

FUNDAMENTAL OF ELECTRONICS ENGINEERING (FEE)

Subject Code: GR14A1019

I Year I Sem

L T P C

3 1 0 4

Prerequisites:

- Fundamentals of Modern Physics
- Fundamentals of Electrical Networks

Course Objectives:

- To provide clear explanation of the working principles of important electronic devices
- To show how each device is used in appropriate circuits
- To demonstrate how such circuits are designed

Course Outcomes:

- Ability to get familiar knowledge on several Semiconductor Devices.
- Ability to analyze the working operation of each device in a circuit.
- Ability to compare the performance of devices in various applications.

UNIT-I Semiconductors and pn Junction Diode: semiconductor physics: n and p type semiconductors, mass action law, continuity equation, hall effect, fermi level in intrinsic and extrinsic semiconductors, open circuited p-n junction energy band diagram of pin diode, forward bias and reverse bias, current components in p-n diode, law of junction, diode equation, volt-ampere characteristics in p-n diode, temperature dependence of v-i characteristics, transition and diffusion capacitances, breakdown mechanisms in semiconductor diodes (avalanche and zener breakdown), zener diode characteristics

UNIT-II Diode Applications, Special Diodes:

Half wave rectifier, ripple factor, full wave rectifier, harmonic components in a rectifier circuit, inductor filter, capacitor filter, L-section filter, π -section filter and comparison of various filter circuits in terms of ripple factors, simple circuit of a regulator using zener diode, series and shunt voltage regulators

Special Diodes: characteristics of Tunnel diode, varactor diode, LED, LCD.

UNIT-III Bipolar Junction Transistor: junction transistor, transistor current components, transistor as an amplifier, transistor construction, Detailed study of currents in a transistor, input and output characteristics of transistor in common base, common emitter and common collector configurations, relation between α and β and γ , typical transistor junction voltage values

junction field effect transistors (JFET): JFET characteristics (n and p channels), small signal model of JFET, MOSFET characteristics (Enhancement and depletion mode), introduction to SCR and UJT

UNIT-IV BIASING AND STABILIZATION: BJT biasing, DC equivalent model, criteria for fixing operating point, fixed bias, collector to base bias, self bias techniques for stabilization, stabilization factors, compensation techniques, compensation against variation in V_{BE} and I_{CO} , Thermal runaway, Thermal stability

UNIT-V Amplifiers:

small signal low frequency transistor amplifier circuits: h-parameter representation of a transistor, analysis of single stage transistor amplifier using h-parameters: voltage gain, current gain, input impedance and output impedance. Comparison of transistor configurations in terms of A_i , R_i , A_v , R_o .

Teaching methodologies:

- Power Point presentations
- Tutorial Sheets
- Assignments
- Lab experiments with Multisim software

Text Books:

1. David A. Bell; Electronic Devices and Circuits, Oxford University Press, 5th edition, 2008.

2. R.L. Boylestad and Louis Nashelsky; Electronic Devices and Circuits, Pearson/Prentice Hall, 9th Edition, 2006.

References:

1. T.F. Bogart Jr J.S.Beasley and G.Rico; Electronic Devices and Circuits – Pearson Education, 6th edition, 2004.
2.Op-Amps and Linear Integrated Circuits, Ramakant A. Gayakwad, Prentice Hall of India(p) Ltd,3rd Ed., 2002.