

ECE 4397: Digital Systems and Circuits

Assignment 1

Task 11

CMOS Inverter, Pushout, and Pullup

Background: Prepare a solution report in PDF pages and upload it to Canvas. You don't have to submit the report until you receive a message on Canvas page. When the report is uploaded on Canvas, please include the following information: V_{DD} , V_{thn} , V_{thp} , μ_n , μ_p , C_{ox} , C_{diff} , C_{par} , C_{load} , C_{in} , C_{out} .

The proposed circuit architecture is described in the following figure. The technology used is given in the table below. All the cells are 100nm. Assume the technology gate length is 100nm. Assume $V_{DD} = 1.0V$.

(a) CMOS Inverter

Use a design tool to design the circuit and simulate it. Show your design and the simulation results for this problem.

(b) The Inverter with parasitics

Design is shown in figure below and provide the gate parasitics as mentioned in the table below. The parasitics of the circuit are shown in the following figure.

1. The gate parasitics

At 100nm gate length, the parasitics are given as follows: $C_{diff} = 2.5fF/\mu m$, $C_{par} = 2.5fF/\mu m$, $C_{in} = 2.5fF/\mu m$, $C_{out} = 2.5fF/\mu m$. Assume $V_{DD} = 1.0V$, $V_{thn} = 0.4V$, $V_{thp} = 0.6V$, $\mu_n = 400cm^2/Vs$, $\mu_p = 150cm^2/Vs$, $C_{ox} = 2.5fF/\mu m^2$.

2. Parasitic delay of the circuit is given as follows:

(c) Static Inverter design

Design is shown in figure below and provide the parasitics as mentioned in the table below. The parasitics of the circuit are shown in the following figure.

1. The gate parasitics

At 100nm gate length, the parasitics are given as follows: $C_{diff} = 2.5fF/\mu m$, $C_{par} = 2.5fF/\mu m$, $C_{in} = 2.5fF/\mu m$, $C_{out} = 2.5fF/\mu m$.

2. Parasitic delay of the circuit is given as follows:

Assume $V_{DD} = 1.0V$, $V_{thn} = 0.4V$, $V_{thp} = 0.6V$, $\mu_n = 400cm^2/Vs$, $\mu_p = 150cm^2/Vs$, $C_{ox} = 2.5fF/\mu m^2$. Assume the parasitics of the circuit are given in the table below.

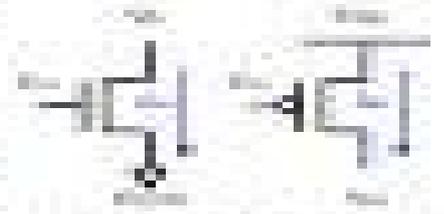


Figure 1: Parasitics of the circuit

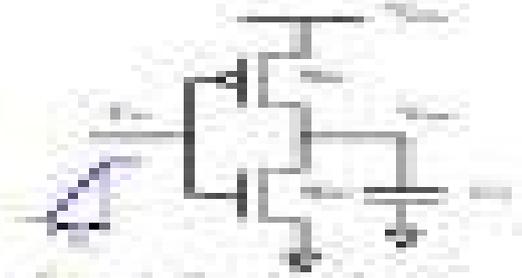


Figure 2: Parasitics of the circuit

Circuits Devices And Systems And Spice

RD Boyd



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web various types of earthing are mentioned below plate earthing pipe earthing strip earthing plate earthing the most efficient way of earthing is plate earthing which involves installing a galvanized copper plate 3m deep in

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web plate earthing fig 3 plate earthing for this form of earthing a plate composed of copper or galvanized iron is placed vertically in the ground pit less than three meters above the ground for a more effective electrical grounding system one must maintain the earth's moisture condition surrounding the plate earthing system

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web sep 22 2022 if a copper or an iron plate is used as an earth electrode then this system of earthing is called plate earthing in pakistan both copper as well as iron type earthing plates are used copperplate tends to be 2 feet long 2 feet wide and 1 8 inches thick 600 x 600 x 3 millimeters whereas the size of the iron plate is 2 feet x 2 feet x 1 4 millimeter

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web jul 12 2021 plate earthing in this method as illustrated in fig 1 the earth wire is securely bolted to the earth plate either of copper minimum size 60 cm 60 cm 3 18 mm or of galvanized iron minimum size 60 cm 60 cm 6 35 mm buried in the ground to the depth of 3 m

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60cmx60cmx6 35mm and that for copper plate is 60cmx60cmx3 18mm

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web plate earthing in the plate earthing system a plate made of either copper with dimensions 60cm 60cm 3 18mm i e 2ft 2ft 1 8 in or galvanized iron gi with dimensions 60cm 60cm 6 35 mm 2ft 2ft ¼ in is vertically buried in the earth earth pit and it should not be less than 3m 10ft from the ground level

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web feb 27 2023 plate earthing is a type of electrical earthing in which a metal plate is buried in the ground and connected to the electrical system the plate used for earthing is typically made of copper steel or galvanized iron the size of the plate depends on the type of soil current to be grounded and other factors

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