

5. Electronics Devices & Circuits (EEEC02)

UNIT 1

Review of semiconductor diodes, Mass action law, carrier concentrations, Graded and step graded semiconductors, calculation of barrier potential, Drift and diffusion currents; Physical structure and operation of Zener Diode, Schottky diode, Varactor diode, Step recovery diode

UNIT 2

Physical structure and modes of operation of BJT, input, output and transfer characteristics, The Ebers-Moll model for BJT; Biasing schemes for BJT, determination of operating point; bias stability and bias stabilization.

UNIT 3

BJT as an amplifier and switch (NPN and PNP both); Various configurations: CE, CB and CC; Low frequency transistor model, Small signal analysis, Estimation of voltage gain, input resistance, output resistance; simple current mirror, Bipolar current sources/sinks and bandgap references.

UNIT 4

JFET characteristics and working principle, Biasing schemes for JFET, Small signal analysis; JFET amplifier, JFET as a voltage-controlled resistance (VCR); MOSFET operation; enhancement mode and depletion mode; Biasing schemes for MOSFET, various configurations: CD, CS, CG; MOSFET as a VCR;

Complimentary MOS (CMOS), CMOS digital inverter; Simple Current mirror, MOS current sources/sinks

UNIT 5

LED, photo-diode, opto-coupler, opto-isolator, photo transistor; Power electronic Devices: Thyristor, UJT, SCR.

List of Experiments

1. Plot the input and output characteristics of BJT in CE configuration
2. Design CE amplifier using BJT: measure input resistance, voltage gain and plot the frequency response curve and measure bandwidth.
3. Design CB amplifier using BJT: measure input resistance, voltage gain and plot the frequency response and measure bandwidth.
4. Design CC amplifier using BJT and find input and output resistance, voltage gain and plot the frequency response curve and measure bandwidth.
5. To perform the operation of BJT as switch (both npn and pnp)
6. To determine the input and output characteristics of JFET
7. Design RC coupled JFET Amplifier: measure input resistance voltage gain and plot the frequency response and measure bandwidth
8. To perform and plot the characteristics curve I_D versus V_{DS} of MOSFET using CD4007 and measure the various parameters of the MOSFET.
9. Design common source amplifier using CD4007, measure its voltage gain and plot frequency response and measure bandwidth
10. To Study the operation of UJT as a Relaxation Oscillator

- 11.** To draw the V-I Characteristics of Silicon controlled rectifier and measure latching and holding current
- 12.** Minor project based upon the use of LED, photo-diode, opto-coupler, opto-isolator, photo transistor.