

CBCC offered by Department of Electronic Science

Electronics

Module – 1: Introduction to Semiconductor Physics & Device Fabrication Technology

Introduction, concept of energy bands, Fermi level, intrinsic and extrinsic semiconductors, P-type and N-type semiconductors, energy band diagram, effective mass, carrier transport, mobility, drift and diffusion, carrier recombination, introduction to device fabrication technology.

Module – 2: Junction Diodes:

Formation of P-N junction, energy band diagram, depletion region, forward and reverse biased P-N junction diode, I-V characteristics, breakdown mechanisms, Zener breakdown, Avalanche breakdown, Zener diode and its characteristics, junction capacitance and Varactor diode, diode rectifier circuits and Zener voltage regulators.

Module – 3: Bipolar Junction Transistors:

PNP and NPN transistors, energy band diagram, working principle of transistor, cut-off, active and saturation, current components in active mode, transistor characteristics, CE, CB, CC configurations, transistor as an amplifier and a switch, biasing and bias stability, CE h-parameter model, analyses of amplifiers using h-parameter model.

Module – 4: Field Effect Transistors:

JFET, construction, working principle, I-V characteristics, small signal equivalent circuit of JFET, MOS devices, concept of depletion and inversion in MOS capacitor, MOSFET, construction, working principle, characteristics, depletion and enhancement type, introduction to CMOS.

Module – 5: Analog Circuits:

Concept of positive and negative feedback, feedback topologies, effects of negative feedback (qualitative), Barkhausen criteria, condition of oscillation, operational amplifier and its characteristics, applications of Op-Amp.

Module – 6: Digital Electronics:

Introduction to number systems, Boolean algebra, logic gates, k-map minimization, half and full adder, subtractor, parity checker, comparator, multiplexer, demultiplexer, encoder, decoder, SR, JK, D and T flip-flops, shift registers, counters.