

**HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN****B.E. SECOND YEAR****ELECTRONICS & COMMUNICATION**

(In Force June 2006)

**SEMESTER - III****EC302: ANALOG CIRCUIT – I**

Teaching Scheme		Examination Scheme				
Theory Hrs.	Practical Hrs.	Theory Hrs.	Theory Marks	Pract./ Viva Marks	Term Work Marks	Total Marks
4	2	3	100	25	25	150

**SYLLABUS**

1. Junction Diode Characteristics: Open circuited pn junction, pn junction as rectifier, current components in p-n diode, V-I characteristics, Temperature dependence, Diode Resistance, Space charge diffusion capacitances, charge control description of a diode, junction diode switching times, Breakdown diodes.
2. Diode Circuits: Diode as a circuit element, Load-line concept, Piecewise Linear diode model, Clipping circuits & Clipping at two independent level, Comparators, Sampling gates, Rectifiers, Capacitor filters & other diode circuits.
3. Transistor characteristics: Junction transistor, current components, transistor as an amplifier, Construction of transistor, Transistor configurations, Transistor characteristics & its different regions, Transistor ratings.
4. IC Fabrication & Characteristics: IC technology, Basic Monolithic ICs, Epitaxial Growth, Masking & Etching, Diffusion of Impurities, Transistor for monolithic Circuits, Monolithic Diodes, Integrated Resistors, Capacitors & Inductors, Monolithic Circuit Layouts.
5. Transistor at Low Frequencies: Two port devices & the Hybrid model,
6. Transistor hybrid model, h parameters, relation between h parameters of different configurations of transistor, Analysis of transistor amplifiers using h parameters, Emitter Follower, Linear analysis of transistor circuit, Miller's Theorem & its Dual, Cascading transistor amplifiers, Simplified model of transistor, CE amplifier with Emitter resistance, Hi Input resistance circuits.
7. Transistor Biasing & Thermal Stabilization: The Operating Point, Bias Stability, Self Bias, Stabilization against variations in  $I_{CO}$ ,  $V_{BE}$  & Bias Compensation, Biasing techniques for Linear ICs, Thermistor & Sensistor Compensation, Thermal Runaway & Thermal Stability.
8. Field Effect Transistors: The junction FETs, Pinch-off voltage, V-I characteristics of JFET, FET small signal model, MOSFETs, Low & High frequency CS & CD amplifiers, Biasing of FETs, FET as VVR.
9. Transistor at High Frequencies: The Hybrid-pi model of transistor, Hybrid-pi conductance & Capacitances, Validity of Hybrid-pi model, Variations of Hybrid-pi parameters, CE Short Circuit Current gain, current gain at resistive load, CE transistor amplifier response, Gain Bandwidth Product, Emitter Follower at high frequencies.

**REFERENCE BOOKS:**

1. Integrated Electronics by Jacob Mill man & Christos Halkias (Tata McGraw Hill)
2. Microelectronics Circuits by Sedra & Smith (Oxford)
3. Electronics Devices & Circuit Theory by Robert Boylested
4. Basic Electronics & Linear Circuits by N.N.Bhargava
5. Electronics Principles by A.P.Malvino
6. Principles of Electronics by V.K.Mehta