DAILY ASSESSMENT

Date:	12/06/2020	Name:	Davis S. Patel
Course:	VLSI	USN:	4AL16EC045
Topic:	CMOS Inverter Basics	Semester & Section:	8th-A
GitHub Repository:	Davis		

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REPORT –

CMOS Inverter

For the investigation of circuit-level degradation a CMOS (complementary MOS) inverter is analyzed. A major advantage of CMOS technology is the ability to easily combine complementary transistors, n-channel and p-channel, on a single substrate. The CMOS inverter consists of the two transistor types which are processed and connected, as seen schematically in Figure.
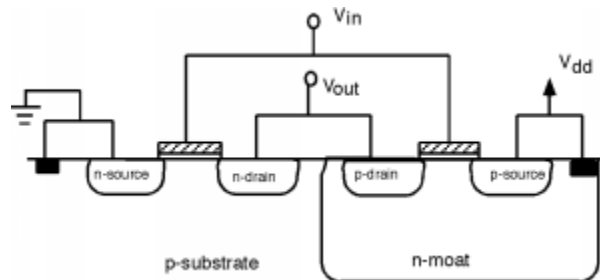
The p-channel MOSFET relies on an n-type substrate. As commonly p-type wafers are used for processing, an additional n-type well implant is necessary. In this well, which is a deep region of n-type doping, the p-channel MOSFET is placed. As the p-substrate and the n-well junction is reverse biased, no significant current flows between these regions and the two transistors are isolated.

The output current of the p-channel MOSFET is typically much lower than the current of an n-channel MOSFET with similar dimensions and doping's. This is due to the lower carrier mobility of holes compared to electrons. As the characteristics of the complementary transistors should be as equal as possible, the width of the p-channel MOSFET is typically made larger to compensate the difference.
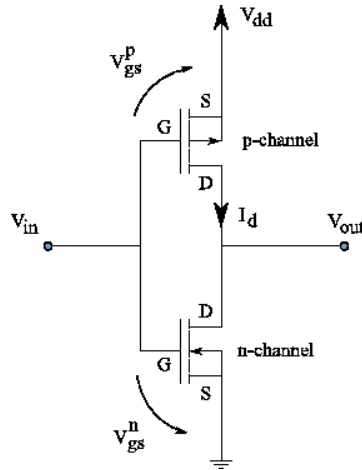
Figure above gives the schematic of the CMOS inverter circuit. It can be seen that the gates are at the same bias V_{in} which means that they are always in a complementary state. When V_{in} is high, $V_{in} \approx V_{dd}$, the voltage between gate and substrate of the nMOS transistor is also approximately V_{dd} and the transistor is in on-state. The gate-substrate bias at the pMOS on the other side is nearly zero and the transistor is turned off. The output voltage V_{out} is pulled to ground, which is the low state. When the input voltage is in a high-state, the complementary situation occurs and the pMOSFET is turned on while the nMOSFET is turned off. The output voltage is therefore pulled to V_{dd} which is the high-state. It is important to note that in both states, high and low, no static current flows through the inverter. This is of course only valid when assuming ideal devices with zero off- and leakage-currents.

Considering negative bias temperature instability, the worst stress conditions are imposed on the p-channel MOSFET at $V_{in} = V_{low}$. At this bias condition the pMOSFET is turned on, with approximately the same potential at the source and the drain $V_{gs} = V_{gd} = V_{dd}$ and negative gate to substrate voltage $V_{gsub} = -V_{dd}$.

Voltage Transfer Characteristics

The voltage transfer characteristic (VTC) gives the response of the inverter circuit, V_{out}, to specific input voltages, V_{in}. It is a figure of merit for the static behavior of the inverter.

The gate-source voltage V_{gs} of the n-channel MOSFET is equal to V_{in} while the gate-source voltage of the p-channel MOSFET calculates as

$$V_{gs}^{P} = V_{in} - V_{dd} \, ,$$

and the drain-source voltage V_{ds}^{P} of the pMOSFET can be expressed as
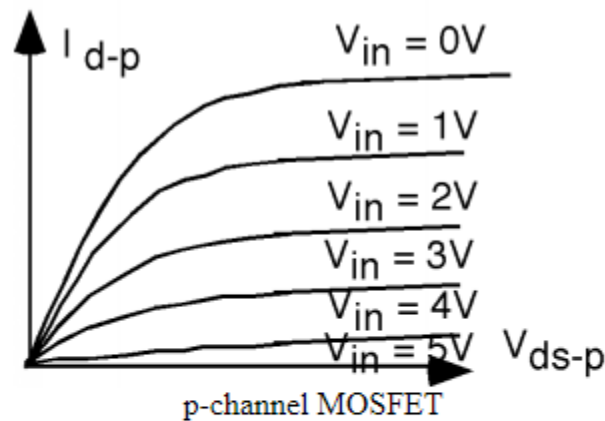
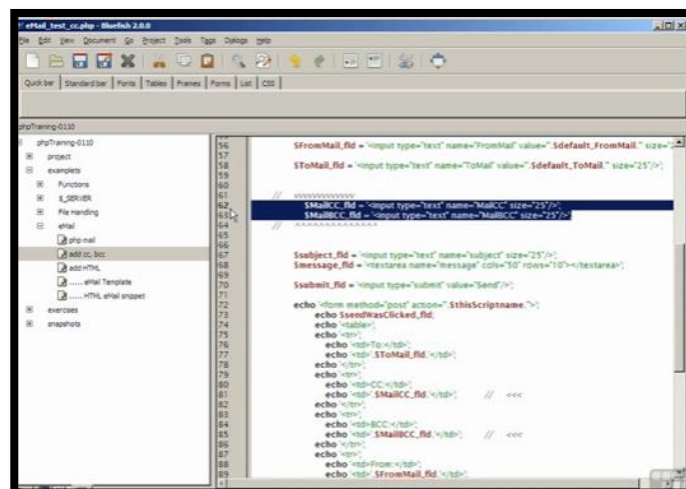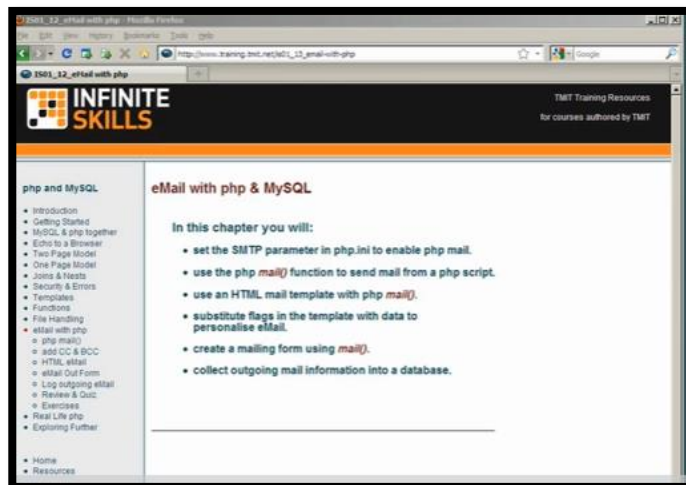$$V_{ds}^{P} = V_{ds}^{n} - V_{dd} \, .$$

Figure 7.12: Output characteristics of both transistors up to $V_{in} = V_{dd} = 5$ V. The resulting drain currents in the inverter circuit must be equal for each V_{in}.

DAILY ASSESSMENT

Date:	12/06/2020	Name:	Davis S. Patel
Course:	MySQL	USN:	4AL16EC045
Topic:	Email With PHP	Semester & Section:	8th-A
GitHub Repository:	Davis		

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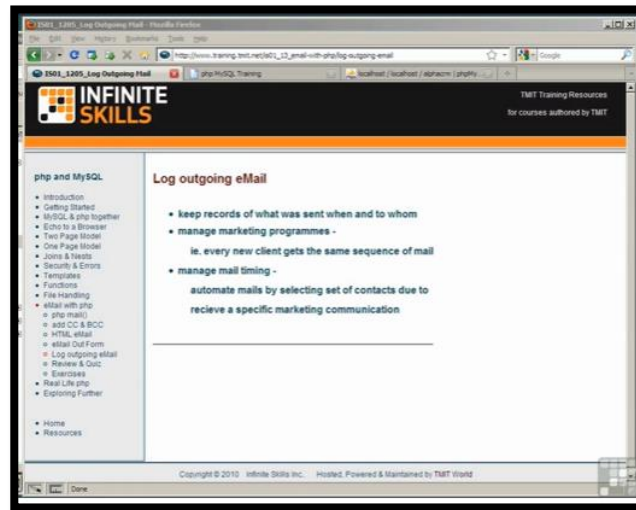
REPORT –

The PHP Mail Function

Sending email messages are very common for a web application, for example, sending welcome email when a user create an account on your website, sending newsletters to your registered users, or getting user feedback or comment through website's contact form, and so on.

You can use the PHP built-in mail() function for creating and sending email messages to one or more recipients dynamically from your PHP application either in a plain-text form or formatted HTML. The basic syntax of this function can be given with:

mail (*to*, *subject*, *message*, *headers*, *parameters*)

The following table summarizes the parameters of this function.

Parameter	Description
Required — The following parameters are required	
to	The recipient's email address.
subject	Subject of the email to be sent. This parameter i.e. the subject line cannot contain any newline character (\n).
message	Defines the message to be sent. Each line should be separated with a line feed-LF (\n). Lines should not exceed 70 characters.
Optional — The following parameters are optional	
headers	This is typically used to add extra headers such as "From", "Cc", "Bcc". The additional headers should be separated with a carriage return plus a line feed-CRLF (\r\n).
parameters	Used to pass additional parameters.

Sending a Simple Mail in PHP

```php
<?php
  $to = "recipient@example.com";
  $sub = "Generic Mail";
  $msg="Hello Geek! This is a generic email.";
  if (mail($to,$sub,$msg))
      echo "Your Mail is sent successfully.";
  else
      echo "Your Mail is not sent. Try Again.";
?>
```

Output:

Your Mail is sent successfully.

Email out STMP Address

When you use the PHP mail function, you are sending email directly from your web server. This can cause issues if the FROM address isn't set properly or if your email isn't hosted with Dream Host. Sending mail via SMTP is recommended as email is sent from the mail server rather than the web server. View the PHP mail troubleshooting article for details.

There are a few options to send PHP mail via SMTP. For example:

- Using PHPmailer.

- Using the PEAR Mail package.