	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**
Pre-requisite	**Basic Electronics (EC 101)**		
Department	**Electronics and Communication Engineering**	Semester	**III**

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
EC 201	**Electronics Devices**	**3**	**1**	**0**	**4**	**50**	**50**	**100**	**200**

Course Objectives		Course Outcomes		
	1. To understand the physical structure and electrical properties of semiconductor materials.		CO1	Understand the principles of semiconductor physics
	2. To master the fundamental concepts and equations of semiconductor devices.		CO2	Understand the current-voltage characteristics and mathematical models of semiconductor junction diodes, bipolar transistors, and field-effect transistors.
	3. To understand the terminal characteristics of junction diodes, bipolar transistors, and field-effect transistors.		CO3	Understand the fabrication processes involved in the manufacturing of semiconductor devices

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	PSO4
1	CO1	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**1**	**-**	**-**
2	CO2	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**1**	**-**	**-**
3	CO3	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**1**	**-**	**-**

No.	Content	Hours	COs
I	***Semiconductor Physics:*** Introduction to Semiconductor Physics, Energy bands in intrinsic and extrinsic silicon; Carrier transport: diffusion current, drift current, mobility and resistivity, Generation and recombination of carriers; Poisson and continuity equation	**8**	**CO1**
II	**Semiconductor Junction Diodes:** P-N junction characteristics, I-V characteristics, and small signal switching models; Avalanche and Zener breakdown, Zener diode, Schottky diode, LED, photodiode and solar cell.	**10**	**CO2**
III	**Bipolar Junction Transistor (BJT):** Bipolar Junction Transistor and its type, I-V characteristics, configuration types, biasing type, BJT model like Ebers-Moll Model, and small signal model.	**10**	**CO2**
IV	**Field effect transistor (JFET) & Metal Oxide Semiconductor (MOS):** Junction Field effect Transistor and its type, MOSFET and its type, I-V characteristics of MOSFET, MOS capacitor, C-V characteristics, MOSFET, I-V characteristics, and small signal models of MOS transistor,	**10**	**CO2**
V	**Fabrication Process:** Integrated circuit fabrication process: oxidation, diffusion, ion implantation, photolithography, etching, chemical vapor deposition, sputtering, twin-tub CMOS process	**10**	**CO3**
	Total Hours	**48**	

Essential Readings

1. G. Streetman and S. K. Banerjee, “Solid State Electronic Devices”, Pearson, Seventh Edition, 2014.
2. D.A. Neamen, “Semiconductor Physics and Devices”, Tata McGraw Hill Education, Third Edition, 2007
3. C.C. Hu, “Modern Semiconductor Devices for Integrated Circuits”, Pearson, 2010.

Supplementary Readings

1. S. M. Sze and K. N. Kwok, “Physics of Semiconductor Devices”, John Wiley & Sons, Third Edition, 2006.
2. C.T. Sah, “Fundamentals of solid state electronics,” World Scientific Publishing Co. Inc, 1991.
3. Y. Tsividis and M. Colin, “Operation and Modeling of the MOS Transistor,” Oxford Univ.Press, 2011..