Analog Circuits
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Module - 03
Lecture – 07

We now understand that biasing a transistor at a given current involves negative feedback. It is not as simple as constant V_{GS} biasing where you simply apply V_{GS} across the gate and source terminals of the MOS transistor, but it is nevertheless done and is the preferred way of biasing MOS transistor and also other types of transistors. So we will see how to do that.

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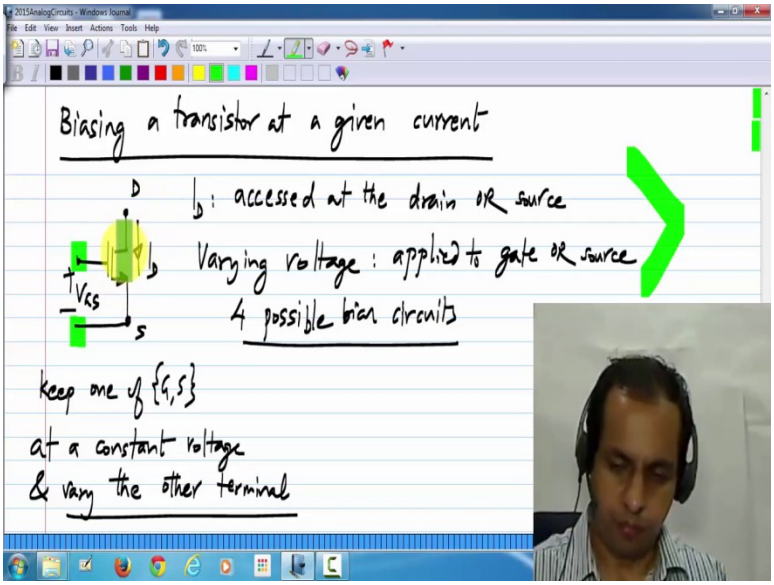

Now in a MOS transistor, the drain current I_D flows from drain to source. So, we can access the drain current at the drain terminal or the source terminal. Also what we need to control is the gate source voltage V_{GS}. And typically it is simpler if we keep one of the terminals constant, and vary only the other terminal, that is, keep one of the gate or source at a constant voltage and vary the other terminal. So, the varying voltage can be applied to gate or source. What I want to point out here is that there are two possibilities for accessing the drain current and two possibilities for choosing the terminal at which to vary the voltage, so that V_{GS} is varied. So totally two times two

there are four possible bias circuits, that is we can measure the current at the drain, we do the current comparison at the drain and vary the gate and so on.

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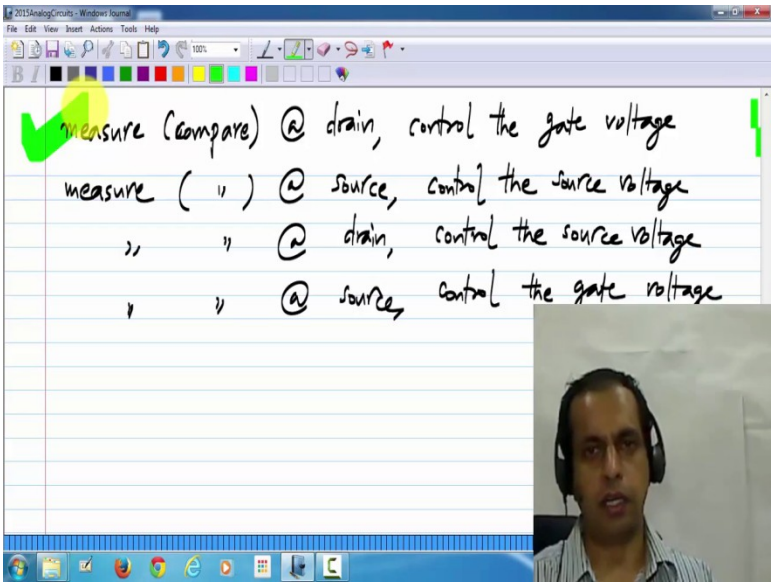

And similarly, I can measure or compare at the source and control the source voltage and the other two possibilities, you measure at the drain, and control the source voltage, and you measure at the source, and control the gate voltage. There are four variants of establishing a constant drain current in a transistor. We will study them one by one. So first, we will take up this first case where we do the current comparison at the drain that is we are looking at the current at the drain terminal and comparing it with the desired current and control the gate voltage. The source voltage will remain fixed.