# 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:** | 4060100 |
| **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.
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| **E-Resources** | 1. <https://nptel.ac.in/courses>
2. <https://iete-elan.ac.in>
3. <https://freevideolectures.com/university/iitm>
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