# BASIC ELECRONICS (EC-101)

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## OBJECTIVE OF COURSE:

1. To understand the concepts of quantum theory of semiconductor & solid materials. To know various wireless network systems & it's standards.
2. To understand the characteristic, operation & limitation of semiconductor devices.

## UNIT-I

## SEMICONDUCTOR DIODE

**Mechanism of Conduction in Semiconductors**: Mobility and Conductivity, Electrons and holes in an intrinsic semiconductors, Donor and acceptor impurities, Fermi level, Carrier densities in semiconductor, Hall effect, Diffusion, Recombination

**Junction Diode** : PN junction characteristic and its equation, Effect of Temperature, Depletion Layer, Piecewise linear diode model, Breakdown Mechanism, Zener and Avalanche Breakdown characteristics

**Diode as circuit element** : Half wave and full wave rectifiers, capacitive filters, Zener diode as a regulator, clamper, clipper and voltage doubler, special diode- LED, Schottkey diodes

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## UNIT-II

## BJT CHARACTERSTIC & CIRCUITS

Transistor Operation, CE, CB, CC configuration and their characteristics, transistor biasing circuits, stability factor, h- parameter model (low frequency), computation of Ai, Av, Ri, Ro of single transistor CE amplifier configuration.

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## UNIT-III

## FIELD EFFECT TRANSISTORS

**JFET**: Construction and principle of working, Drain / Transfer characteristics, basic amplifier circuits, Biasing of JFET

**MOSFET**: Enhancement and depletion type N-channel, P-channel, Drain / Transfer Characteristics & standards.

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**UNIT-IV**

**SWITCHING THEORY & LOGIC GATES**

Number system, Conversion, Compliments, Addition and Subtraction, BCD numbers, Boolean algebra, Canonical form, Logic gates, Minimization of logical function using Karnaugh map

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**UNIT-V**

**OPERATIONAL AMPLIFIER & ELECTRONICS INSTRUMENTS**

**Operational Amplifier** : Concept of ideal operational amplifier (inverting and non-inverting) and its applications, Inverter, integrator, differentiator, voltage follower, summing and differential amplifier

**Electronic Instruments**: Digital Multimeter (block diagram approach), CRO (block diagram and its working),Measurement of voltage, phase, frequency. Double beam CRO (block diagram & its working).

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**Text Book:**

1. Louis Nashelsky & Robert L. Boylestad, Electronic Devices and Circuit Theory, 10th Edition, Pearson India
2. Christos Halkias & Jacob Millman, Integrated Electronics, 2nd Edition, Tata McGraw Hill Publication, India
3. Adel S. Sedra & Kenneth C. Smith, Microelectronic Circuits (With CD) : Theory and Applications 5th Edition, Oxford University Press, India

**References:**

1. Ben G. Streetman & Sanjay Banerjee, “Solid State Electronic Devices”, Sixth Edition , Prentice Hall of India Private Limited, India.
2. Nandita Dasgupta & Amitava Dasgupta, Semiconductor Devices: Modeling and Technology, 1st Edition, Prentice Hall of India Print.
3. S Salivahanan & N Suresh Kumar, Electronic Devices And Circuits, 2nd Edition, Tata McGraw Hill Publication, India

**OUTCOME**

On completion of this course the student will understand

1. Theory of semiconductor

2. Characteristic & working of PN junction and other specific diodes.
3. Characteristic & working of Bipolar Junction Transistor & Field Effect Transistors.
4. Principle & working operational amplifier.
5. Understanding of Working of the basic electronic instrument.
6. Understanding of Number system & minimization of Boolean expressions.