

## **Introduction to Electronics Engineering**

### **3L:1T:0P (4 credits)**

**Unit-I:** P-N Junction Diode, Depletion layer, Barrier potential, forward and reverse bias, Knee voltage, V-I Characteristics and its Equivalent Models, Avalanche and Zener Break Down, Diode Applications as Half Wave, Full Wave & Bridge Rectifier and their comparative analysis, Clippers, Clampers, Voltage Multiplier Circuit, Zener Diode and its Applications as a voltage regulator, Varactor diode.

**Unit-II:** Basic theory and operation of PNP and NPN transistors, Characteristics of Common Base, Common Emitter and Common Collector configuration, DC Biasing : Fixed Bias, Emitter Bias, voltage divider bias, Field effect transistor: JFET, Drain and Transfer characteristic, MOSFET, Introduction to Operational Amplifier and its Applications as Adder, Subtractor, Integrator, Differentiator, log antilog.

**Unit-III:** Number System, Base Conversion, BCD code, Excess-3 code, Gray Code, Review of Logic Gates, Concept of Universal Gates &, Boolean laws and theorems, SOP and POS representation of Boolean functions, Minimization of Boolean functions using K map, Basic Combinational Circuits: Half Adder, Full Adder, Subtractor, Sequential Circuits: Latch, Flip-Flops, Characteristic and Excitation Table of SR, JK, D and T Flip-flop. Concept of Master Slave Flip- Flop, Shift Registers.

**Unit-IV:** Functional Elements of Instruments, Classification & Characteristics, Types of Errors, Sources of Error, Dynamic Characteristics, Active and Passive Transducers: Resistive Transducers, Thermistor, Strain Gauge, Thermocouple, Differential Output Transducers, LVDT and their Characteristics.

**Unit-V:** Display Devices: LCD, LED, Seven Segment Display, Alphanumeric Display, Electronic Ammeter and Voltmeter, Digital Multi-meter, Cathode Ray Oscilloscope (CRO), Digital Storage Oscilloscope (DSO)

#### **Text Books:**

1. Malvino, A.P. / "Electronics Principles" / Tata McGraw-Hill.
2. Boylestad, Robert & Nashelsky, Louis / "Electronic Devices & Circuit Theory" / Prentice Hall of India.
3. H.S. Kalsi / "Electronic Instrumentation" / Tata McGraw-Hill
4. Malvino & Leach / "Digital Principles & Applications" / Tata McGraw-Hill.

#### **Reference Books:**

1. Sedra, Adel S., Smith, Kenneth C. / "Microelectronic Circuits" / Oxford University Press.
2. Sawhney AK/ "Electrical and electronic Measurement and Instrumentation" / Dhanpat Rai & sons.
3. Behzad Razavi/ "Fundamentals of Microelectronics" / Wiley

#### 4. Lectures of NPTEL

##### **OUTCOMES:**

##### **Upon Completion of the course the students will be able:**

1. To understand the basic concept of diodes, and use the diode as a circuit element for different applications.
2. To understand the working of BJT, FET and OP-amp and their application.
3. To design the simple digital circuits using different logic gates.
4. To identify the errors while making electronic measurements and to understand the working of different types of transducers.
5. To understand the working principle of electronic instruments and displaying it on electronic devices.