**LESSON PLAN**

**Subject Code & Name: 13EC3021 & VLSI DESIGN**

**Branch: E.C.E-B**

**Class / Semester: III/II Academic Year:2016-17**

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| **Period** | **Date (Tentative)** | **Topic** | **Unit No.** | **Teaching Methodology** | **Remarks** | **Corrective action upon review** |
|  |  | **Introduction:** | **I** |  |  |  |
| 1 | **6/12/16** | Introduction to IC technology |  | **PPT** |  |  |
| 2 | **7/12/16** | The IC era, MOS and related VLSI technology and basic MOS transistors |  | **PPT** |  |  |
| 3-9 | **8,9,13,14,15,16/12/16** | IC production process, |  | **PPT** |  |  |
| 10-12 | **20/12/16** | MOS and CMOS fabrication process |  | **PPT** |  |  |
| 13 | **22/12/16** | Bi-CMOS technology |  | **PPT** |  |  |
| 14 | **27/12/16** | Comparison between CMOS and bipolar technologies. |  | **PPT** |  |  |
|  |  | **Basic electrical properties of MOS and Bi-CMOS circuits :** | **II** |  |  |  |
| 15 | **28/12/16** | Ids – Vds relationship |  | **Black Board** |  |  |
| 16 | **29/12/16** | Aspects of MOS transistor: threshold voltage, trans-conductance, output conductance and figure of merit |  | **Black Board** |  |  |
| 17 | **30/12/16** | Pass transistor, MOS inverter, |  | **Black Board** |  |  |
| 18 | **3/1/17** | Determination of pull-up to pull-down ratio of NMOS. |  | **Black Board** |  |  |
| 19 | **4/1/17** | NMOS inverter driven by another NMOS inverter and driven through one or more pass transistors |  | **Black Board** |  |  |
| 20 | **5/1/17** | Alternative forms of pull-up, |  | **Black Board** |  |  |
| 21 | **6/1/17** | CMOS inverter |  | **Black Board** |  |  |
| 22  23 | **10/1/17**  **11/1/17** | MOS transistor circuit model, Bi-CMOS inverter and latch-up in CMOS circuits. |  | **Black Board** |  |  |
|  |  | **VLSI Circuit design process** | **III** |  |  |  |
| 24 | **24/1/17** | VLSI design flow |  | **PPT** |  |  |
| 25-26 | **25/1/17** | Layers of abstraction and stick diagrams Design rules for wires, contacts |  | **PPT** |  |  |
| 27-30 | **31/1/17**  **1,3/2/17** | Transistor layout diagrams for NMOS and CMOS inverters and gates |  | **PPT** |  |  |
|  |  | **Scaling of MOS circuits:** |  |  |  |  |
| 31 | **7/2/17** | Scaling models |  | **PPT** |  |  |
| 32-34 | **8,9/2/17** | Scaling factors for device parameters and limitations of scaling. |  | **Black Board** |  |  |
|  |  | **Gate level design:** | **IV** | **Black Board** |  |  |
| 35 | **10/2/17** | Logic gates and other complex gates |  | **Black Board** |  |  |
| 36 | **14/2/17** | Switch logic |  | **Black Board** |  |  |
| 37-38 | **15/2/17** | Alternate gate circuits. |  | **Black Board** |  |  |
|  |  | **Basic circuit concepts**: |  | **Black Board** |  |  |
| 39 | **16/2/17** | Sheet resistance (Rs) and its concept to MOS |  | **Black Board** |  |  |
| 40-41 | **17,21/2/17** | Area capacitance calculations, |  | **Black Board** |  |  |
| 42 | **25/2/17** | Delays, |  | **Black Board** |  |  |
| 43 | **7/3/17** | Driving large capacitive load, wiring capacitances |  | **Black Board** |  |  |
| 44 | **8/3/17** | Fan-in and fan-outs and choice of layers |  | **Black Board** |  |  |
|  |  | **Subsystem design**: |  |  |  |  |
| 45 | **9/3/17** | Shifters |  | **PPT** |  |  |
| 46 | **10/3/17** | Adders |  |  |  |  |
| 47 | **15/3/17** | ALUs |  | **PPT** |  |  |
| 48 | **16/3/17** | Multipliers |  | **PPT** |  |  |
| 49 | **17/3/17** | Parity generators. |  | **PPT** |  |  |
|  |  | **Design methods:** | **V** |  |  |  |
| 50-51 | **21,22/3/17** | Design-capture tools |  | **Black Board** |  |  |
| 52 | **23/3/17** | Design- verification tools |  | **Black Board** |  |  |
|  |  | **Cmos testing:** |  | **Black Board** |  |  |
| 53 | **24/3/17** | Need for CMOS testing |  | **Black Board** |  |  |
| 54 | **30/3/17** | Manufacturing test principles |  | **Black Board** |  |  |
| 55 | **4/4/17** | Design strategies for test |  | **Black Board** |  |  |
| 56 | **6/4/17** | Chip level test techniques |  | **Black Board** |  |  |
| 57 | **11/4/17** | System level test techniques. |  | **Black Board** |  |  |

**PPT: POWER POINT PRESENTATION LCD**

**Text books:**

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, PHI, 2005.
2. Principles of CMOS VLSI Design – Weste and Eshraghian, Pearson Education, 1999.

**Reference books:**

1. VLSI Design – Debaprasad Das, Oxford university press, 2010.
2. VLSI Design – A.Albert Raj and T.Latha, PHI Learing private limited 2010.
3. ASIC design - Smith.

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