

**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)

<b>Course Code :</b> EC 301	<b>Category :</b> Core Courses
<b>Course Title :</b> Electronic Devices	<b>Semester :</b> Third
<b>L-T-P : 3-0-0</b>	<b>Credit:</b> 3
<b>Pre-Requisites:</b>	

**Detailed contents:****Module I****6L**

**Energy bands & Current Carriers in Semiconductors:** Bonding Forces in Solids, Energy Bands theory in crystals (Qualitative Analysis), Metals, Semiconductors, & Insulators, Fermi-Level, Intrinsic and Extrinsic Semiconductors, Concept of Holes, Carrier Concentration, and Mobility, diffusion and drift of carriers, continuity equation, Injected minority carrier charge, Recombination and generation of charge carriers. Generation and recombination of carriers; Poisson and continuity equation

**Module II****10L**

**P-N junction:** Physical Description of p-n junction, Basic device technologies for fabrication of a p-n junction, I-V characteristics, and small signal switching models; Avalanche breakdown, Zener diode, Schottky diode

**Bipolar Junction Transistor:** Basic Construction, I-V characteristics, Ebers-Moll Model.

**Module III****6L**

**MOSFET:** MOS capacitor, C-V characteristics, MOSFET, I-V characteristics, and small signal models of MOS transistor

**MODULE IV****10L**

**Opto-Electronics:** Optical absorption in semiconductors, photovoltaic effects, solar cells (p-n junction), Photoconductors, Photodiode, PIN photodiode, Avalanche photodiode, Phototransistor, LED, Semiconductor Laser (p-n junction)

**Integrated circuit:** fabrication process: oxidation, diffusion, ion implantation, photolithography, etching, chemical vapor deposition, sputtering, twin-tub CMOS process.

**Text /Reference Books:**

1. G. Streetman, and S. K. Banerjee, "Solid State Electronic Devices," 7th edition, Pearson,2014.
2. D. Neamen , D. Biswas "Semiconductor Physics and Devices," McGraw-Hill Education
3. S. M. Sze and K. N. Kwok, "Physics of Semiconductor Devices," 3rd edition, John Wiley & Sons, 2006.
4. C.T. Sah, "Fundamentals of solid state electronics," World Scientific Publishing Co. Inc, 1991.

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5. Y. Tsividis and M. Colin, "Operation and Modeling of the MOS Transistor," Oxford Univ. Press, 2011.

**Course Outcomes:**

At the end of this course students will demonstrate the ability to

- CO1. Differentiate the conduction techniques in semi-conductor materials.
- CO2. Analyze characteristics of Semi-conductor diodes and solve problems.
- CO3. Analyze characteristics of Bi-polar Transistors and solve problems.
- CO4. Analyze characteristics of MOS Transistors and solve problems.
- CO5. Differentiate between different Opto-electronic devices.