CpE 111- Chapter 4 HW
4.1, 4.3c, 4.5, 4.7, 4.8

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4.1 G: $V_{DD} = 5V$, $I = 125mA$
F: P delivered
S:

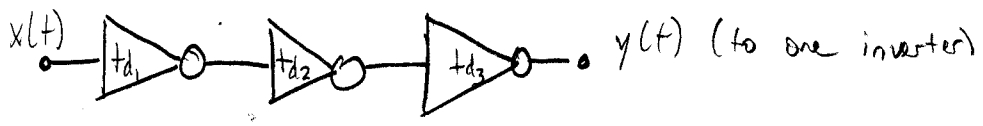
$$P = VI = (5V)(125\times10^{-3}A) = \boxed{0.625W}$$

4.3 G: $P = 15W$, $V = 2.6V$
F: I
S:

$$P = VI \Rightarrow I = \frac{P}{V} = \frac{15W}{2.6V} = 5.76923A$$

$$\boxed{I = 5.8A}$$

4.5 G: NOT Cascade, $t_{PO,NOT} = 0.5ns$
$t_{PL,NOT} = 0.5ns$
F: t_d
S:



$$t_d = t_{d_1} + t_{d_2} + t_{d_3}$$

$t_{d_1} = t_{PO,NOT} + t_{PL,NOT}$
$t_{d_2} = t_{PO,NOT} + t_{PL,NOT}$
$t_{d_3} = t_{PO,NOT} + t_{PL,NOT}$

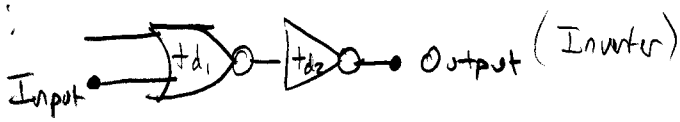
$$t_d = 3t_{PO,NOT} + 3t_{PL,NOT} = 3(0.5ns) + 3(0.5ns) = 3ns$$

$$\boxed{t_d = 3ns}$$

4.7 G: gate delay $t_{PD,NOT} = 0.5ns$ $t_{PL,NOT} = 0.5ns$
$t_{PD,NOR} = 0.75ns$ $t_{PL,NOR} = 0.9ns$

F: t_d

S:



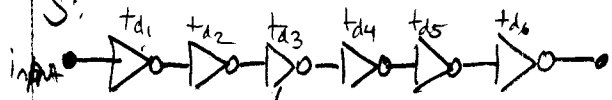
$t_d = t_{d1} + t_{d2}$
$= (t_{PD,NOR} + t_{PL,NOT}) + (t_{PD,NOT} + t_{PL,NOT})$
$= (0.75ns + 0.5ns) + (0.5ns + 0.5ns)$

$\boxed{t_d = 2.25\ ns}$

4.8 G: $t_{PD} = 1ns$ $t_{PL} = 0.25ns$, six inverters

F: t_d

S:



$t_d = \sum_{i=1}^{6} t_{dn}$

$= \underbrace{(t_{PD} + t_{PL})}_{1} + \underbrace{(t_{PD} + t_{PL})}_{2} + \underbrace{(t_{PD} + t_{PL})}_{3} + \underbrace{(t_{PD} + t_{PL})}_{4} + \underbrace{(t_{PD} + t_{PL})}_{5} + (t_{PD} + t_{P,OUTPUT})$

$= (1.25) \times 5 + (1 + t_{PL,OUTPUT})$

$= \boxed{7.25ns + t_{L,OUTPUT}}$