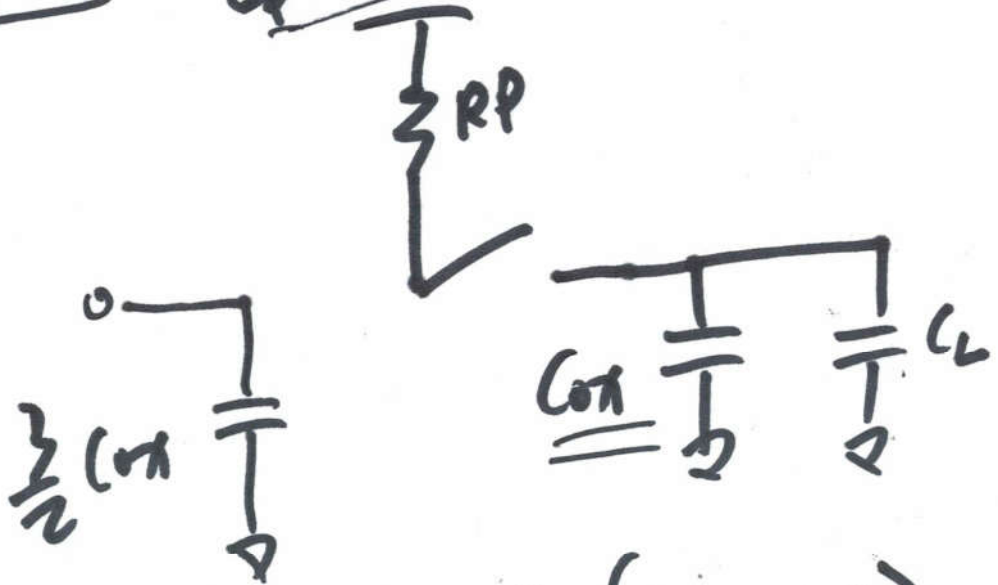
$$= 70ps$$





$$R_p = 4.5k$$

$$C_{comp} = 17.5 fF$$

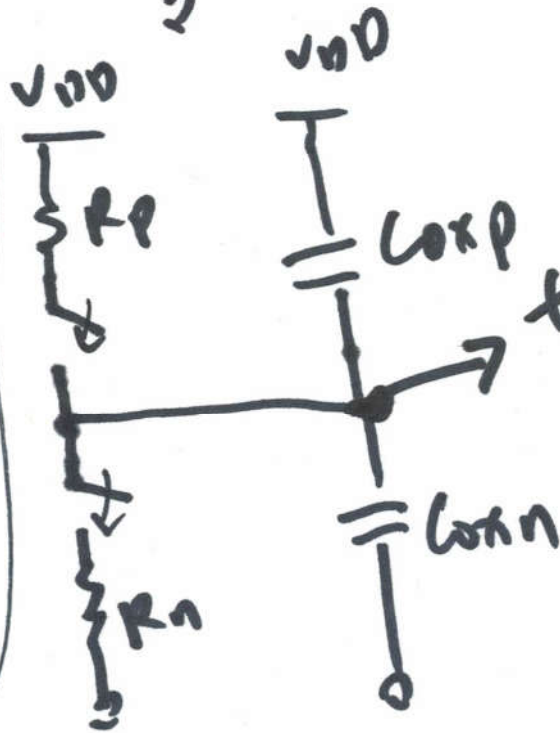
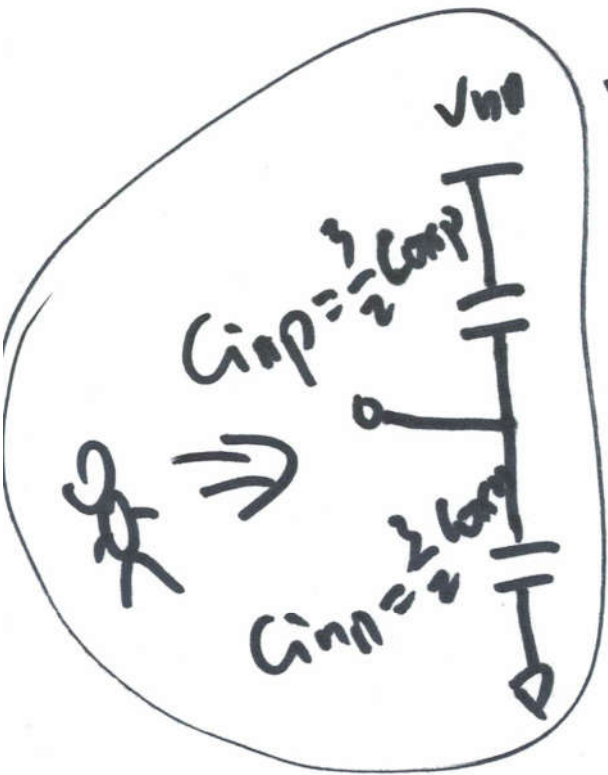


f: 10-15
P: 15-12

$$t_{PLH} = 0.7 R C = 0.7 \cdot R_p (C_{comp} + C_L)$$

$$= 0.7 \times 4.5k \times (\cancel{17.5 fF} + \underset{2PF}{50 fF})$$

(5)



$$t_{PHL} = 0.7RC = 0.7R_n(C_{oxn} + C_{oxp})$$

$$t_{PLH} = 0.7RC = 0.7R_p(C_{oxn} + C_{oxp})$$

$$C_{in} = C_{inp} + C_{inn} = \frac{3}{2}(C_{oxn} + C_{oxp})$$