Course Type	Course Code	Name of the Course	L	T	P	Credits
DP	NECC531	Circuit Simulation Lab	0	0	3	1.5

Course Objective
The objective of the course is to develop the skill of designing various analog building blocks for Analog VLSI system design in VLSI Circuit Simulator.
Learning Outcomes
Upon successful completion of this course, students will: • Schematic design of CMOS circuits in VLSI Circuit Simulators. • Layout design of CMOS circuits in VLSI Circuit Simulators. • Pre and post layout simulation of CMOS Digital circuits in VLSI Circuit Simulators. • Pre and post layout simulation of CMOS Analog circuits in VLSI Circuit Simulators.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	DC transfer characteristics and transient response of CMOS Inverter, Layout design of a CMOS Inverter in VLSI Circuit Simulator and perform DRC, LVS, RCX, Logical effort and parasitic delay of a CMOS inverter, Small signal parameter extraction of MOSFET, Extraction of Threshold voltage and Transition frequency of a MOSFET	15	Develop skill of schematic and layout design of a CMOS Inverter in VLSI Circuit Simulators and analyze the small signal parameters.
2.	Cascode, Wilson and Regulated Cascode Current Mirrors, Single stage amplifiers (Common source with Resistive load, Diode connected and Current source load, Cascode amplifiers and Source followers), Differential amplifiers (Current source load and Active current mirror load), Operational Amplifiers, Operational Transconductance Amplifiers (OTA), Noise analysis	15	Develop skill to design various Current mirrors, Single stage amplifiers, Differential amplifiers, Operational amplifiers, OTAs and perform noise analysis of those circuits.
3.	Minor Project	12	Students will be asked to carry out a small-scale project, based on their understanding of Analog VLSI circuits.
Total		**42**	

Text Books:

1. Design of Analog CMOS Integrated Circuits, Behzad Razavi, McGraw Hill Indian, 2nd Edition (2017).

Reference Books:

1. CMOS Circuit Design: Layout and Simulation, R. Jacob Baker, Wiley IEEE Press, 3rd Edition (2010).
2. CMOS Analog Circuit Design, E. Allen & Douglas R. Holberg, Oxford Press Int. Edition, 3rd Edition (2012).