1.	Title of the course	Semiconductor Devices
2.	Course number	EE210M
3.	Structure of credits (L-T-P-C)	3-1-0-4
4.	New course/modification to	Modified with EE202M/SOLID STATE DEVICES
5.	To be offered by	Electrical Engineering
6.	Prerequisite	None
7.	**Course Objective(s):** To analyze the electronic properties of semiconductors and discuss the fundamentals of semiconductor device physics. To explain the physics and operation of basic semiconductor devices employed in electronic circuits.	
8.	**Course Content:** Crystal structure, basics of quantum mechanics, formation of energy bands in solids, E-k diagram, effective mass, concept of hole, density of states, Fermi level; Carrier concentration: thermal equilibrium, equilibrium carrier concentration, excess carriers, quasi-Fermi levels, generation and recombination of carriers, carrier lifetime; Carrier transport: drift and diffusion, mobility, velocity saturation, diffusion length, continuity and Poisson's equations; Quantitative theory of PN junctions: equilibrium analysis, steady state I-V characteristics under forward bias, reverse bias and illumination, energy band diagram, capacitances, dynamic behavior under small and large signals, breakdown mechanisms; Bipolar Junction Transistor (BJT): physics and characteristics; Hetero junctions; Metal-semiconductor junctions: Schottky diode, Ohmic contact; Field Effect Transistor (FET): analysis of Metal Oxide Semiconductor (MOS) capacitor, calculation of threshold voltage, static I-V characteristics of Metal Oxide Semiconductor Field Effect Transistor (MOSFET) and their models; Light-matter interactions; Optoelectronic devices like photo detectors, solar cells and Light Emitting Diodes (LEDs).	
9.	**Textbook(s):** 1. Streetman B G and Banerjee S K, Solid State Electronic Devices, 7th Edition, Prentice Hall India (2014). 2. Pierret R, Semiconductor Device Fundamentals, Pearson Education (2006).	
10.	**Reference(s):** 1. Dimitrijev S, Principles of Semiconductor Devices, 2nd Edition, Oxford University Press (2012). 2. Neamen D A, Semiconductor Physics and Devices, 4th Edition, McGraw Hill Education (2012). 3. Sah C T, Fundamentals of Solid State Electronics, World Scientific (1991). 4. Tyagi M S, Introduction to Semiconductor Materials and Devices, John Wiley (2004).	