

ANALOG ELECTRONIC CIRCUITS

Course Code:22EC1104

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Prerequisites: Electronic Devices

Course Outcomes: At the end of the course the student will be able to

CO1: Apply biasing techniques to achieve thermal stabilization & Analyze the performance of a transistor using h-parameters.(L3)

CO2: Analyze multistage amplifiers and design for frequency response.(L4)

CO3: Illustrate the performance of various feedback amplifiers and oscillators.(L3)

CO4: Analyze various power amplifiers.(L4)

CO5: Demonstrate the function of Bistable, Monostable and Astable Multivibrator.(L3)

UNIT-I

12 Lectures

Transistor Biasing and Small Signal Amplifiers:

Transistor Biasing: Need for biasing, criteria for fixing the operating point, thermal stability, stabilization techniques.

Small Signal Amplifiers: h-parameter representation of a Transistor, Analysis of single stage transistor amplifier using h-parameters (exact and simplified), comparison of transistor configurations in terms of A_v , A_i , R_i , R_o .

Learning outcomes: At the end of this unit, the student will be able to

1. understand the need for biasing (L2)
2. illustrate different stabilization techniques (L3)
3. analyze the single stage amplifier using h-parameter model (L4)

UNIT-II

10 Lectures

Multi Stage Amplifiers:

High frequency transistor models, Miller's Theorem, Concept of Multi Stage Amplifiers: Methods of Inter Stage Coupling, n-Stage Cascaded Amplifiers, Cascode Configurations, Darlington pair, Frequency response of RC Coupled Amplifiers using BJT, Gain Bandwidth Product.

Learning outcomes: At the end of this unit, the student will be able to

1. describe operation of Multi-Stage Amplifiers (L2)
2. demonstrate cascade and Darlington pair amplifiers (L3)
3. analyze Frequency response of multistage amplifiers (L4)

UNIT-III

8 Lectures

Feedback Topologies and Oscillators:

Feedback topologies: Concept of feedback, classification of feedback amplifiers, general characteristics of negative feedback amplifiers, effect of negative feedback on input and output Resistances.

Oscillators: Concept of stability, Barkhausen criterion, RC oscillators (phase shift and Wienbridge), LC oscillators (Hartley and Colpitts), Crystal Oscillator

Learning outcomes: At the end of this unit, the student will be able to

1. understand different feedback topologies (L2)
2. determine the negative feedback amplifier characteristics (L3)
3. illustrate Voltage and Current amplifiers (L3)

UNIT-IV

8 Lectures

Power Amplifiers

Various classes of Power amplifiers: Class A, Class B, Class AB, Class C and Class D, power efficiency, Thermal Cooling, Single Tuned Capacitive Coupled Amplifier, Single Tuned Transformer Coupled or Inductively Coupled Amplifier.

Learning outcomes: At the end of this unit, the student will be able to

1. understand the Classes of power amplifiers (L2)
2. discuss various types of power amplifiers (L2)
3. summarize various power amplifiers (L2)

UNIT-V

12 Lectures

Multivibrators

Classification of Multivibrators, Bistable Multivibrators, commutating capacitors, Triggering binary-symmetrical & Unsymmetrical Triggering, Schmitt Trigger Circuit, Monostable Multivibrators, Astable Multivibrators.

Learning outcomes: At the end of this unit, the student will be able to

1. describe internal circuit operation of different Multivibrators (L2)
2. illustrate triggering circuits for multi-vibrators (L3)
3. describe hysteresis and Schmitt trigger circuits (L2)

Text Books:

1. J.Millman and C.C.Halkias, *Electronic Devices and Circuits*, 2nd Edition, Tata McGraw Hill, 2007.
2. J.Millman and H. Taub, *Pulse, Digital and Switching Waveforms*, 3rd Edition, McGraw-Hill, 2011.

References:

1. R.L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits*, 10th Edition, Prentice Hall, 2008.
2. T.F. Bogart Jr., J.S.Beasley and G.Rico, *Electronic Devices and Circuits*, 6th Edition, Pearson Education, 2004.
3. S.Salivahanan, N.Suresh Kumar, A.Vallavaraj. *Electronic Devices and Circuits*. 2nd Edition, TMH, 2007.
4. A.Anand Kumar, *Pulse and Digital Circuits*, 2nd Edition, PHI, 2005.
