	National Institute of Technology Meghalaya An Institute of National Importance	**CURRICULUM**

Programme	**Bachelor of Technology in Electronics and Communication Engineering**	Year of Regulation	**2018-19**
Department	**Electronics and Communication Engineering**	Semester	**VI**

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
EC 302	**Digital and Analog Integrated Circuits**	**3**	**1**	**0**	**4**	**50**	**50**	**100**	**200**

Course Objectives		Course Outcomes		
	To understand the MOSFET structure and Operation		CO1	Model the behaviour of a MOS Transistor
	To understand the CMOS differential Amplifier		CO2	Design of MOS differential amplifier
	To develop an ability of CMOS operational amplifier		CO3	Able to compute the MOS operational amplifier
	To develop the CMOS digital circuits		CO4	Able to analyse CMOS Inverter
			CO5	Able to analyse and design of CMOS digital circuits

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	**2**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**3**
2	CO2	**-**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**2**
3	CO3	**-**	**-**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**2**
4	CO4	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**3**	**2**
5	CO5	**-**	**-**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**3**	**3**	**3**
6	CO6	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

SYLLABUS

No.	Content	Hours	COs
I	**MOS Transistor** MOS Structure and Operation, MOSFET Structure And Operations, MOSFET Current- Voltage Characteristics, Channel Length Modulation, Substrate Bias Effect, MOSFET Capacitances, MOSFET Model**.**	**10**	**CO1**
II	**CMOS Differential Amplifiers** BJT/MOSFET Differential Amplifier, DC Transfer Characteristics of An Emitter-Coupled Pair / Source - Coupled Pair, Current Mirrors (Bipolar / MOS), Bipolar Widlar Current Source/ MOS Widlar Current Source, Cascaded Differential Amplifier Stages and Level Translator, AC and DC Analysis of Cascade Amplifier**.**	**08**	**CO2**
III	**CMOS Operational Amplifier Fundamentals** Operational Amplifier, Basic Op-Amp Configuration, An Op-Amp with Negative Feedback, Voltage Series and Voltage Shunt Configurations, Difference Amplifiers, Specification of An Op-Amp, Offset Voltages and Currents, CMRR, Slew Rate, PSRR, Frequency Response, GBW Product, Input Bias and Offset Currents.	**06**	**CO2, CO3**
IV	**NMOS Logic Design** Resistive-Load Inverter, Saturated-Loaded Inverter, Linear Loaded Inverter, Depletion Loaded Inverter, Graphical Determination of VTC, Calculation of VTC Critical Points, Power Dissipation and Rise Time - Fall Time, NMOS Logic Gates.	**06**	**CO2, CO3**
V	**CMOS Logic Design** CMOS Inverter Technology, Static Characteristics, Dynamic Behavior, Static and Dynamic Power Dissipation, Power-Delay Product. CMOS Gates, TTL-CMOS Interfacing.	**08**	**CO3, CO4, CO5**
VI	**Processing Technology** Fabrication Process Flow, CMOS N-Well Process, Layout Design Rules, Full-Custom Mask Layout Design, Stick Diagram**.**	**04**	**CO2, CO4**
VII	**Semiconductor Memories** Type of Memories, Implementation Of ROMs, MOS ROM Cells, MOS EPROM and EEPROM Applications, Static and Dynamic Read Write Memories, Organization of RAM, Paralleling of Semiconductor Memory Integrated Circuit Chips.	**06**	**CO4**
	Total Hours	**48**	

Essential Readings

1. S-M. Kang and Y. Leblebici, "CMOS Digital Integrated Circuits: Analysis and Design", Tata McGraw-Hill, 3rd Edition, 2002
2. B. Razavi, “Design of Analog CMOS Integrated Circuit” Tata McGraw-Hill, 2rd Edition, 2017

Supplementary Readings

1. H. Taub and D. Schilling, "Digital Integrated Electronics", McGraw-Hill, International, 2017.
2. R. Jan, A. Chandrakasan, and B. Nikolic, "Digital Integrated Circuits: A Design Perspective", Pearson Education, 2nd Edition 1999.
3. S. Salivahanan S., "Linear Integrated Circuits", McGraw-Hill, 3rd Edition, 2018