

ELECTRONIC DEVICES (Common to CSE&IT)

II B. Tech. - I Semester
Course Code: A3EC70

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COURSE OVERVIEW:

This course covers fundamental topics that are common to a wide variety of electronic engineering devices and systems. The topics include an introduction to semiconductor devices and their applications. The course creates the background in the physics of the compound semiconductor-based electronic devices and also prepares students to advanced courses in electronics. This course provides a basis for students to continue education by undertaking advanced study and research in the variety of different branches of semiconductor device applications.

COURSE OBJECTIVES:

1. To teach dynamics of electrons and the principle of operation of CRO and its applications.
2. To impart knowledge physics of semiconductor electronic devices, the characteristics and their equivalent models.
3. To demonstrate flow of current through the p-n junction and relating this phenomena to the characteristics and operation of the diodes, bipolar and unipolar transistors.
4. To explain internal working of the regulated power supply this includes characteristic parameters of rectifiers with and without filters using Zener regulation.
5. To teach the concepts of biasing in BJT and JFET

COURSE OUTCOMES:

- After completing this course, the student will be able to:
1. Identify, formulate & solve Engineering problems by making use of modern software/hardware tools.
 2. Analyze behaviour of electronic devices.
 3. Design and analyze various rectifiers, filter circuits.
 4. Design an amplifier circuit with proper biasing techniques (BJT and FET).
 5. Analyze Field effect transistor (FET) and mosfet characteristics

SYLLABUS

UNIT - I

PN JUNCTION DIODE: Operation of PN junction Diode: No bias, forward bias and reverse bias, diode current equation (qualitative treatment), volt-ampere (V-I) characteristics, temperature dependence of V-I characteristics, ideal versus practical diode, static and dynamic resistances, diode equivalent circuits, breakdown mechanisms in semiconductor diodes, zener diode characteristics.

UNIT - II

RECTIFIERS AND FILTERS: PN junction as a rectifier, half wave rectifier, Center-Tapped full wave rectifier, Bridge full wave Rectifier, Harmonic components in a rectifier circuit, Capacitor filter and Inductor filter.

UNIT - III

BIPOLAR JUNCTION TRANSISTOR (BJT): BJT construction, operation, symbol, transistor current components, input & output characteristics of a transistor in CB, CE and CC configurations

TRANSISTOR BIASING AND STABILIZATION: Need for biasing, operating point, DC and AC load lines, stability factor, fixed bias circuit, collector to base bias circuit, self bias circuit.

UNIT - IV

BJT AMPLIFIERS: Operation of CE amplifier, Operation of RC coupled amplifier, Operation of Class-A power amplifier, Operation of Class-B Push-Pull power amplifier

FIELD EFFECT TRANSISTOR: Junction field effect transistor (construction, principle of operation, symbol), volt-ampere characteristics of JFET, MOSFETS (construction, principle of operation, symbol), volt-ampere characteristics of MOSFETS in enhancement and depletion modes.

UNIT - V

FEEDBACK AMPLIFIERS: Feedback concepts, types of feedback circuits (block diagram representation), general characteristics of negative feedback amplifier

OSCILLATORS: Barkhausen criterion, RC Phase shift oscillator using BJT, General form of LC oscillators, Hartley oscillator, Colpitts oscillator and Crystal oscillator.

TEXT BOOKS:

1. J. Millman, Christos C. Halkias (2008), Electronic Devices and Circuits, Tata McGraw Hill, New Delhi.
2. R.L. Boylestad and Louis Nashelsky (2006), Electronic Devices and Circuits, 9th edition, Prentice Hall of India, New Delhi.

REFERENCE BOOKS:

1. Rober T. Paynter (2003), Introduction to Electronic Devices and Circuits, 6th edition, Pearson Education, New Delhi, India.
2. S. Salivahana, N. Suresh Kumar, A. Vallavaraj (2008), Electronic Devices and Circuits, 2nd edition, Tata McGraw Hill, New Delhi.