Road Map to the Syllabus

2005-2006

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

I Year B.Tech   T P C
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ELECTRONIC DEVICES AND CIRCUITS

Syllabus:

UNIT-1

ELECTRON DYNAMICS AND CRO: Motion of charged particles in electric and magnetic fields. Simple problems involving electric and magnetic fields only. Electrostatic and magnetic focusing. Principles of CRT, deflection sensitivity (electrostatic and magnetic deflection), parallel electric and magnetic fields, perpendicular electric and magnetic fields.

▶ Go to   **CHAPTER 1: ELECTRON DYNAMICS AND CRO**

UNIT-2

JUNCTION DIODE CHARACTERISTICS: Review of semiconductor physics, n and p type semiconductor, mass action law, continuity equation, Hall effect, Fermi level in intrinsic and extrinsic semiconductors, open-circuited p-n junction. The p-n junction energy band diagram of pn diode, pn diode as a rectifier (forward bias and reverse bias), the current components in pn diode, law of junction, diode equation, volt-ampere characteristics of pn diode, temperature

dependence of VI characteristic, transition and diffusion capacitances, step-graded junction, breakdown mechanisms in semiconductor (avalanche and zener breakdown) diodes, zener diode characteristics, characteristics of tunnel diode with the help of energy band diagrams, varactor diode, LED, LCD, photodiode

Go to ► **CHAPTER 2: JUNCTION DIODE CHARACTERISTICS**

UNIT-3

RECTIFIERS, FILTERS AND REGULATORS: Half-wave rectifier, ripple factor, full-wave rectifier, harmonic components in a rectifier circuit, inductor filter, capacitor filter, L-section filter, Π-section filter, multiple L-section and multiple Π-section filter, comparison of various filter circuits in terms of ripple factors, simple circuit of a regulator using zener diode, series and shunt voltage regulators.

Go to ► **CHAPTER 3: RECTIFIERS, FILTERS AND REGULATORS**

UNIT-4

TRANSISTOR CHARACTERISTICS: Junction transistor, transistor current components, transistor as an amplifier, transistor construction, detailed study of currents in a transistor, transistor alpha, input and output characteristics of transistor in common base, common emitter and common collector configurations, relation between alpha and beta, typical transistor junction voltage values, JFET characteristics (qualitative and quantitative discussion), small-signal model of JFET, MOSFET characteristics (enhancement and depletion mode), symbols of MOSFET, comparison of transistors, introduction to SCR and UJT.

Go to ► **CHAPTER 4: TRANSISTOR CHARACTERISTICS**

UNIT-5

BIASING AND STABILISATION: BJT biasing, DC equivalent model, criteria for fixing operating point, fixed bias, collector to base bias, self-bias techniques for stabilization, stabilization factors, (S, S′, S″), compensation techniques (compensation against variation in V_{BE}, I_{CO}), thermal runway, thermal stability.

Go to ► **CHAPTER 5: BIASING AND STABILISATION**

UNIT-6

AMPLIFIERS: Small signal low frequency transistor amplifier circuits, h-parameter representation of a transistor, analysis of single stage transistor ampli-

fier 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

UNIT-7

FEEDBACK AMPLIFIERS: Concept of feedback, classification of feedback amplifiers, general characteristics of negative feedback amplifiers, effect of feedback on input and output characteristics, voltage series, voltage shunt, current series and current shunt feedback amplifiers with discrete components and their analysis.

UNIT-8

OSCILLATORS: Condition for oscillations, RC phase shift oscillators with transistor and FET, Hartley and Colpitts oscillators, Wien bridge oscillator, crystal oscillators, frequency and amplitude stability of oscillators.