**DAILY ASSESSMENT FORMAT**

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| **Date:** | **09-June-2020** | **Name:** | **Raziya Banu** |
| **Course:** | **VLSI** | **USN:** | **4AL16EC058** |
| **Topic:** | **MOSFET - Enhancement Type MOSFET Explained** | **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 the MOSFET - Enhancement Type MOSFET Explained. **EMOSFET-Enhancement MOSFET** Although [**DE-MOSFET**](http://www.circuitstoday.com/demosfet-depletion-enhancement-mosfet) is useful in special applications, it does not enjoy widespread use. However, it played an important role in history because it was part of the evolution towards the E-mode MOSFET, a device that has revolutionized the electronic industry. E-MOSFET has become enormously important, in digital electronics and. In th**e**absence of E-MOSFET’s the personal computers (PCs) that are now so widespread would not exist.  **Construction of an EMOSFET:**  [Construction of EMOSFET](http://www.circuitstoday.com/wp-content/uploads/2009/08/n-channel-e-mosfet-structure.jpg)  Construction of EMOSFET  Figure shows the construction of an N-channel E-MOSFET. The main difference between the construction of DE-MOSFET and that of E-MOSFET, as we see from the figures given below the E-MOSFET substrate extends all the way to the silicon dioxide (SiO2) and no channels are doped between the source and the drain. Channels are electrically induced in these MOSFETs, when a positive gate-source voltage VGS is applied to it.  **Operation of an EMOSFET:**  [Working of an EMOSFET](http://www.circuitstoday.com/wp-content/uploads/2009/08/n-channel-e-mosfet-operation.jpg)  Working of an EMOSFET  As its name indicates, this MOSFET operates only in the enhancement mode and has no depletion mode. It operates with large positive gate voltage only. It does not conduct when the gate-source voltage VGS = 0. This is the reason that it is called normally-off MOSFET. In these MOSFET’s drain current ID flows only when VGS exceeds VGST [gate-to-source threshold voltage].  When drain is applied with positive voltage with respect to source and no potential is applied to the gate two N-regions and one P-substrate from two P-N junctions connected back to back with a resistance of the P-substrate. So a very small drain current that is, reverse leakage current flows. If the P-type substrate is now connected to the source terminal, there is zero voltage across the source substrate junction, and the–drain-substrate junction remains reverse biased.  When the gate is made positive with respect to the source and the substrate, negative (i.e. minority) charge carriers within the substrate are attracted to the positive gate and accumulate close to the-surface of the substrate. As the gate voltage is increased, more and more electrons accumulate under the gate. Since these electrons can not flow across the insulated layer of silicon dioxide to the gate, so they accumulate at the surface of the substrate just below the gate. These accumulated minority charge carriers N -type channel stretching from drain to source. When this occurs, a channel is induced by forming what is termed an **inversion layer** (N-type). Now a drain current start flowing. The strength of the drain current depends upon the channel resistance which, in turn, depends upon the number of charge carriers attracted to the positive gate. Thus drain current is controlled by the gate potential.  Since the conductivity of the channel is enhanced by the positive bias on the gate so this device is also called the enhancement MOSFET or E- MOSFET.  The minimum value of gate-to-source voltage VGS that is required to form the inversion layer (N-type) is termed the gate-to-source threshold voltage VGST. For VGS below VGST, the drain current ID = 0. But for VGS exceeding VGST an N-type inversion layer connects the source to drain and the drain current ID is large. Depending upon the device being used, VGST may vary from less than 1 V to more than 5 V.  JFETs and DE-MOSFETs are classified as the depletion-mode devices because their conductivity depends on the action of depletion layers. E-MOSFET is classified as an enhancement-mode device because its conductivity depends on the action of the inversion layer. Depletion-mode devices are normally ON when the gate-source voltage VGS = 0, whereas the enhancement-mode devices are normally OFF when VGS = 0.  **Characteristics of an EMOSFET.**  [Drain Characteristics-EMOSFET](http://www.circuitstoday.com/wp-content/uploads/2009/08/e-mosfet-drain-characteristics.jpg)  Drain Characteristics-EMOSFET  Drain characteristics of an N-channel E-MOSFET are shown in figure. The lowest curve is the VGST curve. When VGS is lesser than VGST, ID is approximately zero. When VGS is greater than VGST, the device turns- on and the drain current ID is controlled by the gate voltage. The characteristic curves have almost vertical and almost horizontal parts. The almost vertical components of the curves correspond to the ohmic region, and the horizontal components correspond to the constant current region. Thus E-MOSFET can be operated in either of these regions i.e. it can be used as a variable-voltage resistor (WR) or as a constant current source.  [EMOSFET-Transfer Characteristics](http://www.circuitstoday.com/wp-content/uploads/2009/08/e-mosfet-tranfer-characteristics.jpg)  EMOSFET-Transfer Characteristics  Figure shows a typical transconductance curve. The current IDSS at VGS <=0 is very small, being of the order of a few nano-amperes. When the VGS is made positive, the drain current IDincreases slowly at first, and then much more rapidly with an increase in VGS. |

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| **Course:** | **Udemy** | **USN:** | **4AL16EC058** | |
| **Topic:** | **Programming core Java** | **Semester & Section:** | **8th sem & ‘B’ section** | |
| **AFTERNOON SESSION DETAILS** | | | |
| **Image of session** | | | |
| **A Hello World Program** The first in a series of video tutorials on Java for absolute beginners, using the free Eclipse IDE.  In this first video, I show you how to create a "hello world" Java program with a minimum of typing!  The code we'll discuss in the tutorial:  **public** **class** **Application** **{**  **public** **static** **void** **main(**String**[]** args**)** **{**  System**.**out**.**println**(**"Hello World!"**);**  **}**  **}** **Using Variables**[**Java for Complete Beginners**](https://www.caveofprogramming.com/categories/java-video/index.html) In this second part of the Java tutorial for beginners series, we look at declaring and initializing variables -- one of the most basic building blocks of any computer program.  Code for this tutorial:  **public** **class** **Application** **{**  **public** **static** **void** **main(**String**[]** args**)** **{**  **int** myNumber **=** 88**;**  **short** myShort **=** 847**;**  **long** myLong **=** 9797**;**  **double** myDouble **=** 7.3243**;**  **float** myFloat **=** 324.3f**;**  **char** myChar **=** 'y'**;**  **boolean** myBoolean **=** **false;**    **byte** myByte **=** 127**;**      System**.**out**.**println**(**myNumber**);**  System**.**out**.**println**(**myShort**);**  System**.**out**.**println**(**myLong**);**  System**.**out**.**println**(**myDouble**);**  System**.**out**.**println**(**myFloat**);**  System**.**out**.**println**(**myChar**);**  System**.**out**.**println**(**myBoolean**);**  System**.**out**.**println**(**myByte**);**  **}**  **}**  88  847  797  7.3243  324.3  Y  False  127 **Strings**[**Java for Complete Beginners**](https://www.caveofprogramming.com/categories/java-video/index.html) In the third part of the Java tutorial for beginners video series, we look at working with text using the String class. We also get our first real peek at using classes and objects.  Code for this tutorial:  **public** **class** **Application** **{**  **public** **static** **void** **main(**String**[]** args**)** **{**    **int** myInt **=** 7**;**    String text **=** "Hello"**;**    String blank **=** " "**;**    String name **=** "Bob"**;**    String greeting **=** text **+** blank **+** name**;**    System**.**out**.**println**(**greeting**);**    System**.**out**.**println**(**"Hello" **+** " " **+** "Bob"**);**    System**.**out**.**println**(**"My integer is: " **+** myInt**);**    **double** myDouble **=** 7.8**;**    System**.**out**.**println**(**"My number is: " **+** myDouble **+** "."**);**  **}**  **}**  Output:  Hello Bob  Hello Bob  My integer is: 7  My number is: 7.8. | | | |