Maulana Abul Kalam Azad University of Technology, West Bengal

(Formerly West Bengal University of Technology)

Syllabus for B. Tech in Electronics & Communication Engineering

(Applicable from the academic session 2018-2019)

PE-EC603C	**CMOS VLSI Design**	**3L:0T:0P**	**3 credits**

VLSI Methodologies: Introduction to VLSI design, Moore's Law, VLSI Design flow, Design hierarchy, VLSI
Design style: Full custom, Gate array, standard-cell, Macro cell based design, Field programmable devices, design quality.
MOSFET: Electrical characteristics of MOSFET, Threshold voltage, Body effect, current expression (gradual channel approximation method), Channel length modulation, MOSFET scaling: constant field and constant voltage scaling, Short-channel effects.

Unit process in VLSI and IC fabrication: Unit process in VLSI: Wafer preparation, Oxidation, Diffusion, Ion implantation, Deposition, Metallization, Etching and Lithography. nMOS fabrication, n-well and p-well process .

CMOS Logic Circuits: General CMOS logic structure, VTC of inverter, noise margin, Different types of inverter (resistive load, enhancement and depletion nMOS load and CMOS), Switching characteristic (propagation delay and parasitic capacitance estimation), NAND, NOR and other complex CMOS logic circuits, Sizing of CMOS logic circuits, CMOS Power: static and dynamic power dissipation, latch-up, sizing for large capacitive load,. Dynamic CMOS logic circuits, charge leakage and charge sharing problem, dynamic gate cascading problem, Domino and NORA logic, Introduction of sequential CMOS logic circuits, Stick diagram. Layout and Layout design rules**.**

Physical Design Automation: Objectives and goals of partitioning, floor planning and placement, Global routing**.**

Text Book

1. CMOS Digital Integrated Circuits – S. Mo. Kang and Yusuf Leblebici, 3rd Ed, TMH 314

Reference Book

1. Digital Integrated Circuits A Design Perspective -Jan M. Rabaey, Prentice-Hall Publication, 2nd Edition.
2. VLSI Design and EDA Tools – Angsuman Sarkar, Swapnadip De & Chandan Kumar Sarkar, Scitech Publication(India) PVT, LTD
3. Basic VLSI Design – D. Pucknell & Eshraghian _PHI, 3rd Edition.
4. Principle of CMOS VLSI Design – Neil H. E. Weste – Pearson Edition, 2nd Edition.
5. CMOS Circuit Design – R. Jacob Baker, Harry W. Li, David E. Boyce – PHI,2003.