**BECG0001: Electronics Engineering**

**L–T–P-J: 3–1-0-0**

**Credits: 04**

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| **Module No.** | **Contents** | **Teaching Hours** |
| **I** | **Transport phenomenon in semiconductors:**  Semiconductor materials; Intrinsic and Extrinsic semiconductors; Mass-action law, Drift and diffusion of charge carriers.  **Junction diodes:**  P-N Junction diode: construction, operation & characteristics; Zener and Avalanche breakdown mechanisms; Diode resistance and capacitance  **Diode applications:**  Rectifiers: half wave, full wave : Centre-tapped and bridge type.; Filters; Clippers; Clampers; Voltage Multipliers; Zener diode as voltage regulator; Regulated power supply.  **Bipolar Junction Transistor (BJT):**  Bipolar junction transistor: construction & operation; CB ,CE, CC configurations & their Characteristics; Operating point; Transistor as a switch; Need of biasing; | 20 |
| **II** | **Bipolar Junction Transistor (BJT):**  Biasing methods: fixed bias, emitter bias, potential divider bias, voltage feedback bias; Bias stabilization; Stability factor;  **Field Effect Transistor (FET):**  Construction, operation & characteristics of JFET; Shockley’s equation; Depletion& Enhancement type MOSFET; Biasing of JFET:-fixed bias, self bias and voltage divider bias; Biasing of depletion type & enhancement type MOSFET.  **Digital Electronics:**  Number systems; Binary Addition & Subtraction;1’s and 2’s complement , Subtraction using 2’s complement; Boolean algebra; Logic gates; Implementation of basic gates using universal gates; Realization of Boolean functions using basic & universal gates; Canonical forms(SOP & POS); Simplification of Boolean functions using Boolean postulates & K-map up to 4 variables with don’t care condition.  **Operational Amplifier (Op-Amp):**  Operational amplifier: Block diagram, ideal and practical Op-Amp characteristics; Inverting, non-inverting and differential configurations (open loop and closed loop); Applications of Op-Amp as buffer, adder, subtractor, integrator and differentiator. | 21 |

**Text Book:**

* Robert L. Boylestad and Louis nashel sky, “*Electronic devices and circuit theory*”, Pearson Education/PHI, New Delhi.

**Reference Books:**

* Morris Mano, “*Digital design*”, Pearson Education.
* R.A. Gayakwad, “*Op-amps & linear Integrated circuits*”, PHI.
* R.J. Smith and R.C. Dorf, Circuits, “*Devices and System,*” Willey, 5th edition.

**Outcomes:**

CO1: To understand the basics of semiconductors and PN junction diodes with its characteristics.

CO2: Apply the basics of diodes to analyze rectifiers, clippers, clampers and voltage regulator circuits.

CO3: To understand the basic concepts of Bipolar Junction Transistor, Field Effect Transistor and MOSFET’s with their characteristics.

CO4: Apply the basics of transistor to design and analyze DC biasing amplifier circuits.

CO5: To understand operations amplifier and its parameters. Design different application circuits such as adder, subtractor, integrator and differentiator.

CO6: Identify and understand different types of Number systems, theorems, postulates of Boolean algebra and logic gates. Apply theorems of Boolean algebra for minimization of Boolean expression. Apply basics of logic gates to draw logic circuits for any Boolean function.