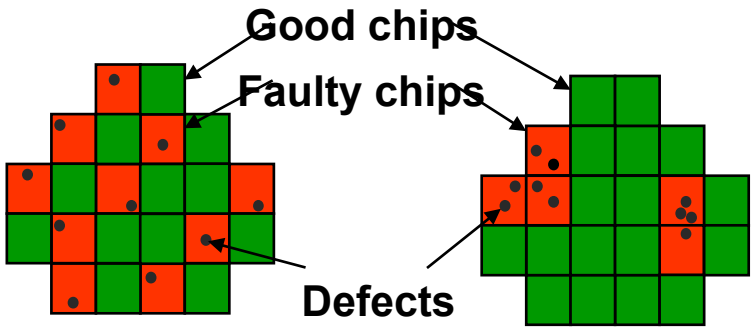
Lecture-1

1. Explain the brief history of semiconductor starting from transistor innovation.
2. What is Moore's Law? Why and how was it modified in 1975?
3. What is the impact of Moore's law on the development of VLSI?
4. Explain the different steps in VLSI realization process.
5. What are the problems of VLSI design on today?

Lecture-2

1. How do you define LSI and VLSI?
2. What are the different design issues in designing ICs?
3. What is yield? How cost is related to yield in chip designing?
4. Find out the yield in the defect wafers shown in following Figure, where good and faulty chips are represented by green and red respectively and defects are shown as black spots.



5. What is design synthesis?
6. What is verification?
7. What is testing in chip?
8. Explain VLSI design Cycle.

Lecture-3

1. What is semiconductor?
2. What are the numbers of electrons in shells and subshells of atoms of different semiconductors?
3. Explain the Energy Band theory of crystal.
4. In the light of energy band theory, explain semiconductor, metal, insulator.
5. Why Si, Ge are semiconductors?
6. What are holes? Explain how holes can be carrier of electricity.
7. What is doping in semiconductor? What are its effects?
8. Explain donor and acceptor impurity in semiconductors?

Lecture-4

1. What is semiconductor diode? What is depletion region? Explain the operation of semiconductor diode with both forward and reverse biased.
2. What is the value of the barrier potential?
3. Who are the carriers of current in case of diode?
4. Explain Bipolar junction transistor. Explain its three modes of operation. 5.
5. For an npn transistor with emitter grounded draw the I_c versus V_{CE} characteristics. Show the saturation region. Generally the term 'saturation' implies something becoming constant, which one is becoming constant here and with respect to whom?
6. How does bipolar transistor act as an amplifier?
7. How does transistor act as a switch?
8. Compare the operations of semiconductor diode and transistor.

Lecture-5

1. What are the problems of bipolar junction transistor?

2. Classify Field effect transistors.
3. Sketch the basic structure of an n-channel field effect transistor.
4. Explain the characteristics of JFET. How does it behave for small V_{DS} and large V_{DS}? How and when it turns from ohomic region to saturation region?
5. Sketch the depletion region before and after pinch-off. How is it changing along the channel?
6. Define pinch-off voltage.
7. Explain JFET as amplifier and switch.
8. Compare bipolar junction transistor versus junction field effect transistor.

Lecture-6

1. Explain MOSFET.
2. What are the advantages of MOSFET over JFET?
3. Explain MOSFET with both enhancement and depletion mode.
4. Compare the transfer characteristics in JFET, depletion type MOSFET, enhancement type MOSFET.
5. Explain the output and transfer characteristics enhancement type NMOS, depletion type NMOS, enhancement type PMOS and depletion type PMOS?
6. Explain how the different operating points of JFET, depletion type MOSFET, enhancement type MOSFET change the uses of them.
7. Explain how MOSFET acts as a switch.
8. Compare p channel and n channel MOSFET.
9. Classify different Field Effect transistors.

Lecture 7

1. Explain the functioning of nMOS inverter considering the load as a) resistor b) enhancement type transistor c) depletion type transistor.
2. Why is transistor being used in place of the resistor in designing a NOT gate?
3. What is the problem of the nMOS inverter with pull up as an enhancement type? How is it improved with depletion type pull up?
4. Explain the output and transfer characteristics enhancement type NMOS, depletion type NMOS, enhancement type PMOS and depletion type PMOS?
5. What are the drawbacks of MOSFETs?
6. What are the advantages of CMOS over MOSFET? What are the disadvantages of CMOS design?
7. How does CMOS work as an inverter?
8. How do you compare FET, enhancement type NMOS, depletion type NMOS with respect to operating point?
9. How is CMOS working as a switch?
10. As in static condition no current flows through CMOS, how do the power dissipation occur?
11. Compare CMOS versus bipolar technology.