IC161 Applied Electronics

Credit: 3-0-0-5

Prerequisite: Consent of the faculty member

Students intended for: B.Tech

Elective or Core: Core Semester: Even/Odd

Course objective: To understand the principle behind common digital and analog electronics devices.

Course content:

- **Digital Electronics:** Number systems (Binary, Decimal, Hexadecimal, Octal), Binary algebra, De-Morganslaws, Combinational Circuits: Adder, Subtractor, Decoder, Encoder, Multiplexers, Demultiplexers Sequential Circuits: Latch, Flipflops, Counters, Shift registers, Memory, Sampling, ADC, DAC
- **Devices and basic circuits:** Diodes, Clipping and Clamping, Rectification, Power-supply filtering, Zener diode regulator BJT and MOSFET Structure and operation,BJT and MOSFET switches, biasing, amplifiers (Common emitter, emitter follower, common source, source follower etc.). Basic logic design with transistors and diodes (TTL and CMOS)
- **Feedback and operational amplifiers :** Introduction to feedback, Operational amplifiers (as a black box), the golden rules, Basic op-amp circuits: Inverting and Noninverting amplifier, Follower, Integrators, Differentiators, Precision rectifiers, Comparators, Schmitt trigger
- **Measurement Transducers:** Temperature, light, acceleration, pressure, force, velocity, magnetic field, particle detectors.
- **PLC & Microcontroller:** Application of Microcontrollers (Toys, Embedded systems etc), General Architecture, Interfacing, Bus Signals, Interrupts, Registers, Support chips. Case study: Compare the architectures of two popularly used microcontrollers, Programming of a microcontroller with examples. Basic operation of relays, PLC as relays, Application of PLC in process industries, Architecture of a typical PLC, Ladder logic programming, Case study: Writing Ladder logic for any process industry (Cement mills, Paper mills etc).

References:

P. Horowitz and Winfield Hill “ The art of electronics” Cambridge University
M. Mano “ Digtial logic design", Prentice Hall