



BIT 202

Micro Electronics

Course Objectives:

1. To understand basic semiconductor devices and create foundation for forthcoming circuit design courses
2. To train students in logic design for real world problems.
3. To familiarize with the principles of the transducers and advances in Instrumentation.

UNIT – I

Semi-conductors, Conductors, and Insulators, Covalent bonds, conduction in semi-conductors, N-type and P-type semi-conductors, PN junction, Biasing, Zener diodes, Rectifier Circuits, Limiting and clamping circuits, Schottky Barrier diode and Varactor diode. Cathode Ray Oscilloscope and its applications

UNIT – II

Bipolar junction transistors – Physical structure and modes of operation, npn transistor, pnp transistor, characteristics, analysis of transistor circuits at DC, transistor as amplifier, small signal equivalent circuit models, biasing, transistor as switch, internal capacitance. MOSFET current-voltage characteristics, MOSFET as an amplifier and as a switch, biasing, Internal capacitance.

The Junction Field-Effect Transistors(JFET) – Structure and physical operation, characteristics.

UNIT – III

Feedback – Structure, Properties of negative feedback, Topologies, Advantages of negative feedback. Sinusoidal Oscillators – Loop gain, Barkhausen criteria, RC Phase shift, LC and Crystal Oscillators.

Power Amplifiers: class A, B and C amplifiers.

UNIT – IV

Operational Amplifiers : Ideal characteristics, op. amp. as adder, Sub tractor, Integrator, differentiator and comparator using op. amp. generation of square and Triangular waveforms, Monostable multi vibrator.

Op. Amp. As Voltage –controlled current switch(VCCS), Current-controlled Voltage source(CCVS), Instrumentation Amplifier, antilogarithmic amplifiers and analog multipliers.

UNIT – V

Digital CMOS logic circuits: Introduction, digital IC technologies and logic circuit families, Voltage Transfer Characteristic (VTC) of inverter, Noise Margins, Propagation delay, static and dynamic operation of CMOS inverter.

CMOS logic gate circuits: Basic structure (PUN and PDN), Implementation of 2-input NOR gate, NAND gate, complex gates and exclusive OR gate.

Suggested Reading :

1. Adel S. Sedra, Kenneth C. Smith, Micro Electronic Circuits, 5th Edition, Oxford International Student Edition, 2006
2. Jacob Millman, Arvin Grable – Micro Electronics – 2nd Edition, McGraw Hill 1987.
3. Shilling, L.D., Belove, C., Electronic Circuit – Discrete Integrate, 3rd Edition, McGraw Hill, ISE, 1989.