**DAILY ASSESSMENT FORMAT**

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| **Date:** | **15-June-2020** | **Name:** | **Raziya Banu** |
| **Course:** | **VLSI** | **USN:** | **4AL16EC058** |
| **Topic:** | **Digital VLSI Design Virtual lab** | **Semester & Section:** | **8th sem & ‘B’ section** |
| **Github Repository:** |  |  |  |

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| **FORENOON SESSION DETAILS** |
| **Image of session** |
| **Report –**  In my first session today I have studied about - Digital VLSI Design Virtual lab.   |  |  | | --- | --- | | **MOSFET** | . | | . | Introduction   The metal–oxide–semiconductor field-effect transistor (MOSFET) is a transistor used for amplifying or switching electronic signals. In MOSFETs, a voltage on the oxide-insulated gate electrode can induce a conducting channel between the two other contacts called source and drain. The channel can be of n-type or p-type, and is accordingly called an nMOSFET or a pMOSFET. Figure 1 shows the schematic diagram of the structure of an nMOS device before and after channel formation.   |  |  | | --- | --- | | http://vlab.amrita.edu/userfiles/7/image/524px-N-channel_mosfet_svg.png | http://vlab.amrita.edu/userfiles/7/image/524px-N-channel_enhancement-type_MOSFET_svg.png | | Fig. (1a): nMOSFET before channel formation | Fig. (1b): nMOSFET structure after channel formation |      Output Characteristics    MOSFET output characteristics plot ID versus VDS for several values of VGS.    The characteristics of an nMOS transistor can be explained as follows. As the voltage on the top electrode increases further, electrons are attracted to the surface. At a particular voltage level, which we will shortly define as the threshold voltage, the electron density at the surface exceeds the hole density. At this voltage, the surface has inverted from the p-type polarity of the original substrate to an n-type inversion layer, or inversion region, directly underneath the top plate as indicated in Fig. 1(b). This inversion region is an extremely shallow layer, existing as a charge sheet directly below the gate. In the MOS capacitor, the high density of electrons in the inversion layer is supplied by the electron–hole generation process within the depletion layer. The positive charge on the gate is balanced by the combination of negative charge in the inversion layer plus negative ionic acceptor charge in the depletion layer. The voltage at which the surface inversion layer just forms plays an extremely important role in field-effect transistors and is called the threshold voltage Vtn. | |  | | CMOS Inverter | . | | . | Introduction   The inverter is universally accepted as the most basic logic gate doing a Boolean operation on a single input variable. Fig.1 depicts the symbol, truth table and a general structure of a CMOS inverter. As shown, the simple structure consists of a combination of an pMOS transistor at the top and a nMOS transistor at the bottom.    CMOS is also sometimes referred to as **complementary-symmetry metal–oxide–semiconductor**. The words "complementary-symmetry" refer to the fact that the typical digital design style with CMOS uses complementary and symmetrical pairs of p-type and n-type metal oxide semiconductor field effect transistors (MOSFETs) for logic functions. Two important characteristics of CMOS devices are high noise immunity and low static power consumption. Significant power is only drawn while the transistors in the CMOS device are switching between on and off states. Consequently, CMOS devices do not produce as much waste heat as other forms of logic, for example transistor-transistor logic (TTL) or NMOS logic, which uses all n-channel devices without p-channel devices.     Inverter Static Characteristics (VTC)   Digital inverter quality is often measured using the Voltage Transfer Curve (VTC), which is a plot of input vs. output voltage. From such a graph, device parameters including noise tolerance, gain, and operating logic-levels can be obtained.    Ideally, the voltage transfer curve (VTC) appears as an inverted step-function - this would indicate precise switching between on and off - but in real devices, a gradual transition region exists. The VTC indicates that for low input voltage, the circuit outputs high voltage; for high input, the output tapers off towards 0 volts. The slope of this transition region is a measure of quality - steep (close to -Infinity) slopes yield precise switching. The tolerance to noise can be measured by comparing the minimum input to the maximum output for each region of operation (on / off). This is more explicitly shown in the fig.3.    Noise margin : is a parameter intimately related to the transfer characteristics. It allows one to estimate the allowable noise voltage on the input of a gate so that the output will not be affected. Noise margin (also called noise immunity) is specified in terms of two parameters - the low noise margin NL, and the high noise margin NH . Referring to above figure, NL is defined as the difference in magnitude between the maximum LOW input voltage recognized by the driven gate and the maximum LOW output voltage of the driving gate. That is, NL =|VIL - VOL|. Similarly, the value of NH is the difference in magnitude between the minimum HIGH output voltage of the driving gate and the minimum HIGH input voltage recognizable by the driven gate. That is, NMH =|VOH - VIH|. Where VIH: minimum HIGH input voltage, VIL: maximum LOW input voltage, VOH: minimum HIGH output voltage, VOL: maximum LOW output voltage. | |  | | 4x1 Multiplexer | . | | . | Introduction   A **multiplexer** or mux is a combinational circuits that selects several analog or digital input signals and forwards the selected input into a single output line. A multiplexer of 2n inputs has n selected lines, are used to select which input line to send to the output.   Design using pass-transistor logic   A multiplexer can be designed using various logics. Fig.3 shows how a 2:1 MUX is implemented using a pass-transistor logic.    The pass-transistor logic attempts to reduce the number of transistors to implement a logic by allowing the primary inputs to drive gate terminals as well as source-drain terminals. The implementation of a 2:1 MUX requires 4 transistors (including the inverter required to invert S), while a complementary CMOS implementation would require 6 transistors. The reduced number of devices has the additional advantage of lower capacitance. | |  | |

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| **Date:** | **15-June-2020** | **Name:** | **Raziya Banu** | |
| **Course:** | **Udemy** | **USN:** | **4AL16EC058** | |
| **Topic:** | **Programming core Java** | **Semester & Section:** | **8th sem & ‘B’ section** | |
| **AFTERNOON SESSION DETAILS** | | | |
| **Image of session** | | | |
| **Getters and Return Values**  Using get methods or "getters" in your Java classes, and how to return values from methods in general.  **class** **Person** **{**  String name**;**  **int** age**;**    **void** **speak()** **{**  System**.**out**.**println**(**"My name is: " **+** name**);**  **}**    **int** **calculateYearsToRetirement()** **{**  **int** yearsLeft **=** 65 **-** age**;**    **return** yearsLeft**;**  **}**    **int** **getAge()** **{**  **return** age**;**  **}**    String **getName()** **{**  **return** name**;**  **}**  **}**  **public** **class** **App** **{**  **public** **static** **void** **main(**String**[]** args**)** **{**  Person person1 **=** **new** Person**();**    person1**.**name **=** "Joe"**;**  person1**.**age **=** 25**;**    *// person1.speak();*    **int** years **=** person1**.**calculateYearsToRetirement**();**    System**.**out**.**println**(**"Years till retirements " **+** years**);**    **int** age **=** person1**.**getAge**();**  String name **=** person1**.**getName**();**    System**.**out**.**println**(**"Name is: " **+** name**);**  System**.**out**.**println**(**"Age is: " **+** age**);**  **}**  **}**    Years till retirements 40  Name is: Joe  Age is: 25 **Setters and 'this'**[**Java for Complete Beginners**](https://www.caveofprogramming.com/categories/java-video/index.html) How to use setters, also known as set methods or mutators, in Java. In this video I also take a look at the 'this' keyword and when to use it.  **class** **Frog** **{**  **private** String name**;**  **private** **int** age**;**    **public** **void** **setName(**String name**)** **{**  **this.**name **=** name**;**  **}**    **public** **void** **setAge(int** age**)** **{**  **this.**age **=** age**;**  **}**    **public** String **getName()** **{**  **return** name**;**  **}**    **public** **int** **getAge()** **{**  **return** age**;**  **}**    **public** **void** **setInfo(**String name**,** **int** age**)** **{**  setName**(**name**);**  setAge**(**age**);**  **}**  **}**  **public** **class** **App** **{**  **public** **static** **void** **main(**String**[]** args**)** **{**    Frog frog1 **=** **new** Frog**();**    *//frog1.name = "Bertie";*  *//frog1.age = 1;*    frog1**.**setName**(**"Bertie"**);**  frog1**.**setAge**(**1**);**    System**.**out**.**println**(**frog1**.**getName**());**  **}**  **}**    Bertie | | | |