

ECE 733
Final Spring 2008

Name:

Student ID:

This test is open book, open notes. Computers are NOT allowed (calculators are). You have 100 minutes. Turn in answers in the space provided.

Question 1

Consider a transmission line that is 1 m long. Its cross section is 10 μm thick and 25 μm wide. For the calculations below, please use the following parameters:

- Dielectric constant = 4.3. Loss tangent $\tan \delta = 0.03$.
- Copper resistivity = $1.7\text{E-}8$ Ohm.m
- Magnetic permeability = $4\pi \text{E-}7$
- Speed of light in a vacuum = $3\text{E}8$ m/s
- $Z_0=50 \Omega$

Please answer the following questions:

(a) What is the DC resistance per unit length of the transmission line? [2 points]

(b) At what frequency is the skin depth half of the thickness? [2 points]

(c) At what frequency does the dielectric loss exceed the skin effect loss? [2 points]

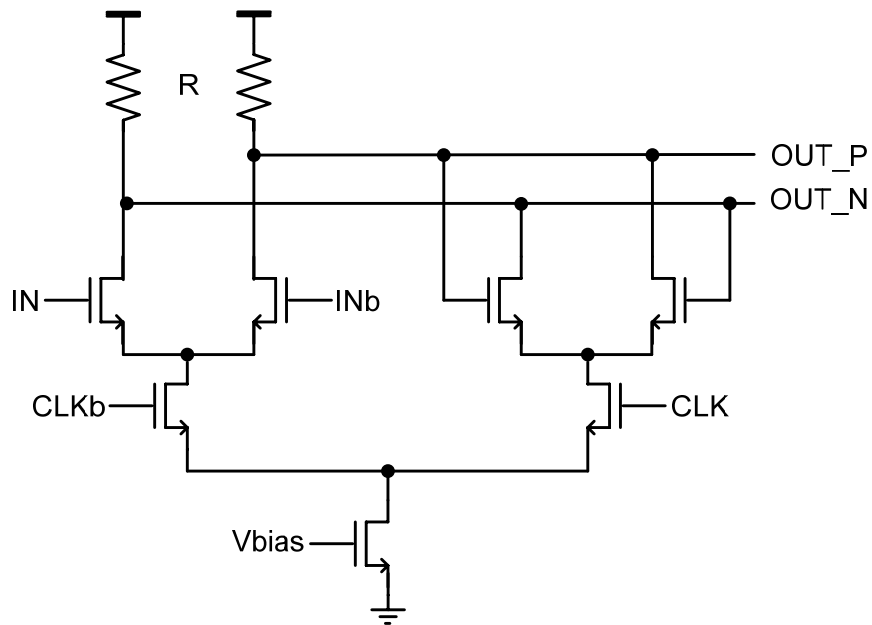
Question 2

(a) Consider an eye diagram analysis. What factors determine the probability of a Bit Error due to horizontal eye closure? [4 points]

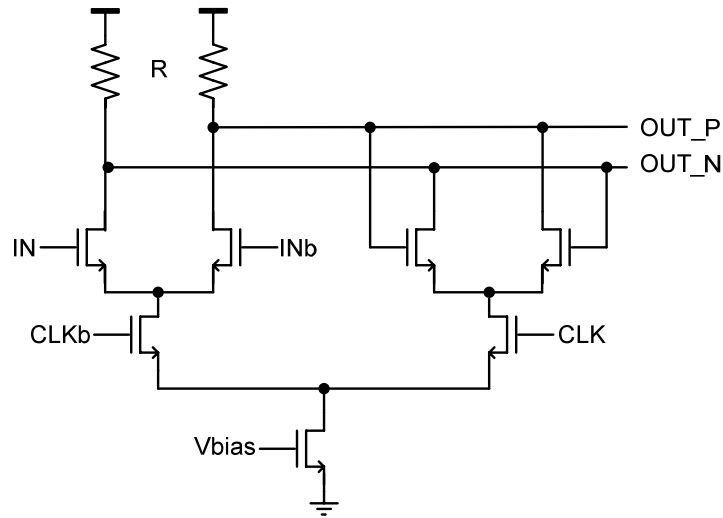
Question 3

Consider the differential current mode latch.

(a) What transistors are on when $Ck=0$ and $IN=1$? [2 points]



(b) What transistors are on after $Ck \rightarrow 1$ ($IN=1$)? [2 points]



(c) What determines the Set-up time? (i.e. transistor sizes or other parameter values.) Is it positive or negative? [3 points]

(d) What determines the tck-Q delay for the rising and falling output? [3 points]