# 17EC1201 - ELECTRONIC DEVICES

(Common to CSE, IT, ECE & EEE)

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| **Course Category:** | Program Core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture - Tutorial - Practical:** | 3-0-0 |
| **Prerequisite:** | To provide students with the fundamentals of Electronics | **Sessional Evaluation:**  **Univ. Exam Evaluation:**  **Total Marks:** | 40  60  100 |
| **Objectives** | Students undergoing this course are expected to understand :   * The concepts of Solid State Semi-Conductor Theory. * The operation of a PN Junction Diode. * The Ideal, Practical and Electrical Characteristics of Zener, Varactor, Tunnel and Avalanche Photo Diode. * The need for biasing of Transistor. * The working of FET and MOSFET. * The operation of Thyristors. | | |

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| **Course Outcomes** | Upon the successful completion of the course, the students will be able to: | |
| CO1 | Understand the Semiconductor Physics for Intrinsic and Extrinsic materials and theory of operation of Solid State devices. |
| CO2 | Apply how the properties of semiconductor materials are used for the formation of PN diode. |
| CO3 | Explain the functioning of various solid-state devices, including several types of diodes including conventional, Zener, Varactor, Tunnel and Avalanche Photo Diode. |
| CO4 | Design the various Bi-polar Junction Transistor biasing circuits and its usage in applications of amplifiers. |
| CO5 | Distinguish the constructional features and operation of FET and MOSFET and their applications. |
| CO6 | Understand the operation with sketch the transfer characteristics of Thyristors. |
| **Course Content** | UNIT-I  **Semiconductor Diodes:** Introduction, Classification of Semiconductors, Conductivity of Semiconductor, Energy Distribution of Electrons, Carrier Concentration in Intrinsic Semiconductor, Mass-Action Law, Properties of Intrinsic Semiconductors, Variation in Semiconductor Parameters with Temperature, Drift and Diffusion currents, Carrier Life Time, Continuity Equation.  UNIT-II  **PN Junction Diode:** Introduction, Energy Band Structure of Open Circuited Diode, Quantitative Theory of Diode Currents, Diode Current Equation, Ideal vs Practical Resistance Levels, Transition Capacitance, Diffusion Capacitance, Temperature Dependence of V-I characteristics, Breakdown in Diodes, Diode as a Circuit Element, Piecewise Linear Diode Model, Applications.  UNIT-III  **Special Diodes:** Introduction, Zener Diode, Varactor Diode, Tunnel Diode, Avalanche Photo Diode.  UNIT-IV  **Bipolar Junction Transistor:** Introduction, Construction, Transistor Biasing, Operation of NPN Transistor, Operation of PNP Transistor, Types of Configuration.  UNIT-V  **Field Effect Transistor:** Introduction, Construction & Operation of N-Channel JFET, Characteristic Parameters, Saturation Drain Current, Slope of the Transfer Characteristic at IDSS, Comparison of JFET and BJT, Applications, MOSFET, Enhancement MOSFET, Depletion MOSFET, Comparison of MOSFET and JFET.  UNIT-VI  **Thyristors:** Introduction, PNPN Diode, SCR, Thyristor Ratings, Rectifier Circuits using SCR, LASER(Light Activated SER), TRIAC(Triode A.C. Switch), DIAC(Diode A.C. Switch). | |
| **Text Books and References** | Text Books:   1. Electronic Devices & Circuits by Jacob Millman&Christos C. Halkias, McGraw- Hilll 2. Mottershed, “Electronic devices and circuits”, PHI. | |
| Reference Books:   1. Electronic Devices and circuits by S. Salivahanan, N. Suresh Kumar, McGraw- Hill 2. Boylestad, Louis Nashelsky “Electronic devices and circuits” 9ed.., 2008 PE. | |
| **E-Resources** | 1. <https://nptel.ac.in/courses> 2. <https://iete-elan.ac.in> 3. <https://freevideolectures.com/university/iitm> | |