**Course Objectives:**

1. To understand the language of electronics, elements and their functionality
2. Basic understanding of analog systems and their applications
3. Basic understanding of digital systems and their applications
4. **Basic Circuits Concepts(4 hours)**
   1. Passive components: Resistance, Inductance, Capacitance; series, parallel combinations; Kirchhoff's law: Voltage, Current; Linearity
   2. Signal sources: Voltage and Current sources; Non-ideal sources; Representation under assumption of Linearity; controlled sources: VCVS, CCVS, VCCS, CCCS; concept of Gain, Transconductance, Transimpedance
   3. Superposition theorem, Thevenin's theorem, Norton's theorem
   4. Introduction to Filter
5. **Diodes(7 hours)**
   1. Semiconductor Diode Characteristics
   2. Modeling the Semiconductor Diode
   3. Diode circuits: Clipper; Clamper circuits
   4. Zener diode, LED, Photodiode, Varacters diode, Tunnel diodes
   5. DC power supply: Rectifier; Half wave, Full wave(center-tapped, bridge), Zener-regulated power supply
6. **Transistor(4 hours)**
   1. BJT configuration and biasing, small and large signal model
   2. T and µ model
   3. Concept of Differential amplifier using BJT
   4. BJT switch and Logic circuits
   5. Construction and working principle of MOSFET and CMOS
   6. MOSFET as logic circuits
7. **The Operational Amplifier and Oscillator(7 hours)**
   1. Basic model; Virtual ground concept; Inverting Amplifier, Non-inverting Amplifier, Integrator, Differentiator,Ssumming Amplifier and their applications
   2. Basic feedback theory; positive and negative feedback; concept of stability; Oscillator
   3. Waveform generator using Op-Amp for Square Wave, Triangular Wave, Wien Bridge Oscillator for sinusoidal waveform
8. **Communication System(4 hours)**
   1. Introduction
   2. Wired and Wireless Communication system
   3. EMW and propagation, Antenna, Broadcasting and Communication
   4. Internet/Intranet
   5. Optical fiber
9. **Digital Electronics(11 hours)**
   1. Number systems, Binary arithmetic
   2. Logic gates: OR, NOT, AND, NOR, NAND, XOR, XNOR gate; Truth tables
   3. Multiplexers, Demux, Encoder, Decoder
   4. Logic Function Representation
   5. Combinational circuits: SOP, POS form; K-map
   6. Latch, flip-flop: S-R flip-flop; JK flip-flop, Master-Slave flip-flop; D-flip flop
   7. Sequential circuits: Generic block diagram; Shift registers; Counters
10. **Application of Electronic System(5 hours)**
    1. Instrumentation system: Transducer, Strain Gauge, DMM, Oscilloscope
    2. Regulated power supply
    3. Remote control, Character Display, Clock, Counter, Measurements, Data Logging, Audio-Video system

**Practical:**

1. Familiarization with passive components, function generator and oscilloscope
2. Diode characteristics, rectifiers, Zener diodes
3. Bipolar junction transistor characteristics and single stage amplifier
4. Voltage amplifiers using op-amp, Comparators, Schmitt
5. Wave generators using op-amp
6. Combinational and sequential circuits

**References:**

1. Robert Boylestad and Louis Nashelsky, “Electronic Devices and Circuit Theory” PHI; 8th Edition.200
2. Thomas L. Floyd, “Electronic Devices” 8th Edition, Pearson Education, Inc., 2007
3. A.S. Sedra and K.C. Smith, “Microelectronic Circuits”, 6th Edition, Oxford University Press, 2006

**Evaluation Scheme:**  
The questions will cover all the chapters of the syllabus. The evaluation scheme will be as indicated in the table below:

|  |  |  |
| --- | --- | --- |
| **Chapter** | **Hour** | **Mark Distribution\*** |
| 1 | 4 | 8 |
| 2 | 7 | 12 |
| 3 | 7 | 10 |
| 4 | 7 | 10 |
| 5 | 4 | 10 |
| 6 | 11 | 12 |
| 7 | 5 | 10 |
| 2, 3, 4, 5, 7 |  | 8 |
| **Total** | **45** | **80** |

**\*Note: There may be minor deviation in marks distribution.**