NPTEL Video Course - Electronics and Communication Engineering - Adv. Digital Signal Processing - Multirate a

Subject Co-ordinator - Prof. V.M. Gadre

Co-ordinating Institute - IIT - Bombay

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - The Haar Wavelet
Lecture 3 - The Haar Multiresolution Analysis
Lecture 4 - Wavelets And Multirate Digital Signal Processing
Lecture 5 - Equivalence - Functions And Sequences
Lecture 6 - The Haar Filter Bank
Lecture 7 - Haar Filter Bank Analysis And Synthesis
Lecture 8 - Relating psi, phi and the Filters
Lecture 9 - Iterating the filter bank from Psi, Phi
Lecture 10 - Z-Domain Analysis Of Multirate Filter Bank
Lecture 11 - Two Channel Filter Bank
Lecture 12 - Perfect Reconstruction - Conjugate Quadrature
Lecture 13 - Conjugate Quadrature Filters - Daubechies Family of MRA
Lecture 14 - Daubechies' Filter Banks - Conjugate Quadrature Filters
Lecture 15 - Time And Frequency Joint Perspective
Lecture 16 - Ideal Time Frequency Behaviour
Lecture 17 - The Uncertainty Principle
Lecture 18 - Time Bandwidth Product Uncertainty
Lecture 19 - Evaluating and Bounding squareroot t.squareroot omega
Lecture 20 - The Time Frequency Plane & its Tilings
Lecture 21 - Short time Fourier Transform & Wavelet Transform in General
Lecture 22 - Reconstruction & Admissibility
Lecture 23 - Admissibility in Detail Discretization of Scale
Lecture 24 - Logarithmic Scale Discretization, Dyadic Discretization
Lecture 25 - The Theorem of (DYADIC) Multiresolution Analysis
Lecture 26 - Proof of the Theorem of (DYADIC) Multiresolution Analysis
Lecture 27 - Introducing Variants of The Multiresolution Analysis Concept
Lecture 28 - JPEG 2000 5/3 FilterBank & Spline MRA
Lecture 29 - Orthogonal Multiresolution Analysis with Splines

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Lecture 30 - Building Piecewise Linear Scaling Function, Wavelet
Lecture 31 - The Wave Packet Transform
Lecture 32 - Nobel Identities & The Haar Wave Packet Transform
Lecture 33 - The Lattice Structure for Orthogonal Filter Banks
Lecture 34 - Constructing the Lattice & its Variants
Lecture 35 - The Lifting Structure & Polyphase Matrices
Lecture 36 - The Polyphase Approach - The Modulation Approach
Lecture 37 - Modulation Analysis and The 3-Band Filter Bank, Applications
Lecture 38 - The Applications *Data Mining, *Face Recognition
Lecture 39 - Proof that a non-zero function can not be both time and band-limited
Lecture 40 - M-Band Filter Banks and Looking Ahead
Lecture 41 - Tutorial -Session 1
Lecture 42 - Student's Presentation
Lecture 43 - Tutorial on Uncertainty Product
Lecture 44 - Tutorial on Two band Filter Bank
Lecture 45 - Tutorial -Frequency Domain Analysis of Two band Filter Bank
Lecture 46 - Zoom in and Zoom out using Wavelet Transform
Lecture 47 - More Thoughts on Wavelets
Lecture 48 - Towards selecting Wavelets through vanishing moments
Lecture 49 - In Search of Scaling Coefficients
Lecture 50 - Wavelet Applications
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NPTEL Video Course - Electronics and Communication Engineering - Advanced Optical Communication

Subject Co-ordinator - Prof. R.K. Shevgaonkar

Co-ordinating Institute - IIT - Bombay

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Basics of Light
Lecture 3 - Ray Model - I
Lecture 4 - Ray Model - II
Lecture 5 - Wave Model - I
Lecture 6 - Wave Model - II
Lecture 7 - Wave Model - III
Lecture 8 - Signal Distortion - I
Lecture 9 - Signal Distortion - II
Lecture 10 - Signal Distortion - III
Lecture 11 - Practical issues in Implementation of Fiber link
Lecture 12 - Optical Sources
Lecture 13 - Light Emitting Diodes - I
Lecture 14 - Light Emitting Diodes - II
Lecture 15 - Laser - I
Lecture 16 - Laser - II
Lecture 17 - Laser - III
Lecture 18 - Laser - IV
Lecture 19 - Laser - V + Photon Detector
Lecture 20 - Photo Diodes and Detector Noise
Lecture 21 - Photo Detector
Lecture 22 - Optical Receivers - I
Lecture 23 - Optical Receivers - II
Lecture 24 - Receiver Sensitivity Degradation
Lecture 25 - Fiber Optic Link Design
Lecture 26 - Wavelength Division Multiplexed Systems
Lecture 27 - EDFA
Lecture 28 - Integrated Optics - I
Lecture 29 - Integrated Optics - II

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Lecture 30 - Tutorials - I
Lecture 31 - Tutorials - II
Lecture 32 - Introduction to Non-Linear Fiber Optics
Lecture 33 - Non-linear Schrodinger Equation
Lecture 34 - Group Velocity Dispersion (GVD)
Lecture 35 - Self Phase Modulation (SPM)
Lecture 36 - Solitonic Communication
Lecture 37 - Raman Amplifier
Lecture 38 - Cross Phase Modulation and four wave mixing
Lecture 39 - Laboratory Experiments - I
Lecture 40 - Laboratory Experiments - II
Lecture 41 - Laboratory Experiments - III
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NPTEL Video Course - Electronics and Communication Engineering - Advanced VLSI Design

Subject Co-ordinator - Prof. A.N. Chandorkar, Prof. D.K. Sharma, Prof. Sachin Patkar, Prof. Virendra Singh

Co-ordinating Institute - IIT - Bombay

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Historical Perspective and Future Trends in CMOS VLSI Circuit and System Design - Part I
Lecture 2 - Historical Perspective and Future Trends in CMOS VLSI Circuit and System Design - Part II
Lecture 3 - Logical Effort - A way of Designing Fast CMOS Circuits - Part I
Lecture 4 - Logical Effort - A way of Designing Fast CMOS Circuits - Part II
Lecture 5 - Logical Effort - A way of Designing Fast CMOS Circuits - Part III
Lecture 6 - Power Estimation and Control in CMOS VLSI circuits - Part I
Lecture 7 - Power Estimation and Control in CMOS VLSI circuits - Part II
Lecture 8 - Low Power Design Techniques - Part I
Lecture 9 - Low Power Design Techniques - Part II
Lecture 10 - Arithmetic Implementation Strategies for VLSI - Part I
Lecture 11 - Arithmetic Implementation Strategies for VLSI - Part II
Lecture 12 - Arithmetic Implementation Strategies for VLSI - Part III
Lecture 13 - Arithmetic Implementation Strategies for VLSI - Part IV
Lecture 14 - Interconnect aware design
Lecture 15 - Interconnect aware design
Lecture 16 - Interconnect aware design
Lecture 17 - Introduction to Hardware Description Languages
Lecture 18 - Managing concurrency and time in Hardware Description Languages
Lecture 19 - Introduction to VHDL
Lecture 20 - Basic Components in VHDL
Lecture 21 - Structural Description in VHDL
Lecture 22 - Behavioral Description in VHDL
Lecture 23 - Introduction to Verilog
Lecture 24 - FSM + datapath (GCD example)
Lecture 25 - FSM + datapath (Continued...)
Lecture 26 - Single Cycle MMIPS
Lecture 27 - Multicycle MMIPS
Lecture 28 - Multicycle MMIPS Â FSM
Lecture 29 - Brief Overview of Basic VLSI Design Automation Concepts

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Lecture 30 - Netlist and System Partitioning
Lecture 31 - Timing Analysis in the context of Physical Design Automation
Lecture 32 - Placement algorithm
Lecture 33 - Introduction to VLSI Testing
Lecture 34 - VLSI Test Basics - I
Lecture 35 - VLSI Test Basics - II
Lecture 36 - VLSI Testing
Lecture 37 - VLSI Testing
Lecture 38 - VLSI Testing
Lecture 39 - VLSI Design Verification
Lecture 40 - VLSI Design Verification
Lecture 41 - VLSI Design Verification
Lecture 42 - VLSI Design Verification
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NPTEL Video Course - Electronics and Communication Engineering - Broadband Networks: Concepts and Technology

Subject Co-ordinator - Prof. Abhay Karandikar

Co-ordinating Institute - IIT - Bombay

Lecture 1 - Introduction to Broadband Networks
Lecture 2 - Qos in Packet Switching and ATM
Lecture 3 - ATM Networks
Lecture 4 - Effective Bandwidth - I
Lecture 5 - Effective Bandwidth - II
Lecture 6 - Traffic Descriptor in ATM
Lecture 7 - Calculus for QOS - I
Lecture 8 - Calculus For Qos - II
Lecture 9 - Packet Scheduling Algorithm Introduction
Lecture 10 - Fluid Fair Queueing and Weighted Fair Queueing
Lecture 11 - Virtual Time In Scheduling
Lecture 12 - Fairness of WFO and SCFO Scheduling Algorithms
Lecture 13 - Rate Proportional Servers
Lecture 14 - Latency Rate Servers - I
Lecture 15 - Latency Rate Servers - II And Delay Bounds
Lecture 16 - QOS In Best Effort Internet
Lecture 17 - TCP Congestion Control
Lecture 18 - Analysis of TCP
Lecture 19 - TCP Throughput
Lecture 20 - Buffer Management
Lecture 21 - IP Addressing Scheme
Lecture 22 - IP Addressing Lookup And Packet Classification
Lecture 23 - IP Over ATM
Lecture 24 - Multiple Label Switching (MPLS)
Lecture 25 - MPLS and Traffic Engineering
Lecture 26 - Optical Network and MPLS
Lecture 27 - Integrated Service Internet (IntServ) and RSVP
Lecture 28 - Differentiated Services Internet
Lecture 29 - Voice over IP
Lecture 30 - RTP
Lecture 31 - Metro Ethernet Access Networks
Lecture 32 - Metro Ethernet Access Networks

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NPTEL Video Course - Electronics and Communication Engineering - Digital Communication

Subject Co-ordinator - Prof. Bikash Kumar Dey

Co-ordinating Institute - IIT - Bombay

Sub-Titles - Available / Unavailable │ MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Digital Communication
Lecture 2 - Sampling
Lecture 3 - Quantization, PCM and Delta Modulation
Lecture 4 - Probability and Random Processes (Part-1)
Lecture 5 - Probability and Random Processes (Part-2)
Lecture 6 - Channels and their Models (Part-1)
Lecture 7 - Channels and their Models (Part-2)
Lecture 8 - Information Theory (Part-1)
Lecture 9 - Information Theory (Part-2)
Lecture 10 - Bandpass Signal Representation (Part-1)
Lecture 11 - Bandpass Signal Representation (Part-2)
Lecture 12 - Digital Modulation Techniques (Part-1)
Lecture 13 - Digital Modulation Techniques (Part-2)
Lecture 14 - Digital Modulation Techniques (Part-3)
Lecture 15 - Digital Modulation Techniques (Part-4)
Lecture 16 - Digital Modulation Techniques (Part-5)
Lecture 17 - Digital Modulation Techniques (Part-6)
Lecture 18 - Digital Modulation Techniques (Part-7)
Lecture 19 - Digital Modulation Techniques (Part-8)
Lecture 20 - Digital Modulation Techniques (Part-9)
Lecture 21 - Digital Modulation Techniques (Part-10)
Lecture 22 - Probability of Error Calculation
Lecture 23 - Calculation of Probability of Error
Lecture 24 - Calculation of Probability of Error
Lecture 25 - Equalizers
Lecture 26 - Source Coding (Part-1)
Lecture 27 - Source Coding (Part-2)
Lecture 28 - Source Coding (Part-3)
Lecture 29 - Source Coding (Part-4)

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Lecture 30 - Channel Coding
Lecture 31 - Fundamentals of OFDM
Lecture 32 - Conclusion

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NPTEL Video Course - Electronics and Communication Engineering - Information Theory and Coding

Subject Co-ordinator - Prof. S.N. Merchant

Co-ordinating Institute - IIT - Bombay

Sub-Titles - Available / Unavailable │ MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Information Theory and Coding
Lecture 2 - Definition of Information Measure and Entropy
Lecture 3 - Extention of An Information Source and Markov Source
Lecture 4 - Adjoint of An Information Source, Joint and Conditional Information Measure
Lecture 5 - Properties of Joint and Conditional Information Measures and A Morkov Source
Lecture 6 - Asymptotic Properties of Entropy and Problem Solving in Entropy
Lecture 7 - Block Code and its Properties
Lecture 8 - Instantaneous Code and Its Properties
Lecture 9 - Kraft-Mcmillan Equality and Compact Codes
Lecture 10 - Shannon's First Theorem
Lecture 11 - Coding Strategies and Introduction to Huffman Coding
Lecture 12 - Huffman Coding and Proof of Its Optamality
Lecture 13 - Competitive Optamality of The Shannon Code
Lecture 14 - Non-Binary Huffman Code and Other Codes
Lecture 15 - Adaptive Huffman Coding - Part-I
Lecture 16 - Adaptive Huffman Coding - Part-II
Lecture 17 - Shannon-Fano-Elias Coding and Introduction to Arithmetic Coding
Lecture 18 - Arithmetic Coding - Part-I
Lecture 19 - Arithmetic Coding - Part-II
Lecture 20 - Introdution to Information Channels
Lecture 21 - Equivocation and Mutual Information
Lecture 22 - Properties of Different Information Channels
Lecture 23 - Reduction of Information Channels
Lecture 24 - Properties of Mutual Information and Introdution to Channel Capacity
Lecture 25 - Calculation of Channel Capacity for Different Information Channels
Lecture 26 - Shannon's Second Theorem
Lecture 27 - Discussion On Error Free Communication Over Noisy Channel
Lecture 28 - Error Free Communication Over A Binary Symmetric Channel and Introdution to Continous Sources ar
Lecture 29 - Differential Entropy and Evaluation of Mutual Information for Continuous Sources and Channels

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Lecture 30 - Channel Capacity of A BandLimited Continuous Channel
Lecture 31 - Introduction to Rate-Distortion Theory
Lecture 32 - Definition and Properties of Rate-Distortion Functions
Lecture 33 - Calculation of Rate-Distortion Functions
Lecture 34 - Computational Approach for Calculation of Rate-Distortion Functions
Lecture 35 - Introdution to Quantization
Lecture 36 - Lloyd-Max Quantizer
Lecture 37 - Companded Quantization
Lecture 38 - Variable Length Coding and Problem Solving in Quantizer Design
Lecture 39 - Vector Quantization
Lecture 40 - Transform Coding - Part-I
Lecture 41 - Transform Coding - Part-II
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NPTEL Video Course - Electronics and Communication Engineering - Transmission Lines and EM Waves

Subject Co-ordinator - Prof. R.K. Shevgaonkar

Co-ordinating Institute - IIT - Bombay

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to EM waves and various techniques of communication
Lecture 2 - Equations of Voltage and Current on TX line
Lecture 3 - Propagation constant, Characteristic impedance and reflection coefficient
Lecture 4 - Impedance Transformation
Lecture 5 - Loss-less and Low loss Transmission line and VSWR
Lecture 6 - Power transfer on TX line
Lecture 7 - Smith Chart
Lecture 8 - Admittance Smith Chart
Lecture 9 - Experimental setup for transmission line measurements
Lecture 10 - Applications of transmission lines
Lecture 11 - Applications of transmission lines-II
Lecture 12 - Impedance Matching
Lecture 13 - Lossy Transmission Line
Lecture 14 - Problems on Transmission line
Lecture 15 - Types of transmission line
Lecture 16 - Basics of Vectors
Lecture 17 - Vector calculus
Lecture 18 - Basic laws of Electromagnetics
Lecture 19 - Maxwell\\\'s Equations
Lecture 20 - Boundary conditions at Media Interface
Lecture 21 - Uniform plane wave
Lecture 22 - Propagation of wave
Lecture 23 - Wave polarization
Lecture 24 - Pioncere\\\'s Sphere
Lecture 25 - Wave propagation in conducting medium
Lecture 26 - Wave propagation and phase velocity
Lecture 27 - Power flow and Poynting vector
Lecture 28 - Surface current and power loss in a conductor
Lecture 29 - Plane wave in arbitary direction

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Lecture 30 - Plane wave at dielectric interface
Lecture 31 - Reflection and refraction at media interface
Lecture 32 - Total internal reflection
Lecture 33 - Polarization at media interface
Lecture 34 - Reflection from a conducting boundary
Lecture 35 - Parallel plane waveguide
Lecture 36 - Wave propagation in parallel plane waveguide
Lecture 37 - Analysis of waveguide general approach
Lecture 38 - Rectangular waveguide
Lecture 39 - Modal propagation in rectangular waveguide
Lecture 40 - Surface currents on the waveguide walls
Lecture 41 - Field visualization and Attenuation in waveguide
Lecture 42 - Attenuation in waveguide continued
Lecture 43 - Radiation (Antenna)
Lecture 44 - Solution for potential function
Lecture 45 - Radiation form the Hertz dipole
Lecture 46 - Power radiated by hertz dipole
Lecture 47 - Thin linear antenna
Lecture 48 - Radiation Parameters of antenna
Lecture 49 - Receiving antenna
Lecture 50 - Monopole and Dipole antenna
Lecture 51 - Fourier transform relation between current and radiation pattern
Lecture 52 - Antenna arrays
Lecture 53 - Uniform Linear array
Lecture 54 - Uniform Linear array continued
Lecture 55 - Synthesis of array
Lecture 56 - Binomial array and general array synthesis
Lecture 57 - Problems on uniform plane wave
Lecture 58 - Problems on uniform plane wave in a meduim
Lecture 59 - Problems on waveguides
Lecture 60 - Problems on Antennas and radiation
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NPTEL Video Course - Electronics and Communication Engineering - CMOS Analog VLSI Design

Subject Co-ordinator - Prof. A.N. Chandorkar

Co-ordinating Institute - IIT - Bombay

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to CMOS Analog VLSI Design
Lecture 2 - Introduction to CMOS Analog VLSI Design (Continued...)
Lecture 3 - MOS Fundamentals
Lecture 4 - MOS Fundamentals (Continued...)
Lecture 5 - Basic of MOS Amplifier (Part-1)
Lecture 6 - Basic of MOS Amplifier (Part-2)
Lecture 7 - Basic of MOS Amplifier (Part-3)
Lecture 8 - Cascode Amplifier
Lecture 9 - Types of MOSFET Amplifier
Lecture 10 - Types of MOSFET Amplifier
Lecture 11 - Differential Amplifier
Lecture 12 - Differential Amplifier
Lecture 13 - Current Sources
Lecture 14 - Current Sources
Lecture 15 - Current Sources
Lecture 16 - Frequency Response of Amplifier
Lecture 17 - Basic of CMOS OPAMP
Lecture 18 - OPAMP Design Issues
Lecture 19 - OPAMP Design
Lecture 20 - OPMAP Design
Lecture 21 - Operational Transconductance Amplifier
Lecture 22 - OTA Operation Transconductance Amplifier and Application
Lecture 23 - Fully Differential Amplifier and Noise
Lecture 24 - Noise
Lecture 25 - Noise (Continued...)
Lecture 26 - Layout of Analog Circuit
Lecture 27 - Oscillators
Lecture 28 - Oscillators (Continued...)
Lecture 29 - Oscillators (Continued...)

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NPTEL Video Course - Electronics and Communication Engineering - Analog Circuits

Subject Co-ordinator - Prof. A.N. Chandorkar

Co-ordinating Institute - IIT - Bombay

Sub-Titles - Available / Unavailable │ MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Analog Circuits - An Overview
Lecture 2 - Two Parts of Review of Analog Filter Approximation
Lecture 3 - BJT Small Signal Model
Lecture 4 - BJT Small Signal Model [Continuation from Lecture 3]
Lecture 5 - MOS Circuit Model
Lecture 6 - Biasing of Circuits
Lecture 7 - Amplifiers
Lecture 8 - MOS Amplifiers
Lecture 9 - Cascode Amplifier
Lecture 10 - Frequency Response of Amplifier
Lecture 11 - Frequency Response of Amplifier
Lecture 12 - Frequency Response of Amplifier
Lecture 13 - Frequency Response of Amplifier
Lecture 14 - Differential Amplifier
Lecture 15 - Differential Amplifier
Lecture 16 - Differential Amplifier
Lecture 17 - Feedback Theory
Lecture 18 - Feedback Theory
Lecture 19 - OPAMP Circuits
Lecture 20 - OPAMP Circuits
Lecture 21 - Active RC Filters
Lecture 22 - Active Filters
Lecture 23 - Oscillators
Lecture 24 - Oscillators
Lecture 25 - DAC/ADC

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NPTEL Video Course - Electronics and Communication Engineering - NOC:Microwave Integrated Circuits

Subject Co-ordinator - Prof. Jayanta Mukherjee

Co-ordinating Institute - IIT - Bombay

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Reflection Coefficient, VSWR, Smith Chart
Lecture 3 - Reflection Coefficient, VSWR
Lecture 4 - Smith Chart
Lecture 5 - Application of the Smith Chart
Lecture 6 - Microwave Components
Lecture 7 - Broadband Impedance Matching
Lecture 8 - Multi-section transformer
Lecture 9 - Maximally flat (binomial) transformer, Chebyshev transformer
Lecture 10 - Non-uniform transmission line (Tapers)
Lecture 11 - Scattering Parameters
Lecture 12 - Properties of Scattering Parameters
Lecture 13 - Properties of Scattering Parameters (Continued...)
Lecture 14 - Signal flow graph, ABCD parameters
Lecture 15 - 1 and 2 Port passive Components
Lecture 16 - 3 Port Microwave Components
Lecture 17 - Couplers
Lecture 18 - Coupled Line Couplers
Lecture 19 - Resonators and narrow band filters
Lecture 20 - Narrow-band filters
Lecture 21 - Filter design
Lecture 22 - Filter synthesis, KurodaÂ s Identity
Lecture 23 - Impedance Matching Circuits for Amplifiers
Lecture 24 - Microstrip Matching (Continued...), Masons Rule, Power Gain Equations
Lecture 25 - Amplifier Gain Stability
Lecture 26 - Amplifier Gain Stability (Continued...)
Lecture 27 - Gain Circles
Lecture 28 - Gain Circles (Continued...)
Lecture 29 - Noise

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Lecture 30 - Noise Figure Circles (Continued...)
Lecture 31 - DC Bias
Lecture 32 - Amplifier Classes, Frequency Compensation
Lecture 33 - Linearity
Lecture 34 - Oscillator Design

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NPTEL Video Course - Electronics and Communication Engineering - NOC:Foundations of Wavelets and Multirate Di

Subject Co-ordinator - Prof. V.M. Gadre

Co-ordinating Institute - IIT - Bombay

Sub-Titles - Available / Unavailable │ MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Origin of wavelets
Lecture 3 - Haar wavelet
Lecture 4 - Dyadic wavelet
Lecture 5 - Dilates and translates of Haar wavelet
Lecture 6 - L2 norm of a function
Lecture 7 - Piecewise constant representation of a function
Lecture 8 - Ladder of subspaces
Lecture 9 - Scaling function of Haar wavelet
Lecture 10 - Demonstration
Lecture 11 - Vector representation of sequences
Lecture 12 - Properties of norm
Lecture 13 - Parsevals theorem
Lecture 14 - Equivalence of functions and sequences
Lecture 15 - Angle between Functions and their Decomposition
Lecture 16 - Additional Information on Direct-Sum
Lecture 17 - Introduction to filter banks
Lecture 18 - Haar Analysis filter bank in Z-domain
Lecture 19 - Haar Synthesis filter bank in Z-domain
Lecture 20 - Moving from Z-domain to frequency domain
Lecture 21 - Frequency Response of Haar Analysis Low pass Filter bank
Lecture 22 - Frequency Response of Haar Analysis High pass Filter bank
Lecture 23 - Ideal Two-band Filter bank
Lecture 24 - Disqualification of Ideal Filter bank
Lecture 25 - Realizable Two-band Filter bank
Lecture 26 - Demonstration
Lecture 27 - Relating Fourier transform of scaling function to filter bank
Lecture 28 - Fourier transform of scaling function
Lecture 29 - Construction of scaling and wavelet functions from filter bank

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Lecture 30 - Demonstration
Lecture 31 - Conclusive Remarks and Future Prospects

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NPTEL Video Course - Electronics and Communication Engineering - RF Integrated Circuits

Subject Co-ordinator - Dr. Shouribrata Chatterjee

Co-ordinating Institute - IIT - Delhi

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - RF system basic architectures
Lecture 2 - Transmission media reflection
Lecture 3 - Maximum power transfer
Lecture 4 - Parallel RLC tank
Lecture 5 - Matching
Lecture 6 - Other matching networks
Lecture 7 - Resistors capacitors
Lecture 8 - Inductors
Lecture 9 - Inductors and wires
Lecture 10 - Wires
Lecture 11 - Transmission lines
Lecture 12 - Device review
Lecture 13 - MOS capacitances
Lecture 14 - Bandwidth estimation constants
Lecture 15 - Bandwidth estimation constants (Continued.)
Lecture 16 - Bandwidth estimation using short circuit
Lecture 17 - Bandwidth groupdelay and peaking
Lecture 18 - Shunt series amplifier
Lecture 19 - Shunt series amplifier (Continued.)
Lecture 20 - Various noise sources
Lecture 21 - Noise in a mosfet
Lecture 22 - Motivation first cut design
Lecture 23 - Motivation first cut design (Continued.)
Lecture 24 - Noise other possible topologies
Lecture 25 - Multiplier Fundamentals
Lecture 26 - Mixer non idealties
Lecture 27 - Mixer non idealties (Continued.)
Lecture 28 - A tank based oscillators
Lecture 29 - Phase noise in oscillators

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Lecture 30 - Other oscillators topologies
Lecture 31 - Phase locked loop basics
Lecture 32 - Charge pump
Lecture 33 - Pll dynamics integer
Lecture 34 - Spurious frequencies fractional and synthesis
Lecture 35 - Fractional spurs
Lecture 36 - Delta and sigma modulation
Lecture 37 - Class abc power amplifiers
Lecture 38 - Class bcd power amplifiers
Lecture 39 - Class cd pwm amplifiers
Lecture 40 - Course summary and conclusion
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NPTEL Video Course - Electronics and Communication Engineering - Communication Engineering

Subject Co-ordinator - Prof. Surendra Prasad

Co-ordinating Institute - IIT - Delhi

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Communication Engineering
Lecture 2 - Communication channel
Lecture 3 - Brief Review of Signal and Systems
Lecture 4 - The Hilbert Transform
Lecture 5 - Analytic Representation of band pass Signals
Lecture 6 - Fundamentals of Analog Signal Transmission
Lecture 7 - Analog Modulation of Carriers
Lecture 8 - Amplitude Modulation
Lecture 9 - Amplitude Modulation
Lecture 10 - Single Sideband Modulation
Lecture 11 - Suppressed Sideband Modulation
Lecture 12 - VSB Modulation - Superhet Receiver
Lecture 13 - Superhet Receiver etc
Lecture 14 - Practical Mixers-Effects of Tonal
Lecture 15 - Angle Modulation
Lecture 16 - Angle Modulation
Lecture 17 - Generation of FM Signals
Lecture 18 - FM Generation and Detection
Lecture 19 - Demodulation of Angle Modulated Signals
Lecture 20 - Demodulation of Angle Modulated Signals
Lecture 21 - Demodulation of Angle Modulated Signals
Lecture 22 - Feedback Demodulators - phase locked loop
Lecture 23 - The Phase Locked Loop
Lecture 24 - Frequency Compressive Feedback Demodulator
Lecture 25 - FM Receivers
Lecture 26 - TV Transmission
Lecture 27 - Review of Probability Theory and Random Process
Lecture 28 - Review of Probability Theory and Random Variables
Lecture 29 - Random Processes

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Lecture 30 - Random Processes
Lecture 31 - Random Processes
Lecture 32 - Gaussian Random Processes
Lecture 33 - Behaviour of Communication System
Lecture 34 - Performance of AM Systems in Noise
Lecture 35 - Noise in AM and Angle Modulation Systems
Lecture 36 - Noise in Phase and Frequency Modulation systems
Lecture 37 - Noise in Angle Modulation
Lecture 38 - Pre emphasis - De emphasis
Lecture 39 - Pulse Modulation Schemes - PWM and PPM
Lecture 40 - Data Modulation
Lecture 41 - Pulse Code Modulation
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NPTEL Video Course - Electronics and Communication Engineering - Digital Signal Processing

Subject Co-ordinator - Prof. S.C. Dutta Roy

Co-ordinating Institute - IIT - Delhi

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Digital Signal Processing Introduction
Lecture 2 - Digital Signal Processing Introduction (Continued.)
Lecture 3 - Digital Systems
Lecture 4 - Characterization Description, Testing of Digital Systems
Lecture 5 - LTI Systems Step & Impulse Responses, Convolution
Lecture 6 - Inverse Systems, Stability, FIR & IIR
Lecture 7 - FIR & IIR; Recursive & Non Recursive
Lecture 8 - Discrete Time Fourier Transform
Lecture 9 - Discrete Fourier Transform (DFT)
Lecture 10 - DFT (Continued.)
Lecture 11 - DFT (Continued.) Introduction to Z Transform
Lecture 12 - Z Transform
Lecture 13 - Z Transform (Continued.)
Lecture 14 - Discrete Time Systems in the Frequency Domain
Lecture 15 - Simple Digital Filters
Lecture 16 - All Pass Filters, Com.Filters
Lecture 17 - Linear Phase filters, Complementary Transfer Fn
Lecture 18 - Compensatory Transfer Functions, (Continued.)
Lecture 19 - Test for Stability using All Pass Functions
Lecture 20 - Digital Processing of Continuous Time Signals
Lecture 21 - Problem Solving Session
Lecture 22 - Problem Solving Session
Lecture 23 - Analog Filter Design
Lecture 24 - Analog Chebyshev LPF Design
Lecture 25 - Analog Filter Design (Continued.)
Lecture 26 - Analog frequency Transformation
Lecture 27 - Problem Solving Session on Discrete Time System
Lecture 28 - Digital Filter Structures
Lecture 29 - IIR Realizations

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Lecture 30 - All Pass Realizations
Lecture 31 - Lattice Synthesis (Continued.)
Lecture 32 - FIR Lattice Synthesis
Lecture 33 - FIR Lattice (Continued.) and Digital Filter Design
Lecture 34 - IIR Filter Design
Lecture 35 - IIR Design by Bilinear Transformation
Lecture 36 - IIR Design Examples
Lecture 37 - Digital to Digital Frequency Transformation
Lecture 38 - FIR Design
Lecture 39 - FIR Digital Filter Design by Windowing
Lecture 40 - FIR Design by Windowing & Frequency Sampling
Lecture 41 - Solving Problems on DSP Structures
Lecture 42 - FIR Design by Frequency Sampling
Lecture 43 - FIR Design by Frequency Sampling (Continued.)
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NPTEL Video Course - Electronics and Communication Engineering - Wireless Communication

Subject Co-ordinator - Prof. Ranjan Bose

Co-ordinating Institute - IIT - Delhi

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Motivation and Introduction
Lecture 2 - Types of Wireless communication
Lecture 3 - The modern wireless Communication Systems
Lecture 4 - The cellular concept - System Design issues
Lecture 5 - Cell capacity and reuse
Lecture 6 - Interference and System capacity
Lecture 7 - Improving coverage and system capacity
Lecture 8 - Mobile Radio Propagation
Lecture 9 - Mobile Radio Propagation (Continued.)
Lecture 10 - Mobile Radio Propagation (Continued.)
Lecture 11 - Mobile Radio Propagation (Continued.)
Lecture 12 - Mobile Radio Propagation (Continued.)
Lecture 13 - Mobile Radio Propagation (Continued.)
Lecture 14 - Mobile Radio Propagation II
Lecture 15 - Mobile Radio Propagation II (Continued.)
Lecture 16 - Mobile Radio Propagation II (Continued.)
Lecture 17 - Mobile Radio Propagation II (Continued.)
Lecture 18 - Mobile Radio Propagation II (Continued.)
Lecture 19 - Mobile Radio Propagation II (Continued.)
Lecture 20 - Mobile Radio Propagation II (Continued.)
Lecture 21 - Modulation Techniques for Mobile Communication
Lecture 22 - Modulation Techniques (Continued.)
Lecture 23 - Modulation Techniques (Continued.)
Lecture 24 - Modulation Techniques (Continued.)
Lecture 25 - Modulation Techniques (Continued.)
Lecture 26 - Modulation Techniques (Continued.)
Lecture 27 - Modulation Techniques (Continued.)
Lecture 28 - Equalization and Diversity Techniques
Lecture 29 - Equalization and Diversity Techniques (Continued.)

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Lecture 30 - Equalization and Diversity Techniques (Continued.)
Lecture 31 - Equalization and Diversity Techniques (Continued.)
Lecture 32 - Coding Techniques for Mobile Communications
Lecture 33 - Coding Techniques for Mobile Communications (Continued.)
Lecture 34 - Coding Techniques for Mobile Communications (Continued.)
Lecture 35 - Coding Techniques for Mobile Communications (Continued.)
Lecture 36 - Wireless Networks
Lecture 37 - GSM and CDMA
Lecture 38 - GSM and CDMA (Continued.)

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NPTEL Video Course - Electronics and Communication Engineering - Basic Electronics

Subject Co-ordinator - Prof. Chitralekha Mahanta

Co-ordinating Institute - IIT - Guwahati

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Semiconductor materials
Lecture 2 - PN Junction Diodes
Lecture 3 - Diode Equivalent Circuits
Lecture 4 - Diode Rectifier Circuits
Lecture 5 - Zener Diode and Applications
Lecture 6 - Clipping and Clamping Circuits
Lecture 7 - Transistor Operation - Part-1
Lecture 8 - Transistor Operation - Part-2
Lecture 9 - Biasing the BJT - Part-1
Lecture 10 - Biasing the BJT - Part-2
Lecture 11 - BJT Small Signal Analysis
Lecture 12 - BJT Amplifier - Part-1
Lecture 13 - BJT Amplifier - Part-2
Lecture 14 - Frequency Response of BJT Analysis - Part-1
Lecture 15 - Bipolar Junction Transistors
Lecture 16 - Transistor as a Switch
Lecture 17 - MOSFET - Part-1
Lecture 18 - MOSFET - Part-2
Lecture 19 - MOSFET under dc operation
Lecture 20 - Mosfet as an Amplifier
Lecture 21 - Small signal model of MOSFET - Part-1
Lecture 22 - Small signal model of MOSFET - Part-2
Lecture 23 - High Frequency model of mosfet
Lecture 24 - Junction Field Effect Transistor
Lecture 25 - Operational Amplifier Introduction
Lecture 26 - Ideal Op-Amp
Lecture 27 - Op-Amp applications Part-1
Lecture 28 - Op-Amp Applications Part-2
Lecture 29 - Op-Amp Applications Part-3

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Lecture 30 - The practical Op-Amp
Lecture 31 - Positive feedback and oscillation
Lecture 32 - Comparator
Lecture 33 - Large Signal Amplifiers
Lecture 34 - Transformer Couple Power Amplifier
Lecture 35 - Class AB Operations of Power Amplifier
Lecture 36 - Power BJTs
Lecture 37 - Regulated Power Supply
Lecture 38 - Four Layered Diode
Lecture 39 - Silicon Control Rectifier
Lecture 40 - SCR Applications
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NPTEL Video Course - Electronics and Communication Engineering - NOC:VLSI Design Verification and Test

Subject Co-ordinator - Dr. Santosh Biswas, Jatindra Kumar Deka, Prof.Arnab sarkar

Co-ordinating Institute - IIT - Guwahati

Sub-Titles - Available / Unavailable │ MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction - Part 1
Lecture 2 - Introduction - Part 2
Lecture 3 - Overview of VLSI Design Flow
Lecture 4 - High Level Synthesis Overview - Part 1
Lecture 5 - High Level Synthesis Overview - Part 2
Lecture 6 - Scheduling in HLS - Part 1
Lecture 7 - Scheduling in HLS - Part 2
Lecture 8 - Scheduling in HLS - Part 3
Lecture 9 - Scheduling in HLS - Part 4
Lecture 10 - Scheduling in HLS - Part 5
Lecture 11 - Scheduling in HLS - Part 6
Lecture 12 - Scheduling in HLS - Part 7
Lecture 13 - Resource Sharing and Binding in HLS - Part 1
Lecture 14 - Resource Sharing and Binding in HLS - Part 2
Lecture 15 - Resource Sharing and Binding in HLS - Part 3
Lecture 16 - Resource Sharing and Binding in HLS - Part 4
Lecture 17 - Resource Sharing and Binding in HLS - Part 5
Lecture 18 - Resource Sharing and Binding in HLS - Part 6
Lecture 19 - Resource Sharing and Binding in HLS - Part 7
Lecture 20 - Logic Synthesis - Part 1
Lecture 21 - Logic Synthesis - Part 2
Lecture 22 - Logic Synthesis - Part 3
Lecture 23 - Physical Design - Part 1
Lecture 24 - Physical Design - Part 2
Lecture 25 - Physical Design - Part 3
Lecture 26 - Introduction to formal methods for design verification
Lecture 27 - Temporal Logic
Lecture 28 - Syntax and Semantics of CLT
Lecture 29 - Syntax and semantics of CTL (Continued...)

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Lecture 30 - Equivalences between CTL Formulas
Lecture 31 - Introduction to Model Checking
Lecture 32 - Model checking Algorithms
Lecture 33 - Model checking Algorithms (Continued...)
Lecture 34 - Model Checking with Fairness
Lecture 35 - Binary Decision Diagram
Lecture 36 - Ordered Binary Decision Diagram (OBDD)
Lecture 37 - Operation On OBDD
Lecture 38 - OBDD for State Transition Systems E
Lecture 39 - Symbolic Model Checking
Lecture 40 - Introduction to Digital VLSI Testing
Lecture 41 - Functional and Structural Testing
Lecture 42 - Fault Equivalence
Lecture 43 - Fault Simulation - I
Lecture 44 - Fault Simulation - II
Lecture 45 - Fault Simulation - III
Lecture 46 - Testability Measures (SCOAP)
Lecture 47 - Introduction to Automatic Test Pattern Generation (ATPG) and ATPG Algebras
Lecture 48 - D-Algorithm - I
Lecture 49 - D-Algorithm - II
Lecture 50 - ATPG for Synchronous Sequential Circuits
Lecture 51 - Scan Chain based Sequential Circuit Testing - I
Lecture 52 - Scan Chain based Sequential Circuit Testing - II
Lecture 53 - BIST - I
Lecture 54 - BIST - II
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NPTEL Video Course - Electronics and Communication Engineering - NOC:Design of Power Electronic Converters

Subject Co-ordinator - Prof. Shabari Nath

Co-ordinating Institute - IIT - Guwahati

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Analysis of Buck Converter
Lecture 3 - Choosing L and C
Lecture 4 - Design Example of Buck Converter
Lecture 5 - Analysis of H Bridge
Lecture 6 - Bipolar PWM
Lecture 7 - Unipolar PWM
Lecture 8 - Bipolar vs Unipolar PWM
Lecture 9 - Different types of power diode
Lecture 10 - Diode characteristics
Lecture 11 - Diode Datasheets
Lecture 12 - Diode Datasheet Examples
Lecture 13 - MOSFET
Lecture 14 - Switching characteristics of MOSFET
Lecture 15 - MOSFET Datasheets - I
Lecture 16 - MOSFET Datasheets - II
Lecture 17 - MOSFET Datasheet example
Lecture 18 - IGBT
Lecture 19 - IGBT Datasheets - I
Lecture 20 - IGBT Datasheets - II
Lecture 21 - IGBT Datasheet Example
Lecture 22 - Introduction to Gate Drivers
Lecture 23 - Gate Driver Requirements
Lecture 24 - Optocouplers based Gate Drivers - I
Lecture 25 - Optocouplers based Gate Drivers - II
Lecture 26 - Desat Protection
Lecture 27 - Bootstrapping
Lecture 28 - Pulse Transformer based Gate Drivers
Lecture 29 - Gate Drivers - Few Other Requirements

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Lecture 30 - Introduction to Snubbers
Lecture 31 - RC Snubber Analysis - I
Lecture 32 - RC Snubber Analysis - II : Underdamped Case
Lecture 33 - RC Snubber Analysis - III : Overdamped and Critically Damped Case
Lecture 34 - RC Snubber Design - I
Lecture 35 - RC Snubber Design - II
Lecture 36 - RCD Snubbers - I
Lecture 37 - RCD Snubbers - II
Lecture 38 - Power Loss - I
Lecture 39 - Power Loss - II
Lecture 40 - Thermal Modelling - I
Lecture 41 - Thermal Modelling - II
Lecture 42 - Thermal Modelling - III
Lecture 43 - Choosing Heat Sinks
Lecture 44 - Fundamentals
Lecture 45 - Magnetic Losses
Lecture 46 - Conductors
Lecture 47 - Magnetic Materials
Lecture 48 - Magnetic Core
Lecture 49 - Inductor Design - I
Lecture 50 - Inductor Design - II
Lecture 51 - Transformer Design
Lecture 52 - Inductor Design Example
Lecture 53 - Example of Transformer Design
Lecture 54 - Introduction to EMI
Lecture 55 - EMI Measurements
Lecture 56 - EMI in Power Electronics
Lecture 57 - CM and DM noise
Lecture 58 - Design Solutions of EMI
Lecture 59 - EMI Filter - I
Lecture 60 - EMI Filter - II
Lecture 61 - Sections of Power Converters
Lecture 62 - Capacitors
Lecture 63 - Familiarity with Components - I
Lecture 64 - Familiarity with Components - II
Lecture 65 - PCB - I
Lecture 66 - PCB - II
Lecture 67 - PCB - III
Lecture 68 - Grounds
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Lecture 69 - Lab Demo of Hardware Design
Lecture 70 - Tutorial: PCB Designing

NPTEL Video Course - Electronics and Communication Engineering - NOC:Operation and Planning of Power Distribu

Subject Co-ordinator - Prof. Sanjib Ganguly

Co-ordinating Institute - IIT - Guwahati

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Power systems: Overview and historical developments
Lecture 2 - Introduction to power delivery systems
Lecture 3 - Introduction to electrical loads
Lecture 4 - Load diversity
Lecture 5 - Different load indices
Lecture 6 - Loss factor
Lecture 7 - Load management
Lecture 8 - Brief overview of power distribution substation
Lecture 9 - Substation bus schemes and primary distribution network topology
Lecture 10 - Voltage drop and power loss computations for typical radial distribution feeders
Lecture 11 - Genaralized expression for voltage drop for radial distribution feeder
Lecture 12 - Derivation of K-constant for voltage drop computation
Lecture 13 - Different reliability indices used in distribution networks
Lecture 14 - Different reliability indices with numerical examples
Lecture 15 - Mathematical concept of reliability
Lecture 16 - Reliability evaluation of multiple units connected to series and/or parallel
Lecture 17 - Numerical problems on reliability evaluation
Lecture 18 - Power quality problems in distribution systems
Lecture 19 - Forward backward load flow approach for power distribution systems
Lecture 20 - Forward backward load flow approach for power distribution systems
Lecture 21 - Reactive power compensation: Basic idea
Lecture 22 - Reactive power compensation: Numerical examples
Lecture 23 - Capacitor placement at distribution feeder: Analytical approach
Lecture 24 - Power distribution system planning: Economic aspects
Lecture 25 - Power distribution system planning: Different models and solution strategies
Lecture 26 - Mono-objective power distribution system planning approach
Lecture 27 - Multi-objective power distribution system planning approach
Lecture 28 - Multi-objective planning incorporating sectionalizing switches and tie-lines
Lecture 29 - Reconfiguration of power distribution networks

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Lecture 30 - Distribution networks with the integration of Distributed Generation
Lecture 31 - Concept of microgrids
Lecture 32 - Wind and solar energy conversion systems
Lecture 33 - Energy storage systems
Lecture 34 - Distribution system automation and smart grid - Part I
Lecture 35 - Distribution system automation and smart grid - Part II

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NPTEL Video Course - Electronics and Communication Engineering - NOC:Nanophotonics, Plasmonics, and Metamater

Subject Co-ordinator - Dr. Debabrata Sikdar, Dr. Debabrata Sikdar

Co-ordinating Institute - IIT - Guwahati

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Nanophotonics and Plasmonics
Lecture 2 - Introduction to Metamaterials and Metasurfaces
Lecture 3 - Overview and current status
Lecture 4 - Electromagnetic theory of light
Lecture 5 - Electromagnetic properties of material
Lecture 6 - Electromagnetic waves in dielectric media
Lecture 7 - Polarization of light
Lecture 8 - Reflection and refraction: Fresnel equations
Lecture 9 - Absorption, dispersion and scattering of light
Lecture 10 - Matrix theory of dielectric layered media
Lecture 11 - 1D Photonic crystals
Lecture 12 - Dispersion relation and photonic band structure
Lecture 13 - Real and reciprocal lattices
Lecture 14 - 2D and 3D Photonic crystals
Lecture 15 - Emerging Applications of Photonic Crystals
Lecture 16 - Optical properties of metals
Lecture 17 - Surface Plasmon Polaritons (SPP): Fundamentals
Lecture 18 - Applications of SPPs
Lecture 19 - Localized surface plasmon resonance (LSPR)
Lecture 20 - Plasmonic nanoparticles: Antenna and Waveguides
Lecture 21 - Applications of LSPR
Lecture 22 - Fundamentals of metamaterials
Lecture 23 - Effective medium theories
Lecture 24 - Single and Double-Negative Metamaterials
Lecture 25 - Metamaterial Perfect absorbers
Lecture 26 - Super lens, Hyperbolic Metamaterials and Hyper lens
Lecture 27 - Tunable photonic metamaterial based devices
Lecture 28 - Metasurfaces and Frequency selective surfaces
Lecture 29 - Guided mode resonances (GMR)

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Lecture 30 - Applications of metasurfaces and GMR devices
Lecture 31 - Transformation Optics (TO) and Invisibility Cloaks
Lecture 32 - Carpet cloaking and TO metamaterials
Lecture 33 - Introduction to alternative materials
Lecture 34 - Nanofabrication: Physical and Chemical methods
Lecture 35 - Lithography and Pattern transfer
Lecture 36 - Nanophotonic characterization methods

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NPTEL Video Course - Electronics and Communication Engineering - NOC:Power Electronics Applications in Power

Subject Co-ordinator - Prof. Sanjib Ganguly

Co-ordinating Institute - IIT - Guwahati

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Basic Concepts of active and reactive power
Lecture 2 - Basic Concepts of reactive power compensation
Lecture 3 - Basic mathematical modelling of power transmission systems
Lecture 4 - Derivation of the relation of sending and receiving end voltages and currents - Part A
Lecture 5 - Derivation of the relation of sending and receiving end voltages and currents - Part B
Lecture 6 - Derivations of power flow expressions
Lecture 7 - Numerical example showing determination of power flow
Lecture 8 - Generalized expression for active and reactive power at any point of a long line
Lecture 9 - Mid-point voltage and current for long, lossless transmission lines
Lecture 10 - Plot of mid-point voltage vs line loading
Lecture 11 - Numerical example of mid-point compensation - Part A
Lecture 12 - Numerical example of mid-point compensation - Part B
Lecture 13 - Effect of Mid-point compensation on power flow of transmission lines
Lecture 14 - Thyristor controlled reactor (TCR)
Lecture 15 - Harmonics in TCR and Three-phase TCR configuration
Lecture 16 - Operating Characteristics of TCR
Lecture 17 - Categorization of different types of SVC and Fixed capacitor TCR (FC-TCR)
Lecture 18 - Mechanically Switched Capacitor TCR (MSC-TCR) and Thyrisor Switch Capacitor (TSC)
Lecture 19 - Thyristor Switch Capacitor (TSC)
Lecture 20 - Design of TSC-TCR: Numerical Example
Lecture 21 - SVC in enhancement of steady-state power transmission capacity
Lecture 22 - SVC in enhancement of transient stability of power systems
Lecture 23 - SVC in enhancement of synchronizing power coefficient
Lecture 24 - SVC in and power system oscillation damping
Lecture 25 - SVC in voltage control of power systems: Modelling
Lecture 26 - SVC in voltage control of power systems: Control characteristics
Lecture 27 - SVC in voltage control of power systems: Numerical example
Lecture 28 - Basic operating principle of TCSC
Lecture 29 - Basic mathematical modelling of TCSC - Part 1

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Lecture 30 - Basic mathematical modelling of TCSC - Part 2
Lecture 31 - TCSC reactance and hamomics analysis
Lecture 32 - Applications of TCSC in power systems
Lecture 33 - Basic mathematical modelling of STATCOM
Lecture 34 - Applications of STATCOM in power systems
Lecture 35 - Basic mathematical modelling of SSSC
Lecture 36 - Applications of SSSC in power systems
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NPTEL Video Course - Electronics and Communication Engineering - Signals and Systems

Subject Co-ordinator - Prof. K.S. Venkatesh

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1
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Lecture 3
Lecture 4
Lecture 5
Lecture 6
Lecture 7
Lecture 8
Lecture 9
Lecture 10
Lecture 11
Lecture 12
Lecture 13
Lecture 14
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Lecture 30
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Lecture 41
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Lecture 43
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Lecture 45
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NPTEL Video Course - Electronics and Communication Engineering - Advanced 3G and 4G Wireless Mobile Communica

Subject Co-ordinator - Prof. Aditya K. Jagannatham

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to 3G/4G Standards
Lecture 2 - Wireless Channel and Fading
Lecture 3 - Rayleigh Fading and BER of Wired Communication
Lecture 4 - BER for Wireless Communication
Lecture 5 - Introduction to Diversity
Lecture 6 - Multi-antenna Maximal Ratio Combiner
Lecture 7 - BER with Diversity
Lecture 8 - Spatial Diversity and Diversity Order
Lecture 9 - Wireless Channel and Delay Spread
Lecture 10 - Coherence Bandwidth of the Wireless Channel
Lecture 11 - ISI and Doppler in Wireless Communications
Lecture 12 - Doppler Spectrum and Jakes Model
Lecture 13 - Introduction to CDMA, Spread Spectrum and LFSR
Lecture 14 - Generation and Properties of PN Sequences
Lecture 15 - Correlation of PN Sequences and Jammer Margin
Lecture 16 - CDMA Advantages and RAKE Receiver
Lecture 17 - Multi-User CDMA Downlink Part I
Lecture 18 - Multi-User CDMA Downlink Part II
Lecture 19 - Multi-User CDMA Uplink and Asynchronous CDMA
Lecture 20 - CDMA Near-Far Problem and Introduction to MIMO
Lecture 21 - MIMO System Model and Zero-Forcing Receiver
Lecture 22 - MIMO MMSE Receiver and Introduction to SVD
Lecture 23 - SVD Based Optimal MIMO Transmission and Capacity
Lecture 24 - SVD Based Optimal MIMO Transmission and Capacity
Lecture 25 - OSTBCs and Introduction to V-BLAST Receiver
Lecture 26 - V-BLAST (Continued) and MIMO Beamforming
Lecture 27 - Introduction to OFDM and Multi-Carrier Modulation
Lecture 28 - IFFT Sampling for OFDM
Lecture 29 - OFDM Schematic and Cyclic Prefix

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Lecture 30 - OFDM Based Parallelization and OFDM Example
Lecture 31 - OFDM Example (Continued) and Introduction to MIMO-OFDM
Lecture 32 - MIMO-OFDM (Continued)
Lecture 33 - Impact of Carrier Frequency Offset (CFO) in OFDM
Lecture 34 - PAPR in OFDM Systems and Introduction to SC-FDMA
Lecture 35 - SC-FDMA (Continued) and Introduction of Wireless Propagation Models
Lecture 36 - Ground Reflection and Okumura Models
Lecture 37 - Hata Model and Log Normal Shadowing
Lecture 38 - Link Budget Analysis
Lecture 39 - Introduction to Teletraffic Theory
Lecture 40 - Cellular Traffic Modeling and Blocking Probability
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NPTEL Video Course - Electronics and Communication Engineering - Digital Switching

Subject Co-ordinator - Prof. Yatindra N Singh

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Digital Switching
Lecture 2 - Digital Switching
Lecture 3 - Digital Switching
Lecture 4 - Digital Switching
Lecture 5 - Digital Switching
Lecture 6 - Digital Switching
Lecture 7 - Digital Switching
Lecture 8 - Digital Switching
Lecture 9 - Digital Switching
Lecture 10 - Digital Switching
Lecture 11 - Digital Switching
Lecture 12 - Digital Switching
Lecture 13 - Digital Switching
Lecture 14 - Digital Switching
Lecture 15 - Digital Switching
Lecture 16 - Digital Switching
Lecture 17 - Digital Switching
Lecture 18 - Digital Switching
Lecture 19 - Digital Switching
Lecture 20 - Digital Switching
Lecture 21 - Digital Switching
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Lecture 23 - Digital Switching
Lecture 24 - Digital Switching
Lecture 25 - Digital Switching
Lecture 26 - Digital Switching
Lecture 27 - Digital Switching
Lecture 28 - Digital Switching
Lecture 29 - Digital Switching

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Lecture 30 - Digital Switching
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NPTEL Video Course - Electronics and Communication Engineering - NOC:Principles of Modern CDMA-MIMO-OFDM Wire

Subject Co-ordinator - Prof. Aditya K. Jagannatham

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Evolution of Wireless Communication Technologies
Lecture 2 - Modeling Wireless Channel
Lecture 3 - Wireless Fading Channel Model
Lecture 4 - Fading Channel Distribution
Lecture 5 - Rayleigh Fading Channel
Lecture 6 - Bit Error Rate (BER) Performance
Lecture 7 - Bit Error Rate (BER) of AWGN Channels
Lecture 8 - Bit Error Rate of Rayleigh Fading Wireless Channel
Lecture 9 - Exact BER Expression for Rayleigh Fading Wireless Channel
Lecture 10 - Deep Fade Analysis of Wireless Communication
Lecture 11 - Principle of Diversity
Lecture 12 - Multiple Antenna Diversity
Lecture 13 - Maximal-Ratio Combining
Lecture 14 - BER of Multiple Antenna Wireless Systems
Lecture 15 - Approximate BER for Multiple Antenna Wireless System
Lecture 16 - Examples for BER of Wireless Communication
Lecture 17 - Deep Fade in Multi Antenna Systems
Lecture 18 - Intuition for Deep Fade in Multi-Antenna System
Lecture 19 - Definition of Diversity Order
Lecture 20 - Max Delay Spread
Lecture 21 - RMS Delay Spread
Lecture 22 - Delay Spread and Inter Symbol Interference
Lecture 23 - Coherence Bandwidth of Wireless Channel
Lecture 24 - Mobility and Doppler Effect in Wireless Channels
Lecture 25 - Imapact of Doppler Effect on Wireless Channel
Lecture 26 - Introduction to Code Division Multiple Access (CDMA)
Lecture 27 - Chip Time and Bandwidth Expansion in CDMA
Lecture 28 - Code Generation for CDMA
Lecture 29 - CDMA Codes

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Lecture 30 - BER of CDMA Systems
Lecture 31 - Analysis of Multi-user CDMA
Lecture 32 - Multipath Diversity in CDMA Systems
Lecture 33 - Near-Far Problem in CDMA
Lecture 34 - Multiple Input Multiple Output (MIMO) Systems
Lecture 35 - Examples of MIMO Systems
Lecture 36 - MIMO Receivers
Lecture 37 - BER Performance of ZF Receiver
Lecture 38 - Transmit Beamforming in MISO Systems
Lecture 39 - Alamouti Code and Space-Time Block Codes
Lecture 40 - BER of Alamouti Coded System
Lecture 41 - Singular Value Decomposition (SVD)
Lecture 42 - SVD in MIMO
Lecture 43 - Capacity of MIMO Wireless Systems
Lecture 44 - SVD based MIMO Transmission
Lecture 45 - Orthogonal Frequency Division Multiplexing (OFDM)
Lecture 46 - Transmission in Multicarrier Systems
Lecture 47 - FFT/IFFT Processing in OFDM
Lecture 48 - Cyclic Prefix in OFDM Systems
Lecture 49 - Schematic Represntation of OFDM Transmitter and Receiver
Lecture 50 - BER Performance of OFDM Systems
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NPTEL Video Course - Electronics and Communication Engineering - NOC:Probability and Random Variables, Proces

Subject Co-ordinator - Prof. Aditya K. Jagannatham

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Basics - Sample Space and Events
Lecture 2 - Axioms of Probability
Lecture 3 - Conditional Probability - Mary-PAM Example
Lecture 4 - Independent Events - Mary-PAM Example
Lecture 5 - Independent Events - Block Transmission Example
Lecture 6 - Independent Events - Multiantenna Fading Example
Lecture 7 - Bayes Theorem and Aposteriori Probabilities
Lecture 8 - Maximum Aposteriori Probability (MAP) Receiver
Lecture 9 - Random Variables, Probability Density Function (PDF)
Lecture 10 - Application
Lecture 11 - Mean, Variance of Random Variables
Lecture 12 - Application
Lecture 13 - Transformation of Random Variables and Rayleigh Fading Wireless Channel
Lecture 14 - Gaussian Random Variable and Linear Transformation
Lecture 15 - Special Case
Lecture 16 - Application
Lecture 17 - Random Processes and Wide Sense Stationarity (WSS)
Lecture 18 - WSS Example Narrowband Wireless Signal with Random Phase
Lecture 19 - Power Spectral Density (PSD) for WSS Random Process
Lecture 20 - PSD Application in Wireless Bandwidth Required for Signal Transmission
Lecture 21 - Transmission of WSS Random Process Through LTI System
Lecture 22 - Special Random Processes Gaussian Process and White Noise AWGN Communication Channel
Lecture 23 - Gaussian Process Through LTI System Example

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NPTEL Video Course - Electronics and Communication Engineering - NOC:Estimation for Wireless Communications,

Subject Co-ordinator - Prof. Aditya K. Jagannatham

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Basics - Sensor Network and Noisy Observation Model
Lecture 2 - Likelihood Function and Maximum Likelihood (ML) Estimate
Lecture 3 - Properties of Maximum Likelihood (ML) Estimate Â Mean and Unbiasedness
Lecture 4 - Properties of Maximum Likelihood (ML) Estimate Â Variance and Spread Around Mean
Lecture 5 - Reliability of the Maximum Likelihood (ML) Estimate Â Number of Samples Required
Lecture 6 - Estimation of Complex Parameters Â Symmetric Zero Mean Complex Gaussian Noise
Lecture 7 - Wireless Fading Channel Estimation Â Pilot Symbols and Likelihood Function
Lecture 8 - Wireless Fading Channel Estimation Â Pilot Training based Maximum Likelihood ML Estimate
Lecture 9 - Wireless Fading Channel Estimation Â Mean and Variance of Pilot Training Based Maximum Likelihoo
Lecture 10 - Example Â Wireless Fading Channel Estimation for Downlink Mobile Communication
Lecture 11 - Cramer Rao Bound (CRB) for Parameter Estimation
Lecture 12 - Cramer Rao Bound CRB Example Â Wireless Sensor Network
Lecture 13 - Vector Parameter Estimation Â System Model for Multi Antenna Downlink Channel Estimation
Lecture 14 - Likelihood Function and Least Squares Cost Function for Vector Parameter Estimation
Lecture 15 - Least Squares Cost Function for Vector Parameter Estimation Vector Derivative Gradient
Lecture 16 - Least Squares Solution Maximum Likelihood ML Estimate Pseudo Inverse
Lecture 17 - Properties of Least Squares Estimate Â Mean Covariance and Distribution
Lecture 18 - Least Squares Multi Antenna Downlink Maximum Likelihood Channel Estimation
Lecture 19 - Multiple Input Multiple Output MIMO Channel Estimation Â Least Squares Maximum Likelihood ML
Lecture 20 - Example Â Least Squares Multiple Input Multiple Output MIMO Channel Estimation
Lecture 21 - Channel Equalization and Inter Symbol Interference ISI Model
Lecture 22 - Least Squares based Zero Forcing Channel Equalizer
Lecture 23 - Example of ISI Channel and Least Squares based Zero Forcing
Lecture 24 - Equalization and Approximation Error for Zero Forcing Channel Equalizer
Lecture 25 - Example Equalization and Approximation Error for Zero Forcing Channel Equalizer
Lecture 26 - Introduction to Orthogonal Frequency Division Multiplexing OFDM Â Cyclic Prefix CP and Circular
Lecture 27 - Introduction to Orthogonal Frequency Division Multiplexing OFDM Â FFT at Receiver and Flat Fadi
Lecture 28 - Channel Estimation Across Each Subcarrier in Orthogonal Frequency Division Multiplexing OFDM
Lecture 29 - Example Orthogonal Frequency Division Mulltiplexing OFDM Â Transmission of Samples with Cyclic

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Lecture 30 - Example Orthogonal Frequency Division Mulltiplexing OFDM Â FFT at Receiver and Channel Estimati
Lecture 31 - Comb Type Pilot CTP Based Orthogonal Frequency Division Multiplexing OFDM Channel Estimation
Lecture 32 - Comb Type Pilot CTP Based Orthogonal Frequency Division Multiplexing OFDM Channel Estimation
Lecture 33 - Example Comb Type Pilot CTP Based Orthogonal Frequency Division Multiplexing OFDM Channel
Lecture 34 - Frequency Domain Equalization FDE for Inter Symbol Interference ISI Removal in Wireless System
Lecture 35 - Example Frequency Domain Equalization FDE for Inter Symbol Interference ISI Removal in Wireless
Lecture 36 - Example Frequency Domain Equalization FDE for Inter Symbol Interference ISI Removal in Wireless
Lecture 37 - Introduction to Sequential Estimation Â Application in Wireless Channel Estimation
Lecture 38 - Sequential Estimation of Wireless Channel Coefficient Â Estimate and Variance Update Equation
Lecture 39 - Example Sequential Estimation of Wireless Channel Coefficient

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NPTEL Video Course - Electronics and Communication Engineering - NOC:Error Control Coding - An Introduction t

Subject Co-ordinator - Dr. Adrish Banerjee

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Error Coding - I
Lecture 2 - Introduction to Error Coding - II
Lecture 3 - Introduction to Error Control Coding - III
Lecture 4 - Introduction to Convolutional Codes - I
Lecture 5 - Introduction to Convolutional Codes - II
Lecture 6 - Convolutional Codes
Lecture 7 - Convolutional Codes
Lecture 8 - Decoding of Convolutional Codes - I
Lecture 9 - Decoding of Convolutional Codes - II
Lecture 10 - Problem Solving Session - I
Lecture 11 - Problem Solving Session - II
Lecture 12 - Performance Bounds for Convolutional Codes
Lecture 13 - Turbo Codes
Lecture 14 - Turbo Decoding
Lecture 15 - Convergence of Turbo Codes
Lecture 16 - Applications of Convolutional Codes
Lecture 17 - Problem Solving Sessions - III

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Subject Co-ordinator - Dr. Adrish Banerjee

Co-ordinating Institute - IIT - Kanpur

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Lecture 1 - Introduction to Error Control Coding - I
Lecture 2 - Introduction to Error Control Coding - II
Lecture 3 - Introduction to Error Control Coding - III
Lecture 4 - Introduction to Linear Block Codes, Generator Matrix and Parity Check Matrix
Lecture 5 - Syndrome, Error Correction and Error Detection
Lecture 6 - Problem Solving Session - I
Lecture 7 - Decoding of Linear Block Codes
Lecture 8 - Distance Properties of Linear Block Codes - I
Lecture 9 - Distance Properties of Linear Block Codes - II
Lecture 10 - Problem Solving Session - II
Lecture 11 - Some Simple Linear Block Codes - I
Lecture 12 - Some Simple Linear Block Codes - II
Lecture 13 - Bounds on the Size of a Code
Lecture 14 - Problem Solving Session - III
Lecture 15 - Low Density Parity Check Codes
Lecture 16 - Decoding of Low Density Parity Check Codes - I
Lecture 17 - Decoding of Low Density Parity Check Codes - II
Lecture 18 - Applications of Linear Block Codes

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NPTEL Video Course - Electronics and Communication Engineering - NOC:Bayesian, MMSE Estimation for Wireless C

Subject Co-ordinator - Prof. Aditya K. Jagannatham

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable │ MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Basics Â Introduction to Bayesian Minimum Mean Squared Error
Lecture 2 - Optimal Bayesian Minimum Mean Squared Error (MMSE) Estimate
Lecture 3 - Derivation of Minimum Mean Squared Error MMSE Estimate for Gaussian Parameter Â Part I
Lecture 4 - Derivation of Minimum Mean Squared Error MMSE Estimate for Gaussian Parameter Â Part II
Lecture 5 - Derivation of Minimum Mean Squared Error (MMSE) Estimate for Gaussian Parameter Â Non-Zero Mean
Lecture 6 - Minimum Mean Squared Error MMSE Estimation Application Â Wireless Sensor Network
Lecture 7 - Simplification and Example of Minimum Mean Squared Error MMSE Estimate for Wireless Sensor Networ
Lecture 8 - Minimum Mean Squared Error MMSE Estimation Application Â Wireless Fading Channel Estimation
Lecture 9 - Simplification and Example of Minimum Mean Squared Error MMSE Estimate for Wireless Fading Channe
Lecture 10 - Minimum Mean Squared Error MMSE for Wireless Sensor Network WSN Â Derivation and Example
Lecture 11 - Reliability of Minimum Mean Squared Error MMSE Estimate Â Part I
Lecture 12 - Reliability of Minimum Mean Squared Error MMSE Estimate Â Part II
Lecture 13 - Minimum Mean Squared Error MMSE for Wireless Fading Channel Estimation Â Derivation
Lecture 14 - Minimum Mean Squared Error (MMSE) for Wireless Fading Channel Estimation Â Example and Properti
Lecture 15 - Linear Minimum Mean Squared Error LMMSE Estimate Derivation Â Part I
Lecture 16 - Linear Minimum Mean Squared Error LMMSE Estimate Derivation Â Part II
Lecture 17 - Vector Parameter Estimation Â System Model for Multi-Antenna Downlink Channel Estimation
Lecture 18 - Linear Minimum Mean Squared Error LMMSE Estimate for Multi Antenna Downlink Wireless Channel - F
Lecture 19 - Linear Minimum Mean Squared Error LMMSE Estimate for Multi Antenna Downlink Wireless Channel - F
Lecture 20 - Example of Linear Minimum Mean Squared Error LMMSE Estimation for Multi Antenna Downlink Wireles
Lecture 21 - Derivation and Example of Error Covariance of Multi Antenna LMMSE Channel Estimation
Lecture 22 - System Model for Multiple Input Multiple Output MIMO Downlink Wireless Channel Estimation
Lecture 23 - Channel/ Noise Statistics for Multiple-Input Multiple-Output (MIMO) Downlink Wireless Channel Es
Lecture 24 - LMMSE/ MMSE Estimation for Multiple-Input Multiple-Output(MIMO) Downlink Wireless Channel Estima
Lecture 25 - Example of LMMSE/ MMSE Estimation for Multiple-Input Multiple-Output (MIMO) Downlink Wireless Ch
Lecture 26 - Introduction and system model for equalization
Lecture 27 - Linear Minimum Mean Square Error (LMMSE) Channel Equalization
Lecture 28 - Error for LMMSE Channel Equalizer and Example of LMMSE Channel Equalization
Lecture 29 - Example of Linear Minimum Mean Square Error (LMMSE) Channel Equalization

Lecture 30 - Introduction and system model for OFDM
Lecture 31 - System model for OFDMl, IFFT/ FFT Operations
Lecture 32 - LMMSE Estimation for OFDM
Lecture 33 - Estimate and Error variance of LMMSE Estimate
Lecture 34 - Example of OFDM
Lecture 35 - Example of LMMSE estimate and Error variance for OFDM

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NPTEL Video Course - Electronics and Communication Engineering - NOC:Optical communications

Subject Co-ordinator - Dr. Pradeep Kumar K

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Overview of Fiber-optic communications
Lecture 2 - Optical Transmitter - I
Lecture 3 - Optical Transmitter - I (Continued...)
Lecture 4 - Optical Transmitter - II
Lecture 5 - Optical Transmitter - II (Continued...)
Lecture 6 - Intensity modulation
Lecture 7 - Review of Signals and Representations - I
Lecture 8 - Review of Signals and Representations - II
Lecture 9 - Digital Modulation - I
Lecture 10 - Review of Signals and Representations - III
Lecture 11 - Review of Signals and Representations - IV
Lecture 12 - Digital Modulation - II
Lecture 13 - Digital Modulation - II (Continued...)
Lecture 14 - Digital Modulation - III
Lecture 15 - Optical receivers - I
Lecture 16 - Optical receivers - II
Lecture 17 - Optical Modulator
Lecture 18 - Propagation of Electromagnetic wave
Lecture 19 - Review of EM Theory
Lecture 20 - Reflection of Waves
Lecture 21 - Optical fiber - I
Lecture 22 - Optical fiber - II
Lecture 23 - Modes in Optical fiber - I
Lecture 24 - Modes in Optical fiber - I (Continued...)
Lecture 25 - Modes in Optical fiber - II
Lecture 26 - Dispersion in Fibers
Lecture 27 - Dispersion in Fibers (Continued...)
Lecture 28 - Wrapping up fiber parameters
Lecture 29 - System Design - I

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Lecture 30 - Passive WDM components - I
Lecture 31 - Passive WDM components - II
Lecture 32 - Detection of light
Lecture 33 - Detection of light (Continued...)
Lecture 34 - Response time and Noise in Detectors
Lecture 35 - Noise in photodiodes - I Edit Lesson
Lecture 36 - Noise in photodiodes - II
Lecture 37 - Light sources - I
Lecture 38 - Light sources - II Edit Lesson
Lecture 39 - Semiconductor laser diodes
Lecture 40 - Optical communication
Lecture 41 - Power spectral density
Lecture 42 - Power spectral density (Continued...)
Lecture 43 - Advantage of coherent receiver
Lecture 44 - Dispersion induced limitations
Lecture 45 - Optical amplifiers - I
Lecture 46 - Optical amplifiers - II
Lecture 47 - Noise in optical amplifiers
Lecture 48 - Noise in optical amplifiers (Continued...)
Lecture 49 - ASE induced limitations
Lecture 50 - Determining BER in OOK system
Lecture 51 - BER determination
Lecture 52 - Eye diagram and Higher modulation techniques Edit Lesson
Lecture 53 - Higher modulation techniques (Continued...)
Lecture 54 - Optical OFDM
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NPTEL Video Course - Electronics and Communication Engineering - NOC:Digital Switching-I

Subject Co-ordinator - Prof. Yatindra N Singh

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Telephony and Networks
Lecture 2 - Strowger Automatic Exchange
Lecture 3 - Crossbar Switching
Lecture 4 - Logic Circuit for Crosspoint Operation
Lecture 5 - Introduction to Multistage Interconnection Networks
Lecture 6 - Blocking probability of crossbar switches
Lecture 7 - Call congestion and time congestio
Lecture 8 - Clos network
Lecture 9 - Lee's approximation
Lecture 10 - Karnaugh's approximation
Lecture 11 - Time switch
Lecture 12 - Time switch and Clos network
Lecture 13 - TST switch, Strictly Non-blocking network, Rearrangeably non-blocking network
Lecture 14 - Paull's Matrix
Lecture 15 - f-way multicasting
Lecture 16 - Strictly sense non blocking multicasting switch
Lecture 17 - Rearrangeably non blocking networks
Lecture 18 - Slepian Duguid theorem, Paull's theorem
Lecture 19 - Paull's matrix for rearrangeabbly non blocking networks
Lecture 20 - Recursive construction; Crosspoint complexity for rearrangebly and strictly non-blocking network
Lecture 21 - Cantor network
Lecture 22 - Wide-sense non blocking network
Lecture 23 - Example of wide -sense non-blocking switch
Lecture 24 - Packet Switching
Lecture 25 - Buffering strategies
Lecture 26 - Output Queued Switch
Lecture 27 - Input Queued Switch
Lecture 28 - Banyan Network, Delta Network
Lecture 29 - Shufflenet as Delta network

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Lecture 30 - Performance analysis of crossbar and delta network
Lecture 31 - Properties of Delta Network
Lecture 32 - Buffered and Unbuffered Delta network
Lecture 33 - Analysis of Buffered Delta Network - 1 of 3
Lecture 34 - Analysis of Buffered Delta Network - 2 of 3
Lecture 35 - Analysis of Buffered Delta Network - 3 of 3
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NPTEL Video Course - Electronics and Communication Engineering - NOC:An Introduction to Information Theory

Subject Co-ordinator - Dr. Adrish Banerjee

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable │ MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Measure of Information
Lecture 3 - Information Inequalities
Lecture 4 - Problem solving session - I
Lecture 5 - Block to Variable Length Coding - I : Prefix-free code
Lecture 6 - Block to Variable Length Coding - II : Bounds on Optimal Code Length
Lecture 7 - Block to Variable Length Coding - III : Huffman Coding
Lecture 8 - Variable to block length coding
Lecture 9 - The asymptotic equipartition property
Lecture 10 - Block to block coding of DMS
Lecture 11 - Problem solving session - II
Lecture 12 - Universal Source Coding - I : Lempel-Ziv Algorithm-LZ77
Lecture 13 - Universal source coding - II : Lempel-Ziv Welch Algorithm (LZW)
Lecture 14 - Coding of sources with memory
Lecture 15 - Channel Capacity
Lecture 16 - Joint typical sequences
Lecture 17 - Noisy channel coding theorem
Lecture 18 - Differential entropy
Lecture 19 - Gaussian channel
Lecture 20 - Parallel Gaussian channel
Lecture 21 - Problem solving session - III
Lecture 22 - Rate distortion theory
Lecture 23 - Blahut-Arimoto Algorithm
Lecture 24 - Problem solving session - IV

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NPTEL Video Course - Electronics and Communication Engineering - NOC:5G Wireless Standard Design

Subject Co-ordinator - Prof. Rohit Budhiraja

Co-ordinating Institute - IIT - Kanpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Course Introduction
Lecture 2 - Key 5G Technologies - Adaptive Modulation and Coding (AMC)
Lecture 3 - Key 5G Technologies - Hybrid automatic repeat request (HARQ)
Lecture 4 - Key 5G Technologies - Orthogonal frequency division multiplexing (OFDM)
Lecture 5 - 5G Numerology
Lecture 6 - 5G frame structure
Lecture 7 - 5G physical downlink shared channel (PDSCH) transmit chain- CRC generation
Lecture 8 - 5G PDSCH transmit chain - code block segmentation â   Part I
Lecture 9 - 5G PDSCH transmit chain - LDPC coding
Lecture 10 - 5G PDSCH transmit chain - code block segmentation â   Part II
Lecture 11 - 5G PDSCH transmit chain - rate matching â   Part I
Lecture 12 - 5G PDSCH transmit chain - rate matching â   Part II
Lecture 13 - 5G PDSCH transmit chain - interleaving and concatenation
Lecture 14 - 5G PDSCH transmit chain - scrambling and modulation
Lecture 15 - 5G PDSCH transmit chain - recap
Lecture 16 - 5G PDSCH receive chain - Part I
Lecture 17 - 5G PDSCH receive chain - Part II
Lecture 18 - 5G PDSCH - map receiver design - Part I
Lecture 19 - 5G PDSCH - map receiver design - Part II
Lecture 20 - 5G baseband - RF conversion
Lecture 21 - Indigenous 5G network architecture
Lecture 22 - 5G physical downlink control channel (PDCCH) transmit chain - introduction
Lecture 23 - 5G PDCCH transmit chain - CRC and segmentation
Lecture 24 - 5G PDCCH transmit chain - Polar encoding
Lecture 25 - 5G PDCCH transmit chain - CRC interleaver
Lecture 26 - 5G PDCCH transmit chain - sub-block interleaver
Lecture 27 - 5G PDCCH transmit chain - rate matching
Lecture 28 - 5G PDCCH transmit chain - control resource set (CORESET) design â   Part I
Lecture 29 - 5G PDCCH transmit chain - CORESET design â   Part II

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Lecture 30 - 5G PDCCH transmit chain - CORESET design â   Part III
Lecture 31 - 5G PDCCH transmit chain - CORESET design â   Part IV
Lecture 32 - 5G physical uplink control channel (PUCCH) - Part I
Lecture 33 - 5G physical uplink control channel (PUCCH) - Part II
Lecture 34 - Multiple input multiple output (MIMO) transceiver chain - Part I
Lecture 35 - MIMO transceiver chain - Part II
Lecture 36 - MIMO transceiver chain - Part III
Lecture 37 - MIMO transceiver chain - Part IV
Lecture 38 - MIMO transceiver chain - Part V
Lecture 39 - MIMO transceiver chain - Part VI
Lecture 40 - MIMO transceiver chain - Part VII
Lecture 41 - 5G demodulation reference signal (DM-RS) design - Part I
Lecture 42 - 5G DM-RS design - Part II
Lecture 43 - 5G DM-RS design - Part III
Lecture 44 - 5G DM-RS design - Part IV
Lecture 45 - 5G sounding reference signal (SRS) design - Part I
Lecture 46 - 5G SRS design - Part II
Lecture 47 - 5G SRS design - Part III
Lecture 48 - 5G SRS design - Part IV
Lecture 49 - 5G SRS design - Part V
Lecture 50 - 5G channel state estimation reference signal (CSI-RS) - Part I
Lecture 51 - 5G CSI-RS - Part II
Lecture 52 - 5G MIMO transceiver chain - Part I
Lecture 53 - 5G MIMO transceiver chain - Part II
Lecture 54 - 5G MIMO codebook design - Part I
Lecture 55 - 5G MIMO codebook design - Part II
Lecture 56
Lecture 57
Lecture 58
Lecture 59
Lecture 60
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NPTEL Video Course - Electronics and Communication Engineering - Adaptive Signal Processing

Subject Co-ordinator - Prof. Mrityunjoy Chakraborty

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Adaptive Filters
Lecture 2 - Introduction to Stochastic Processes
Lecture 3 - Stochastic Processes
Lecture 4 - Correlation Structure
Lecture 5 - FIR Wiener Filter (Real)
Lecture 6 - Steepest Descent Technique
Lecture 7 - LMS Algorithm
Lecture 8 - Convergence Analysis
Lecture 9 - Convergence Analysis (Mean Square)
Lecture 10 - Convergence Analysis (Mean Square)
Lecture 11 - Misadjustment and Excess MSE
Lecture 12 - Misadjustment and Excess MSE
Lecture 13 - Sign LMS Algorithm
Lecture 14 - Block LMS Algorithm
Lecture 15 - Fast Implementation of Block LMS Algorithm
Lecture 16 - Fast Implementation of Block LMS Algorithm
Lecture 17 - Vector Space Treatment to Random Variables
Lecture 18 - Vector Space Treatment to Random Variables
Lecture 19 - Orthogonalization and Orthogonal Projection
Lecture 20 - Orthogonal Decomposition of Signal Subspaces
Lecture 21 - Introduction to Linear Prediction
Lecture 22 - Lattice Filter
Lecture 23 - Lattice Recursions
Lecture 24 - Lattice as Optimal Filter
Lecture 25 - Linear Prediction and Autoregressive Modeling
Lecture 26 - Gradient Adaptive Lattice
Lecture 27 - Gradient Adaptive Lattice
Lecture 28 - Introduction to Recursive Least Squares
Lecture 29 - RLS Approach to Adaptive Filters

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Lecture 30 - RLS Adaptive Lattice
Lecture 31 - RLS Lattice Recursions
Lecture 32 - RLS Lattice Recursions
Lecture 33 - RLS Lattice Algorithm
Lecture 34 - RLS Using QR Decomposition
Lecture 35 - Givens Rotation
Lecture 36 - Givens Rotation and QR Decomposition
Lecture 37 - Systolic Implementation
Lecture 38 - Systolic Implementation
Lecture 39 - Singular Value Decomposition
Lecture 40 - Singular Value Decomposition
Lecture 41 - Singular Value Decomposition
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NPTEL Video Course - Electronics and Communication Engineering - Digital Computer Organization

Subject Co-ordinator - Prof. P.K. Biswas

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Digital Computer Organization
Lecture 2 - CPU Design - I
Lecture 3 - CPU Design - II
Lecture 4 - CPU Design Tirning and Control
Lecture 5 - Micro programmed Control - I
Lecture 6 - Micro programmed Control - II
Lecture 7 - Pipeline Concept - I
Lecture 8 - Pipeline Concept - II
Lecture 9 - Pipeline Concept - III
Lecture 10 - Pipeline CPU - I
Lecture 11 - Pipeline CPU - II
Lecture 12 - Pipeline CPU - III
Lecture 13 - Memory Organization - I
Lecture 14 - Memory Organization - II
Lecture 15 - Memory Organization - III
Lecture 16 - Memory Organization - IV
Lecture 17 - Memory Organization - V
Lecture 18 - Cache Memory Architecture
Lecture 19 - Cache Memory Architecture RAM Architecture
Lecture 20 - RAM Architecture
Lecture 21 - DAM Architecture-1
Lecture 22 - DAM Architecture Buffer Cache
Lecture 23 - Buffer Cache
Lecture 24 - Secondary Storage Organization - I
Lecture 25 - Secondary Storage Organization - II
Lecture 26 - Secondary Storage Organization - III
Lecture 27 - I/O Subsystem Organization
Lecture 28 - Error Detection and Correction

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NPTEL Video Course - Electronics and Communication Engineering - Digital Image Processing

Subject Co-ordinator - Prof. P.K. Biswas

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Image Digitization - I
Lecture 3 - Image Digitization - II
Lecture 4 - Pixels Relationships - I
Lecture 5 - Pixels Relationships - II
Lecture 6 - Basic Transformations
Lecture 7 - Camera Model and Imaging Geometry
Lecture 8 - Camera Calibration and Stereo Imaging
Lecture 9 - Interpolation and Resampling
Lecture 10 - Image Interpolation - II
Lecture 11 - Image Interpolation - I
Lecture 12 - Image Transformation - II
Lecture 13 - Fourier Transformation - I
Lecture 14 - Fourier Transformation - II
Lecture 15 - Discrete Cosine Transform
Lecture 16 - K-L Transform
Lecture 17 - Image Enhancement
Lecture 18 - Image Enhancement
Lecture 19 - Image Enhancement
Lecture 20 - Image Enhancement
Lecture 21 - Image Enhancement Frequency
Lecture 22 - Image Restoration - I
Lecture 23 - Image Restoration - II
Lecture 24 - Image Restoration - III
Lecture 25 - Image Registration
Lecture 26 - Colour Image Processing - I
Lecture 27 - Colour Image Processing - II
Lecture 28 - Colour Image Processing - III
Lecture 29 - Image Segmentation - I

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Lecture 30 - Image Segmentation - II
Lecture 31 - Image Segmentation - III
Lecture 32 - Image Segmentation - IV
Lecture 33 - Mathematical Morphology - I
Lecture 34 - Mathematical Morphology - II
Lecture 35 - Mathematical Morphology - III
Lecture 36 - Mathematical Morphology - IV
Lecture 37 - Object Representation and Description - I
Lecture 38 - Object Representation and Description - II
Lecture 39 - Object Representation and Description - III
Lecture 40 - Object Recognition
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NPTEL Video Course - Electronics and Communication Engineering - Digital Systems Design

Subject Co-ordinator - Prof. D. Roychoudhury

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Digital Systems Design
Lecture 2 - Introduction
Lecture 3 - Digital Logic - I
Lecture 4 - Digital Logic - II
Lecture 5 - Digital Logic - III
Lecture 6 - Boolean Algebra
Lecture 7 - Boolean Algebra
Lecture 8 - Boolean Function Minimization
Lecture 9 - Boolean Function Minimization
Lecture 10 - Boolean Function Minimization
Lecture 11 - Hazzard Covers by K - Map
Lecture 12 - Combinational Circuit Design
Lecture 13 - Design of ADDER Circuits
Lecture 14 - Design of Subtractor Circuits
Lecture 15 - Digital of Common Digital Elements
Lecture 16 - Design of Complex Combinational Circuits
Lecture 17 - Design of Combinational Circuits
Lecture 18 - Combinational Logic Problem Design
Lecture 19 - Combinational Logic Design
Lecture 20 - Logic Design with PLA
Lecture 21 - Synchronous Sequential Circuit Design
Lecture 22 - Design of Sequential Modules
Lecture 23 - Design of Registers and Counter
Lecture 24 - Finite State Machine Design
Lecture 25 - Finite State Machine Design and Optimization
Lecture 26 - Programmable Logic Devices
Lecture 27 - Programmable Logic Devices
Lecture 28 - Programmable Logic Devices
Lecture 29 - Design of Arithmetic Circuits

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Lecture 30 - Design of Arithmetic Circuits
Lecture 31 - Design of Memory Circuits
Lecture 32 - Algorithmic State Machines Chart
Lecture 33 - Design of Computer Instruction Set and the CPU
Lecture 34 - Design of Computer Instruction Set and the CPU
Lecture 35 - Design of Computer Instruction Set and the CPU
Lecture 36 - Design of Computer Instruction Set and the CPU
Lecture 37 - Design of Computer Instruction Set and the CPU
Lecture 38 - Design of Computer Instruction Set and the CPU
Lecture 39 - Design of a Micro Programmed CPU
Lecture 40 - Digital System Design Current State of the Art
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NPTEL Video Course - Electronics and Communication Engineering - Digital Voice and Picture Communication

Subject Co-ordinator - Prof. Somnath Sengupta

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Speech Production Model
Lecture 3 - Speech Coding
Lecture 4 - Quantizers for Speech Signal
Lecture 5 - mew - Law and Optimum Quantizer
Lecture 6 - Adaptive Quantizer
Lecture 7 - Differential Quantization
Lecture 8 - LDM and ADM
Lecture 9 - Differential PCM and Adaptive Prediction
Lecture 10 - Linear Prediction of Speech
Lecture 11 - Computational Aspects of LPC parameters
Lecture 12 - Cholesky Decomposition
Lecture 13 - Lattice Formulation of LPC Coefficient
Lecture 14 - Linear Predictive Synthesizer
Lecture 15 - LPC Vocoder
Lecture 16 - Introduction to Image and Video Coding
Lecture 17 - Lossy Image Compression
Lecture 18 - DCT Quantization and Limitations
Lecture 19 - Theory of Wavelets
Lecture 20 - Discrete Wavelet Transforms
Lecture 21 - DWT on the Images and its Encoding
Lecture 22 - Embedded Zero Tree Wavelet Encoding
Lecture 23 - Video Coding
Lecture 24 - Motion Estimate Techniques
Lecture 25 - Fast Motion Estimation Techniques
Lecture 26 - Video Coding Standards
Lecture 27 - Advanced Coding Aspects
Lecture 28 - Audio Coding
Lecture 29 - Audio Coding AC - 3

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Lecture 30 - AC -3 Decoder
Lecture 31 - MPEG - 1 Audio Coding
Lecture 32 - Introduction to VoIP
Lecture 33 - VoIP Signaling
Lecture 34 - H.323 Call Controls and Enhancements
Lecture 35 - Interworking with PSTN Limitations and Solution
Lecture 36 - Multiplexing Schemes
Lecture 37 - H.323
Lecture 38 - ISDN Video Conferencing
Lecture 39 - Video Conferencing
Lecture 40 - 4G Multimedia Conferencing
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NPTEL Video Course - Electronics and Communication Engineering - MEMS and Microsystems

Subject Co-ordinator - Prof. Santiram Kal

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to MEMS & Microsystems
Lecture 2 - Introduction to Microsensors
Lecture 3 - Evaluation of MEMS, Microsensors, Market Survey
Lecture 4 - Application of MEMS
Lecture 5 - MEMS Materials
Lecture 6 - MEMS Materials Properties
Lecture 7 - MEMS Materials Properties (Continued...)
Lecture 8 - Microelectronic Technology for MEMS - II
Lecture 9 - Microelectronic Technology for MEMS - III
Lecture 10 - Micromachining Technology for MEMS
Lecture 11 - Micromachining Process
Lecture 12 - Etch Stop Techniques and Microstructure
Lecture 13 - Surface and Quartz Micromachining
Lecture 14 - Fabrication of Micromachined Microstructure
Lecture 15 - Microstereolithography
Lecture 16 - MEMS Microsensors Thermal
Lecture 17 - Micromachined Microsensors Mechanical
Lecture 18 - MEMS Pressure and Flow Sensor
Lecture 19 - Micromachined Flow Sensors
Lecture 20 - MEMS Inertial Sensors
Lecture 21 - Micromachined Microaccelerometers for MEMS
Lecture 22 - MEMS Accelerometers for Avionics
Lecture 23 - Temperature Drift and Damping Analysis
Lecture 24 - Piezoresistive Accelerometer Technology
Lecture 25 - MEMS Capacitive Accelerometer
Lecture 26 - MEMS Capacitive Accelerometer Process
Lecture 27 - MEMS Gyro Sensor
Lecture 28 - MEMS for Space Application
Lecture 29 - Polymer MEMS & Carbon Nano Tubes CNT

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Lecture 30 - Wafer Bonding & Packaging of MEMS
Lecture 31 - Interface Electronics for MEMS
Lecture 32 - MEMS for Biomedical Applications (Bio-MEMS)

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NPTEL Video Course - Electronics and Communication Engineering - Neural Networks and Applications

Subject Co-ordinator - Prof. Somnath Sengupta

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Artificial Neural Networks
Lecture 2 - Artificial Neuron Model and Linear Regression
Lecture 3 - Gradient Descent Algorithm
Lecture 4 - Nonlinear Activation Units and Learning Mechanisms
Lecture 5 - Learning Mechanisms-Hebbian, Competitive, Boltzmann
Lecture 6 - Associative memory
Lecture 7 - Associative Memory Model
Lecture 8 - Condition for Perfect Recall in Associative Memory
Lecture 9 - Statistical Aspects of Learning
Lecture 10 - V.C. Dimensions
Lecture 11 - Importance of V.C. Dimensions Structural Risk Minimization
Lecture 12 - Single-Layer Perceptions
Lecture 13 - Unconstrained Optimization
Lecture 14 - Linear Least Squares Filters
Lecture 15 - Least Mean Squares Algorithm
Lecture 16 - Perceptron Convergence Theorem
Lecture 17 - Bayes Classifier & Perceptron
Lecture 18 - Bayes Classifier for Gaussian Distribution
Lecture 19 - Back Propagation Algorithm
Lecture 20 - Practical Consideration in Back Propagation Algorithm
Lecture 21 - Solution of Non-Linearly Separable Problems Using MLP
Lecture 22 - Heuristics For Back-Propagation
Lecture 23 - Multi-Class Classification Using Multi-layered Perceptrons
Lecture 24 - Radial Basis Function Networks
Lecture 25 - Radial Basis Function Networks
Lecture 26 - Posed Surface Reconstruction
Lecture 27 - Solution of Regularization Equation
Lecture 28 - Use of Greens Function in Regularization Networks
Lecture 29 - Regularization Networks and Generalized RBF

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Lecture 30 - Comparison Between MLP and RBF
Lecture 31 - Learning Mechanisms in RBF
Lecture 32 - Introduction to Principal Components and Analysis
Lecture 33 - Dimensionality reduction Using PCA
Lecture 34 - Hebbian-Based Principal Component Analysis
Lecture 35 - Introduction to Self Organizing Maps
Lecture 36 - Cooperative and Adaptive Processes in SOM
Lecture 37 - Vector-Quantization Using SOM

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NPTEL Video Course - Electronics and Communication Engineering - Probability and Random Processes

Subject Co-ordinator - Prof. Mrityunjoy Chakraborty

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to the Theory of Probability
Lecture 2 - Axioms of Probability
Lecture 3 - Axioms of Probability (Continued.)
Lecture 4 - Introduction to Random Variables
Lecture 5 - Probability Distributions and Density Functions
Lecture 6 - Conditional Distribution and Density Functions
Lecture 7 - Function of a Random Variable
Lecture 8 - Function of a Random Variable (Continued.)
Lecture 9 - Mean and Variance of a Random Variable
Lecture 10 - Moments
Lecture 11 - Characteristic Function
Lecture 12 - Two Random Variables
Lecture 13 - Function of Two Random Variables
Lecture 14 - Function of Two Random Variables (Continued.)
Lecture 15 - Correlation Covariance and Related Innver
Lecture 16 - Vector Space of Random Variables
Lecture 17 - Joint Moments
Lecture 18 - Joint Characteristic Functions
Lecture 19 - Joint Conditional Densities
Lecture 20 - Joint Conditional Densities (Continued.)
Lecture 21 - Sequences of Random Variables
Lecture 22 - Sequences of Random Variables (Continued.)
Lecture 23 - Correlation Matrices and their Properties
Lecture 24 - Correlation Matrices and their Properties
Lecture 25 - Conditional Densities of Random Vectors
Lecture 26 - Characteristic Functions and Normality
Lecture 27 - Tchebycheff Inequality and Estimation of an Unknown Parameter
Lecture 28 - Central Limit Theorem
Lecture 29 - Introduction to Stochastic Process

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Lecture 30 - Stationary Processes
Lecture 31 - Cyclostationary Processes
Lecture 32 - System with Random Process at Input
Lecture 33 - Ergodic Processes
Lecture 34 - Introduction to Spectral Analysis
Lecture 35 - Spectral Analysis (Continued.)
Lecture 36 - Spectrum Estimation - Non Parametric Methods
Lecture 37 - Spectrum Estimation - Parametric Methods
Lecture 38 - Autoregressive Modeling and Linear Prediction
Lecture 39 - Linear Mean Square Estimation - Wiener (FIR)
Lecture 40 - Adaptive Filtering - LMS Algorithm
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NPTEL Video Course - Electronics and Communication Engineering - Pattern Recognition and Application

Subject Co-ordinator - Prof. P.K. Biswas

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Feature Extraction - I
Lecture 3 - Feature Extraction - II
Lecture 4 - Feature Extraction - III
Lecture 5 - Bayes Decision Theory
Lecture 6 - Bayes Decision Theory (Continued.)
Lecture 7 - Normal Density and Discriminant Function
Lecture 8 - Normal Density and Discriminant Function (Continued.)
Lecture 9 - Bayes Decision Theory - Binary Features
Lecture 10 - Maximum Likelihood Estimation
Lecture 11 - Probability Density Estimation
Lecture 12 - Probability Density Estimation (Continued.)
Lecture 13 - Probability Density Estimation (Continued.)
Lecture 14 - Probability Density Estimation (Continued.)
Lecture 15 - Probability Density Estimation (Continued.)
Lecture 16 - Dimensionality Problem
Lecture 17 - Multiple Discriminant Analysis
Lecture 18 - Multiple Discriminant Analysis (Tutorial)
Lecture 19 - Multiple Discriminant Analysis (Tutorial)
Lecture 20 - Perceptron Criterion
Lecture 21 - Perceptron Criterion (Continued.)
Lecture 22 - MSE Criterion
Lecture 23 - Linear Discriminator (Tutorial)
Lecture 24 - Neural Networks for Pattern Recognition
Lecture 25 - Neural Networks for Pattern Recognition (Continued.)
Lecture 26 - Neural Networks for Pattern Recognition (Continued.)
Lecture 27 - RBF Neural Network
Lecture 28 - RBF Neural Network (Continued.)
Lecture 29 - Support Vector Machine

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Lecture 30 - Hyperbox Classifier
Lecture 31 - Hyperbox Classifier (Continued.)
Lecture 32 - Fuzzy Min Max Neural Network for Pattern Recognition
Lecture 33 - Reflex Fuzzy Min Max Neural Network
Lecture 34 - Unsupervised Learning - Clustering
Lecture 35 - Clustering (Continued.)
Lecture 36 - Clustering using minimal spanning tree
Lecture 37 - Temporal Pattern recognition
Lecture 38 - Hidden Markov Model
Lecture 39 - Hidden Markov Model (Continued.)
Lecture 40 - Hidden Markov Model (Continued.)
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NPTEL Video Course - Electronics and Communication Engineering - NOC:Basic Tools of Microwave Engineering

Subject Co-ordinator - Dr. Amitabha Bhattacharya

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Challenges of Microwave Design
Lecture 2 - Introduction to the 1st tool
Lecture 3 - Measurement of Unknown Impedance
Lecture 4 - Application of Smith Chart for finding unknown impedance in laboratory
Lecture 5 - Problem Solving using Smith Chart
Lecture 6 - Need of Impedance Matching at Microwave Frequency
Lecture 7 - Lumped Element Based Impedance Matching Network Design by Smith Chart
Lecture 8 - Distributed Impedance Matching Design by Smith Chart
Lecture 9 - Broadband Impedance Matching Network Design
Lecture 10 - Tutorial 2
Lecture 11 - Voltage and Current at Microwave Frequency
Lecture 12 - Scattering Parameter
Lecture 13 - Properties of Scattering Parameter
Lecture 14 - Network Analyser
Lecture 15 - Tutorial 3
Lecture 16 - Radiation between S-Parameters and Transmission Parameters
Lecture 17 - Scattering Parameters of Coupler and Magic Tee
Lecture 18 - Signal Flow Graph
Lecture 19 - Understanding Network Analyser Calibration with the help of Signal Flow Graph
Lecture 20 - Tutorial 4

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NPTEL Video Course - Electronics and Communication Engineering - NOC:Basic Building Blocks of Microwave Engin

Subject Co-ordinator - Dr. Amitabha Bhattacharya

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Concept of Mode
Lecture 2 - Mathematical Model of Modes
Lecture 3 - Mathematical Model of TEM Mode
Lecture 4 - Mathematical Model of TE and TM Mode and Impedance Concept
Lecture 5 - Losses Associated with Microwave Transmission
Lecture 6 - Coaxial Line
Lecture 7 - Rectangular Waveguide
Lecture 8 - Circular Waveguide
Lecture 9 - Planar Transmission Line
Lecture 10 - Coaxial Connectors
Lecture 11 - 3 Port Microwave Power Divider/Combiner - Part I
Lecture 12 - 3 Port Microwave Power Divider/Combiner - Part II
Lecture 13 - 4 Port Microwave Power Divider/Combiner
Lecture 14 - Microwave Resonator
Lecture 15 - Microwave Attenuuators
Lecture 16 - Microwave Detector and Switching Diodes
Lecture 17 - Microwave Tubes
Lecture 18 - Microwave Tubes
Lecture 19 - Microwave Solid State Diode Oscillator and Amplifier
Lecture 20 - Microwave Transistors

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NPTEL Video Course - Electronics and Communication Engineering - NOC:Satellite Communication Systems

Subject Co-ordinator - Prof. Kalyankumar Bandyopadhyay

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable


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Lecture 1 - Introduction
Lecture 2 - Orbit - 1
Lecture 3 - Orbit - 2
Lecture 4 - Orbit - 3
Lecture 5 - Orbit - 4
Lecture 6 - Space Segment - 1
Lecture 7 - Space Segment - 2
Lecture 8 - Space Segment - 3
Lecture 9 - Space Segment - 4
Lecture 10 - Space Segment - 5
Lecture 11 - Link Budget - 1
Lecture 12 - Link Budget - 2
Lecture 13 - Link Budget - 3
Lecture 14 - Link Budget - 4
Lecture 15 - Link Budget - 5
Lecture 16 - Link Budget - 6
Lecture 17 - Link Budget - 7
Lecture 18 - Link Budget - 8
Lecture 19 - Propagation - 1
Lecture 20 - Propagation - 2
Lecture 21 - Propagation - 3
Lecture 22 - Ground Segment - 1
Lecture 23 - Ground Segment - 2
Lecture 24 - Ground Segment - 3
Lecture 25 - Ground Segment - 4
Lecture 26 - Multiple Access - 1
Lecture 27 - Multiple Access - 2
Lecture 28 - Multiple Access - 3
Lecture 29 - Multiple Access - 4
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Lecture 30 - Multiple Access - 5
Lecture 31 - Nonlinearity - I
Lecture 32 - Nonlinearity - II
Lecture 33 - Nonlinearity - III
Lecture 34 - Synchronisation - I
Lecture 35 - Synchronisation - II
Lecture 36 - Effect on Higher Layer - I
Lecture 37 - Effect on Higher Layer - II
Lecture 38 - Effect on Higher Layer - III
Lecture 39 - Satellite Navigation - I
Lecture 40 - Satellite Navigation - II
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NPTEL Video Course - Electronics and Communication Engineering - NOC:Fundamentals of MIMO Wireless Communicat

Subject Co-ordinator - Prof. Suvra Sekhar Das

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Evolution of Wireless Communication Systems 1G - 5G
Lecture 2 - Elements of Wireless Communication System
Lecture 3 - Overview of MIMO Communication Systems
Lecture 4 - Layered View of Transmitter and Receiver
Lecture 5 - Wireless Channel Models - I
Lecture 6 - Large Scale Propagation Models Path Loss
Lecture 7 - Large Scale Propagation Models Path Loss and Shadowing
Lecture 8 - Small Scale Propagation Multipath Model
Lecture 9 - Small Scale Propagation Frequency Flat Fading
Lecture 10 - Small Scale Propagation Envelope Distribution
Lecture 11 - Small Scale Propagation Received Signal Correlation
Lecture 12 - Small Scale Propagation Received Signal Correlation (Continued...)
Lecture 13 - Coherence Time
Lecture 14 - Doppler Spectrum
Lecture 15 - Frequency Selective Fading
Lecture 16 - Frequency Selective Fading - II
Lecture 17 - FSF-Coherence Bandwidth, Delay Doppeler Characteristics
Lecture 18 - Spatial Channel Characteristics - I
Lecture 19 - Expression of MIMO Channel
Lecture 20 - MIMO Channel Characteristics
Lecture 21 - Statistical Properties of H
Lecture 22 - Important Results from Linear Algebra
Lecture 23 - Spatial Diversity
Lecture 24 - Selection Combining
Lecture 25 - Maximal Ratio Combining
Lecture 26 - Problem of Error in MRC
Lecture 27 - Diversity Gain and Transmit MRC
Lecture 28 - Transmit Diversity without Channel known at Tx
Lecture 29 - MIMO Transmit Diversity - 1

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Lecture 30 - MIMO Diversity - 2
Lecture 31 - Fundamentals of Information Theory - I
Lecture 32 - Fundamentals of Information Theory - II
Lecture 33 - Fundamentals of Information Theory - III
Lecture 34 - Fundamentals of Information Theory - IV
Lecture 35 - Capacity of Deterministic MIMO Channels
Lecture 36 - Capacity of Channel Unknown at Transmitter
Lecture 37 - Capacity of Channel Known of Transmitter
Lecture 38 - More on MIMO Channel Capacity
Lecture 39 - Capacity of Random Channel
Lecture 40 - MIMO in Practice
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NPTEL Video Course - Electronics and Communication Engineering - NOC:Audio System Engineering

Subject Co-ordinator - Prof. S. Dasmandal

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Fundamentals of Linear Vibrations Edit Lesson
Lecture 3 - Damped Oscillation and Forced Oscillation
Lecture 4 - Equivalent Electrical Circuits for Oscillation
Lecture 5 - Tutorial I
Lecture 6 - Acoustic Wave Equation
Lecture 7 - Acoustic Wave Equation (Continued...)
Lecture 8 - Acoustic Wave Equation (Continued...)
Lecture 9 - Spherical Waves Propagation
Lecture 10 - Perception at Sound
Lecture 11 - Sound Transmission
Lecture 12 - Sound Transmission (Continued...)
Lecture 13 - The Acoustic Environment
Lecture 14 - Room Acoustics - I
Lecture 15 - Room Acoustics - II
Lecture 16 - Large Room Acoustics and Small Room Acoustics
Lecture 17 - Large Room Acoustics and Small Room Acoustics (Continued...)
Lecture 18 - Auditorium Acoustics
Lecture 19 - Transduction - I
Lecture 20 - Transduction - II
Lecture 21 - Transduction - III
Lecture 22 - Microphone - I
Lecture 23 - Microphone Sensitivity
Lecture 24 - Loudspeaker

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NPTEL Video Course - Electronics and Communication Engineering - NOC:Discrete Time Signal Processing

Subject Co-ordinator - Prof. Mrityunjoy Chakraborty

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Discrete Time Signals and Systems
Lecture 3 - Linear, Shift Invariant Systems
Lecture 4 - Properties of Discrete Convolution Causal and Stable Systems
Lecture 5 - Graphical Evaluation of Discrete Convolutions
Lecture 6 - Discrete Time Fourier Transform
Lecture 7 - Properties of DTFT
Lecture 8 - Dirac Comb and Sampling Analog Signals
Lecture 9 - Relation between DTFT and Analog Fourier Transform
Lecture 10 - Nyquist Interpolation Formula
Lecture 11 - Rational Systems
Lecture 12 - Properties of Rational Systems
Lecture 13 - Introduction to Z-transform
Lecture 14 - Properties of Z-transform
Lecture 15 - Properties of z-transform
Lecture 16 - Inverse z-transform
Lecture 17 - Introduction to DFT
Lecture 18 - Properties of DFT
Lecture 19 - Introduction to Interpretation of Circular Convolution
Lecture 20 - Graphically Interpretation of Circular Convolution
Lecture 21 - Zero Padding and Linear convolution Via DFT
Lecture 22 - Decimation and DFT of Decimated Sequences
Lecture 23 - Expension and Interpolation of Sequences
Lecture 24 - Factor-of-M Polyphase Decomposition of Sequences
Lecture 25 - Nobel Identifies
Lecture 26 - Efficient Decimator and Interpolator Structure
Lecture 27 - Linear Phase Filters
Lecture 28 - Properties of Linear Phase Filters
Lecture 29 - Structures for IIR Filters

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Lecture 30 - Structures for FIR Filters
Lecture 31 - Analog LTI Systems, Fourier and Laplace Transforms
Lecture 32 - Pole, Zero and Stability of of Analog Filters
Lecture 33 - Analog Filter Design Example Butterworth Lowpass Filter
Lecture 34 - IIR Filter Design by Implus Invariance Method
Lecture 35 - Design Filter Design from Analog Proptotype Filters by s-z Transformations
Lecture 36 - Bilinear Transformation
Lecture 37 - FIR Filter Design by Window
Lecture 38 - FFT
Lecture 39 - Complexity Analysis of FFT
Lecture 40 - Bit Reversal and FFT
```

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NPTEL Video Course - Electronics and Communication Engineering - NOC:Digital Image Processing

Subject Co-ordinator - Prof. P.K. Biswas

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Digital Image Processing
Lecture 2 - Application of Digital Image Processing
Lecture 3 - Image Digitalization, Sampling Quantization and Display
Lecture 4 - Signal Reconstruction from Samples
Lecture 5 - Signal Reconstruction from Image
Lecture 6 - Quantizer Design
Lecture 7 - Relationship between Pixels
Lecture 8 - Relationship of Adjacency and Connected Components Labeling
Lecture 9 - Application of Distance Measures
Lecture 10 - Basic Transform
Lecture 11 - Image Formation - I
Lecture 12 - Image Formation - II
Lecture 13 - Image Geometry - I
Lecture 14 - Image Geometry - II
Lecture 15 - Stereo Imaging Model - II
Lecture 16 - Interpolation and Resampling
Lecture 17 - Interpolation Techniques
Lecture 18 - Interpolation with examples - I
Lecture 19 - Interpolation with Examples - II
Lecture 20 - Image Transformation - I Edit Lesson
Lecture 21 - Image Transformation - 2
Lecture 22 - Separable Transformation
Lecture 23 - Basis Images
Lecture 24 - Fourier Transformation
Lecture 25 - Properties of FT
Lecture 26 - FT Result Display - 2
Lecture 27 - Rotation Invariance Property
Lecture 28 - DCT and Walsh Transform
Lecture 29 - Handmard Transformation

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Lecture 30 - Histogram Equalization and Specifications - I
Lecture 31 - KL-transform-2
Lecture 32 - Image Enhancement
Lecture 33 - Contrast Stretching Operation
Lecture 34 - Histogram Equalization and Specification - I
Lecture 35 - Histogram Equalization and Specification - II
Lecture 36 - Histogram Implementation - I
Lecture 37 - Histogram Implementation - II
Lecture 38 - Image Enhancement
Lecture 39 - Image Enhancement
Lecture 40 - Image Enhancement
Lecture 41 - Frequency Domain Processing Techniques
Lecture 42 - Image Restoration Techniques - I
Lecture 43 - Image Restoration Techniques - II
Lecture 44 - Estimation of Degradation Model and Restoration Techniques - I
Lecture 45 - Estimation of Degradation Model and Restoration Techniques - II
Lecture 46 - Other Restoration Techniques - I
Lecture 47 - Other Restoration Techniques - II
Lecture 48 - Image Registration - I
Lecture 49 - Image Registration - II
Lecture 50 - Colour Image Processing
Lecture 51 - Colour Model
Lecture 52 - Conversion of one color model to another - I
Lecture 53 - Conversion of one color model to another - II
Lecture 54 - Pseudo color image processing
Lecture 55 - Full color image processing
Lecture 56 - Different Approaches for Image Segmentation
Lecture 57 - Image Segmentation
Lecture 58 - Region based Segmentation Operation. Thresholding Techniques
Lecture 59 - Region Splitting and Merging Technique Edit Lesson
```

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NPTEL Video Course - Electronics and Communication Engineering - NOC:Spread Spectrum Communications and Jammi

Subject Co-ordinator - Prof. Debarati Sen

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Spread Spectrum Communication
Lecture 2 - Direct Sequence Spread Spectrum System
Lecture 3 - Performance Analysis of DSSS
Lecture 4 - Concept of Jamming Margin
Lecture 5 - Frequency Hopping Spread Spectrum System
Lecture 6 - Tutorial-1
Lecture 7 - Slow and Fast Frequency Hopping
Lecture 8 - Hybrid Spread Spectrum System and Time Hopped SSS
Lecture 9 - Spread Sequences and Waveforms
Lecture 10 - Generation Mechanism of ML Sequence
Lecture 11 - Properties of Spread Spectrum Sequences
Lecture 12 - Tutorial-2
Lecture 13 - Power Spectral Density of ML Sequence
Lecture 14 - Walsh Hadamard Code and Properties
Lecture 15 - Generation Mechanism and Properties of OVSF and Barker Codes
Lecture 16 - Generation Mechanism and Properties of Gold and Kasami Codes
Lecture 17 - Performance Analysis of DSSS in Presence of Tone Jamming
Lecture 18 - Performance Analysis During Generation Tone Jamming
Lecture 19 - Performance Analysis in Presence of Gaussian Interference
Lecture 20 - Performance Analysis of a Quaternary System
Lecture 21 - Despreading with Matched Filter
Lecture 22 - Noncoherent Systems
Lecture 23 - Tutorial - III
Lecture 24 - Galois Field Mathematics
Lecture 25 - Galois Field Mathematics (Continued...)
Lecture 26 - Galois Field Mathematics (Continued...)
Lecture 27 - Polynomials over Binary Field
Lecture 28 - Long Nonlinear Sequence Generation
Lecture 29 - Rejection of Narrowband Interference

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Lecture 30 - Narrow Band Interference Cancellation by Transform Domain Processing
Lecture 31 - PN Code Acquisition Fundamentals
Lecture 32 - Performance Analysis of PN Code Acquisition System - Part I
Lecture 33 - Performance Analysis of PN Code Acquisition System - Part II
Lecture 34 - Tutorial - IV
Lecture 35 - Rapid Acquisition Using Matched Filter - Part I
Lecture 36 - Rapid Acquisition Using Matched Filter - Part II
Lecture 37 - Active Search Acquisition for FFH/MFSK Signals
Lecture 38 - Active Search Code Acquisiton for FFH/MFSK Analysis
Lecture 39 - Detection Probability Analysis of Code Acquisition for FFH / MFSK
Lecture 40 - Tutorial - V
Lecture 41 - DSSS Tracking
Lecture 42 - FHSS Synchronization Method - I
Lecture 43 - FHSS Synchronization Method - II
Lecture 44 - FHSS Synchronization Method - III
Lecture 45 - FHSS Tracking
Lecture 46 - Tutorial - VI
Lecture 47 - Concept of Fading for Wireless Communications
Lecture 48 - Diversity for Fading Channels
Lecture 49 - Rake Receiver
Lecture 50 - Performance Analysis of Rake Receiver
Lecture 51 - Spread Spectrum Multiple Access
Lecture 52 - Tutorial - VII
Lecture 53 - Introduction to CDMA
Lecture 54 - Interference Handling Mechanism in CDMA Networks
Lecture 55 - Interference Handling by Soft Handover
Lecture 56 - Interference Handling by Smart Antenna
Lecture 57 - Multiuser Detection and Interference Cancellation
Lecture 58 - Tutorial - VIII
Lecture 59 - Multiuser Detection - Part I
Lecture 60 - Multiuser Detection - Part II
Lecture 61 - MUD - Probability of Error
Lecture 62 - IS95 and CDMA - Part I
Lecture 63 - IS95 and CDMA - Part II
Lecture 64 - Tutorial - IX
Lecture 65 - WCDMA and UMTS - Part I
Lecture 66 - WCDMA and UMTS - Part II
Lecture 67 - LPI Communications
Lecture 68 - Radiometer
```

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Lecture 69 - Interceptor Detectors

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NPTEL Video Course - Electronics and Communication Engineering - NOC:Digital VLSI Testing

Subject Co-ordinator - Prof. Santanu Chattopadhyay

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable


```
Lecture 1 - Introduction
Lecture 2 - Introduction (Continued...)
Lecture 3 - Introduction (Continued...)
Lecture 4 - Introduction (Continued...)
Lecture 5 - DFT
Lecture 6 - DFT (Continued...)
Lecture 7 - DFT (Continued...)
Lecture 8 - DFT (Continued...)
Lecture 9 - DFT (Continued...)
Lecture 10 - DFT (Continued...)
Lecture 11 - Logic and Fault Simulation
Lecture 12 - Logic and Fault Simulation (Continued...)
Lecture 13 - Logic and Fault Simulation (Continued...)
Lecture 14 - Logic and Fault Simulation (Continued...)
Lecture 15 - Logic and Fault Simulation (Continued...)
Lecture 16 - Logic and Fault Simulation (Continued...)
Lecture 17 - Test Generation
Lecture 18 - Test Generation (Continued...)
Lecture 19 - Test Generation (Continued...)
Lecture 20 - Test Generation (Continued...)
Lecture 21 - Test Generation (Continued...)
Lecture 22 - Test Generation (Continued...)
Lecture 23 - Test Generation (Continued...)
Lecture 24 - Logic BIST
Lecture 25 - Logic BIST (Continued...)
Lecture 26 - Logic BIST (Continued...)
Lecture 27 - Logic BIST (Continued...)
Lecture 28 - Test Compression
Lecture 29 - Test Compression (Continued...)
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```
Lecture 30 - Test Compression (Continued...)
Lecture 31 - Test Compression (Continued...)
Lecture 32 - Low Power Testing
Lecture 33 - Low Power Testing (Continued...)
Lecture 34 - Low Power Testing (Continued...)
Lecture 35 - Low Power Testing (Continued...)
Lecture 36 - Low Power Testing (Continued...)
Lecture 37 - Thermal Aware Testing
Lecture 38 - Thermal Aware Testing (Continued...)
Lecture 39 - Thermal Aware Testing (Continued...)
Lecture 40 - Boundary Scan
Lecture 41 - Boundary Scan (Continued...)
Lecture 42 - Boundary Scan (Continued...)
Lecture 43 - Boundary Scan (Continued...)
Lecture 44 - Boundary Scan (Continued...)
Lecture 45 - System/Network - On - Chip Test
Lecture 46 - System/Network - On - Chip Test (Continued...)
Lecture 47 - System/Network - On - Chip Test (Continued...)
Lecture 48 - System/Network - On - Chip Test (Continued...)
Lecture 49 - System/Network - On - Chip Test (Continued...)
Lecture 50 - System/Network - On - Chip Test (Continued...)
Lecture 51 - System/Network - On - Chip Test (Continued...)
Lecture 52 - System/Network - On - Chip Test (Continued...)
Lecture 53 - System/Network - On - Chip Test (Continued...)
Lecture 54 - System/Network - On - Chip Test (Continued...)
Lecture 55 - System/Network - On - Chip Test (Continued...)
Lecture 56 - System/Network - On - Chip Test (Continued...)
Lecture 57 - Memory Testing
Lecture 58 - Memory Testing (Continued...)
Lecture 59 - Memory Testing (Continued...)
Lecture 60 - Memory Testing (Continued...)
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NPTEL Video Course - Electronics and Communication Engineering - NOC:Design Principles of RF and Microwave Fi

Subject Co-ordinator - Prof. Amitabha Bhattacharya

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Image Impedance based RF filter design
Lecture 2 - Concept of Image impedance and Propagation Constant
Lecture 3 - Symmetrical lossless network description for filter design
Lecture 4 - Constant k prototype filter design
Lecture 5 - m-derived prototype filter design
Lecture 6 - Introduction to Insertion loss based Microwave Filter Design
Lecture 7 - Prototype low pass filter design
Lecture 8 - Filter transformation
Lecture 9 - Microwave Filter implementation
Lecture 10 - Tutorial an Insertion Loss based Microwave Filter design
Lecture 11 - Gain Definitions of Microwave Amplifiers
Lecture 12 - Stability Analysis of Microwave Amplifiers
Lecture 13 - Conditional stability enforcement for Microwave Amplifier
Lecture 14 - Amplifier design of maximising transducer gain
Lecture 15 - Amplifier design for specified gain
Lecture 16 - Amplifier design for specified noise performance
Lecture 17 - Broadband Amplifier Design
Lecture 18 - Quantitative Characterisation of Nonlinearity for Large Signal Amplifier
Lecture 19 - Quantitative Characterisation of Nonlinearity for Large Signal Amplifier (Continued...)
Lecture 20 - Measurement of Nonlinearity

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NPTEL Video Course - Electronics and Communication Engineering - NOC:Millimeter Wave Technology

Subject Co-ordinator - Prof. Mrinal Kanti Mandal

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Millimeter-Wave Technology
Lecture 2 - Introduction to Millimeter-Wave Technology (Continued...)
Lecture 3 - Introduction to Millimeter-Wave Technology (Continued...)
Lecture 4 - Introduction to Millimeter-Wave Technology (Continued...)
Lecture 5 - Introduction to Millimeter-Wave Technology (Continued...)
Lecture 6 - Guiding Structures
Lecture 7 - Guiding Structures (Continued...)
Lecture 8 - Guiding Structures (Continued...)
Lecture 9 - Guiding Structures (Continued...)
Lecture 10 - Guiding Structures (Continued...)
Lecture 11 - Guiding Structures (Continued...)
Lecture 12 - Guiding Structures (Continued...)
Lecture 13 - Guiding Structures (Continued...)
Lecture 14 - Guiding Structures (Continued...)
Lecture 15 - Guiding Structures (Continued...)
Lecture 16 - Antennas at MM-Wave Frequencies
Lecture 17 - Antennas at MM-Wave Frequencies (Continued...)
Lecture 18 - Antennas at MM-Wave Frequencies (Continued...)
Lecture 19 - Antennas at MM-Wave Frequencies (Continued...)
Lecture 20 - Antennas at MM-WaveFrequencies (Continued...)
Lecture 21 - Passive Components
Lecture 22 - Passive Components (Continued...)
Lecture 23 - Passive Components (Continued...)
Lecture 24 - Passive Components (Continued...)
Lecture 25 - Passive Components (Continued...)
Lecture 26 - Active Devices
Lecture 27 - Active Devices (Continued...)
Lecture 28 - Active Devices (Continued...)
Lecture 29 - Active Devices (Continued...)

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Lecture 30 - Active Devices (Continued...)
Lecture 31 - Noise and Link Budget
Lecture 32 - Noise and Link Budget (Continued...)
Lecture 33 - Noise and Link Budget (Continued...)
Lecture 34 - Noise and Link Budget (Continued...)
Lecture 35 - Noise and Link Budget (Continued...)
Lecture 36 - Millimeter-Wave Systems
Lecture 37 - Millimeter-Wave Systems (Continued...)
Lecture 38 - Millimeter-Wave Systems (Continued...)
Lecture 39 - Millimeter-Wave Systems (Continued...)
Lecture 40 - Millimeter-Wave Systems (Continued...)
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NPTEL Video Course - Electronics and Communication Engineering - NOC:Power System Analysis

Subject Co-ordinator - Prof. Debapriya Das

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Structure of Power Systems and Few other Aspects - I
Lecture 2 - Structure of Power Systems and Few other Aspects - II
Lecture 3 - Structure of Power Systems and Few other Aspects - III
Lecture 4 - Resistance and Inductance
Lecture 5 - Resistance and Inductance (Continued...)
Lecture 6 - Resistance and Inductance (Continued...)
Lecture 7 - Resistance and Inductance (Continued...)
Lecture 8 - Resistance and Inductance (Continued...)
Lecture 9 - Resistance and Inductance (Continued...)
Lecture 10 - Resistance and Inductance (Continued...)
Lecture 11 - Capacitance of Transmisson Lines
Lecture 12 - Capacitance of Transmisson Lines (Continued...)
Lecture 13 - Capacitance of Transmisson Lines (Continued...)
Lecture 14 - Capacitance of Transmisson Lines (Continued...)
Lecture 15 - Power System Components and per-unit system
Lecture 16 - Power System Components and per-unit system (Continued...)
Lecture 17 - Power System Components and per-unit system (Continued...)
Lecture 18 - Power System Components and per-unit system (Continued...)
Lecture 19 - Power System Components and per-unit system (Continued...)
Lecture 20 - Power System Components and per-unit system (Continued...)
Lecture 21 - Characteristic and performance of transmission lines
Lecture 22 - Characteristic and performance of transmission lines (Continued...)
Lecture 23 - Characteristic and performance of transmission lines (Continued...)
Lecture 24 - Characteristic and performance of transmission lines (Continued...)
Lecture 25 - Characteristic and performance of transmission lines (Continued...)
Lecture 26 - Load flow studies
Lecture 27 - Load flow studies (Continued...)
Lecture 28 - Load flow studies (Continued...)
Lecture 29 - Load flow studies (Continued...)

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Lecture 30 - Load flow studies (Continued...)
Lecture 31
Lecture 32
Lecture 33
Lecture 34
Lecture 35
Lecture 36 - Load flow studies (Continued...)
Lecture 37 - Optimal system operation
Lecture 38 - Optimal system operation (Continued...)
Lecture 39 - Optimal system operation (Continued...)
Lecture 40 - Optimal system operation (Continued...)
Lecture 41 - Optimal system operation (Continued...)
Lecture 42 - Optimal system operation (Continued...)
Lecture 43 - Optimal system operation (Continued...)
Lecture 44 - Optimal system operation (Continued...)
Lecture 45 - Three phase fault studies
Lecture 46 - Three phase fault studies (Continued...)
Lecture 47 - Three phase fault studies (Continued...)
Lecture 48 - Three phase fault studies (Continued...)
Lecture 49 - Symmetrical components
Lecture 50 - Symmetrical components (Continued...)
Lecture 51 - Symmetrical components (Continued...)
Lecture 52 - Symmetrical components (Continued...)
Lecture 53 - Symmetrical components (Continued...)
Lecture 54 - Symmetrical components (Continued...)
Lecture 55 - Power system stability>
Lecture 56 - Power system stability (Continued...)
Lecture 57 - Power system stability (Continued...)
Lecture 58 - Power system stability (Continued...)
Lecture 59 - Power system stability (Continued...)
Lecture 60 - Power system stability (Continued...)
```

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NPTEL Video Course - Electronics and Communication Engineering - NOC:Analog Communication

Subject Co-ordinator - Prof. Goutam Das

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Fourier Series
Lecture 2 - Fourier Series (Continued...)
Lecture 3 - Fourier Series (Continued...)
Lecture 4 - Fourier Series (Continued...)
Lecture 5 - Fourier Series (Continued...)
Lecture 6 - Fourier Series (Continued...)
Lecture 7 - Fourier Series (Continued...)
Lecture 8 - Fourier Transform
Lecture 9 - Fourier Transform (Continued...)
Lecture 10 - Fourier Transform (Continued...)
Lecture 11 - Fourier Transform (Continued...)
Lecture 12 - Energy Spectral Density
Lecture 13 - Power Spectral Density
Lecture 14 - PSD of Random Signal
Lecture 15 - Amplitude Modulation
Lecture 16 - Amplitude Modulation (Continued...)
Lecture 17 - Amplitude Modulation (Continued...)
Lecture 18 - Amplitude Modulation (Continued...)
Lecture 19 - SSB - SC
Lecture 20 - SSB - SC (Continued...)
Lecture 21 - VSB-SC
Lecture 22 - VSB-SC (Continued...)
Lecture 23 - Effect of Carrier Synchronization
Lecture 24 - Comparison of Different Modulation Technique
Lecture 25 - PLL
Lecture 26 - PLL (Continued...)
Lecture 27 - PLL (Continued...)
Lecture 28 - PLL (Continued...) and LTI
Lecture 29 - Dispersion

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Lecture 30 - Channel Nonlinearities and Multipath Effects
Lecture 31 - Probability Theory
Lecture 32 - Probability Theory (Continued...)
Lecture 33 - Probability Theory (Continued...)
Lecture 34 - Probability Theory (Continued...)
Lecture 35 - Probability Theory (Continued...)
Lecture 36 - Probability Theory (Continued...)
Lecture 37 - Probability Theory (Continued...)
Lecture 38 - Random Process
Lecture 39 - Random Process (Continued...)
Lecture 40 - Random Process (Continued...)
Lecture 41 - Random Process (Continued...)
Lecture 42 - Random Process (Continued...)
Lecture 43 - Random Process (Continued...)
Lecture 44 - Noise Analysis - DSB-SC
Lecture 45 - Noise Analysis - AM
Lecture 46 - Noise Analysis - SSB-SC
Lecture 47 - Frequency Modulation
Lecture 48 - Frequency Modulation (Continued...)
Lecture 49 - Frequency Modulation (Continued...)
Lecture 50 - Frequency Modulation (Continued...)
Lecture 51 - Frequency Modulation (Continued...)
Lecture 52 - Frequency Modulation (Continued...)
Lecture 53 - FM Noise Analysis
Lecture 54 - FM Noise Analysis (Continued...)
Lecture 55 - FM Noise Analysis (Continued...)>
Lecture 56 - Sampling Theorem
Lecture 57 - Sampling Theorem (Continued...)
Lecture 58 - FDM Vs TDM
Lecture 59 - Flat Top Vs Natural Sampling
Lecture 60 - Pulse Coded Modulation
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NPTEL Video Course - Electronics and Communication Engineering - NOC:Modern Digital Communication Techniques

Subject Co-ordinator - Prof. Suvra Sekhar Das

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction of Digital Communication System
Lecture 2 - Introduction of Digital Communication System (Continued...)
Lecture 3 - Introduction of Digital Communication System (Continued...)
Lecture 4 - Introduction of Digital Communication System (Continued...)
Lecture 5 - Introduction of Digital Communication System (Continued...)
Lecture 6 - Source Coding
Lecture 7 - Source Coding (Continued...)
Lecture 8 - Source Coding (Continued...)
Lecture 9 - Source Coding (Continued...)
Lecture 10 - Source Coding (Continued...)
Lecture 11 - Source Coding (Continued...)
Lecture 12 - Source Coding (Continued...)
Lecture 13 - Source Coding (Continued...)
Lecture 14 - Source Coding (Continued...)
Lecture 15 - Analog to Digital Conversion
Lecture 16 - Analog to Digital Conversion (Continued...)
Lecture 17 - Characterization of Signals and Systems
Lecture 18 - Characterization of Signals and Systems (Continued...)
Lecture 19 - Characterization of Signals and Systems (Continued...)
Lecture 20 - Characterization of Signals and Systems (Continued...)
Lecture 21 - Characterization of Signals and Systems (Continued...)
Lecture 22 - Characterization of Signals and Systems (Continued...)
Lecture 23 - Characterization of Signals and Systems (Continued...)
Lecture 24 - Memoryless Modulation
Lecture 25 - Memoryless Modulation (Continued...)
Lecture 26 - Memoryless Modulation (Continued...)
Lecture 27 - Memoryless Modulation (Continued...)
Lecture 28 - Memoryless Modulation (Continued...)
Lecture 29 - Memoryless Modulation (Continued...)

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Lecture 30 - Memoryless Modulation (Continued...)
Lecture 31 - Memoryless Modulation (Continued...)
Lecture 32 - Memoryless Modulation (Continued...)
Lecture 33 - With Memory Modulation
Lecture 34 - With Memory Modulation (Continued...)
Lecture 35 - With Memory Modulation (Continued...)
Lecture 36 - With Memory Modulation (Continued...)
Lecture 37 - With Memory Modulation (Continued...)
Lecture 38 - With Memory Modulation (Continued...)
Lecture 39 - With Memory Modulation (Continued...)
Lecture 40 - Optimum Receivers for AWGN
Lecture 41 - Optimum Receivers for AWGN (Continued...)
Lecture 42 - Optimum Receivers for AWGN (Continued...)
Lecture 43 - Optimum Receivers for AWGN (Continued...)
Lecture 44 - Optimum Receivers for AWGN (Continued...)
Lecture 45 - Optimum Receivers for AWGN (Continued...)
Lecture 46 - Performance of Digital Modulation Techniques
Lecture 47 - Performance of Digital Modulation Techniques (Continued...)
Lecture 48 - Performance of Digital Modulation Techniques (Continued...)
Lecture 49 - Performance of Digital Modulation Techniques (Continued...)
Lecture 50 - Performance of Digital Modulation Techniques (Continued...)
Lecture 51 - Performance of Digital Modulation Techniques (Continued...)
Lecture 52 - Performance of Digital Modulation Techniques (Continued...)
Lecture 53 - Channel Estimation and Equalization
Lecture 54 - Channel Estimation and Equalization (Continued...)
Lecture 55 - Channel Estimation and Equalization (Continued...)>
Lecture 56 - Channel Estimation and Equalization (Continued...)
Lecture 57 - Synchronization Techniques
Lecture 58 - Synchronization Techniques (Continued...)
Lecture 59 - Synchronization Techniques (Continued...)
Lecture 60 - Synchronization Techniques (Continued...)
```

NPTEL Video Course - Electronics and Communication Engineering - NOC:Digital Speech Processing

Subject Co-ordinator - Prof. Shyamal Kumar Das Mandal

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1
Lecture 2
Lecture 3
Lecture 4
Lecture 5
Lecture 6
Lecture 7
Lecture 8
Lecture 9
Lecture 10
Lecture 11
Lecture 12
Lecture 13
Lecture 14
Lecture 15
Lecture 16 - Human Auditory System
Lecture 17
Lecture 18
Lecture 19 - Time Domain Methods in Speech Processing
Lecture 20
Lecture 21 - Introduction to Liner Prediction
Lecture 22 - Autocorrelation Method of LPC analysis
Lecture 23 - Autocorrelation Method of LPC analysis (Continued...)
Lecture 24 - Lattice Formulations of Linear Prediction
Lecture 25 - Lattice Formulations of Linear Prediction (Continued...)
Lecture 26
Lecture 27
Lecture 28
Lecture 29

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Lecture 30
Lecture 31 - Segmental and Supra-segmental features of speech signal
Lecture 32 - Cepstral Transform Coefficients (CC) Parameters extraction
Lecture 33 - Mel Frequency Cepstral Coefficients
Lecture 34 - MFCC features vector
Lecture 35 - Fundamental Frequency (F0) Detection of speech signal
Lecture 36 - Frequency Domain Fundamental Frequency Detection Algorithms
Lecture 37 - Text to Speech Synthesis
Lecture 38 - Text to Speech Synthesis (Continued...)
Lecture 39 - Automatic Speech Recognition
Lecture 40 - Statistical Modeling of Automatic Speech Recognition
Lecture 41 - Speech based Technology Development for e-learning
Lecture 42 - Prosody Modeling
Lecture 43 - Fundamental frequency countur modeling
Lecture 44 - Fundamental frequency contour modeling (Continued...)
```

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NPTEL Video Course - Electronics and Communication Engineering - NOC:Analog Circuits and Systems through SPIC

Subject Co-ordinator - Prof. Mrigank Sharad

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Basic Analog Design Part I
Lecture 2 - Basic Analog Design Part I (Continued...)
Lecture 3 - Basic Analog Design Part II
Lecture 4 - Basic Analog Design Part II (Continued...)
Lecture 5 - Basic Analog Design Part III
Lecture 6 - Basic Analog Design Part III (Continued...)
Lecture 7 - Basic Analog Design Part III (Continued...)
Lecture 8 - Basic Analog Design Part III (Continued...)
Lecture 9 - Basic Analog Design Part III (Continued...)
Lecture 10 - Basic Analog Design Part III (Continued...)
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NPTEL Video Course - Electronics and Communication Engineering - NOC:Communication Networks

Subject Co-ordinator - Prof. Goutam Das

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Communication Networks
Lecture 2 - Introduction to Communication Networks (Continued...)
Lecture 3 - Introduction to Communication Networks (Continued...)
Lecture 4 - Circuit Switch Networks
Lecture 5 - Space switch Artitechture
Lecture 6 - Space switch Architecture (Continued...)
Lecture 7 - Space Switch Architecture (Continued...)
Lecture 8 - Space Switch Architecture (Continued...)
Lecture 9 - Space Switch Architecture (Continued...)
Lecture 10 - Time Switch
Lecture 11 - Space Time Switch
Lecture 12 - Space Time Switch (Continued...)
Lecture 13 - Synchronisation
Lecture 14 - Synchronisation (Continued...)
Lecture 15 - Introduction to Queuing Theory
Lecture 16 - Arrival and Service Process
Lecture 17 - Poisson Process
Lecture 18 - poisson process (Continued...)
Lecture 19 - Memorylessness
Lecture 20 - Little's Theorem
Lecture 21 - Little's Theorem (Continued...)
Lecture 22 - D T M C
Lecture 23 - D T M C (Continued...)
Lecture 24 - D T M C To C T M C
Lecture 25 - C T M C
Lecture 26 - M/M/1 Queue
Lecture 27 - M/M/m And M/M/m/m System
Lecture 28 - Introduction to Data Networks
Lecture 29 - Introduction to Data Networks (Continued...)

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Lecture 30 - Introduction to Data Networks (Continued...)
Lecture 31 - Layered Architecture
Lecture 32 - Layered Architecture (Continued...)
Lecture 33 - Broadband Access - Dail Up/ADSL
Lecture 34 - Broadband Access - DSL, Aloha
Lecture 35 - Aloha/Slotted Aloha
Lecture 36 - Slotted Aloha
Lecture 37 - Slotted Aloha (Continued...)
Lecture 38 - Slotted Aloha- Stability Analysis
Lecture 39 - Slotted Aloha- Stability Analysis (Continued...)
Lecture 40 - Stabilized Slotted Aloha-bayesian Estimation
Lecture 41 - Binary Back- off Algorithm
Lecture 42 - Effect of Physical Media
Lecture 43 - PON and Ethernet MAC
Lecture 44 - PON and Ethernet MAC (Continued...)
Lecture 45 - CSMA/CD
Lecture 46 - CSMA/CA
Lecture 47 - CSMA/CA (Continued...)
Lecture 48 - CSMA/CA (Continued...)
Lecture 49 - CSMA/CA (Continued...)
Lecture 50 - Learning Bridges
Lecture 51 - Learning Bridges (Continued...)
Lecture 52 - Distributed Spanning Tree
Lecture 53 - Distributed Spanning Tree (Continued...)
Lecture 54 - Internet Protocol
Lecture 55 - Internet Protocol (Continued...)
Lecture 56 - Subnet and ARP
Lecture 57 - ARP and DHCP
Lecture 58 - DHCP and Routing
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NPTEL Video Course - Electronics and Communication Engineering - NOC:Signal Processing Techniques and its Ap

Subject Co-ordinator - Prof. Shyamal Kumar Das Mandal

Co-ordinating Institute - IIT - Kharagpur

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Signal and its Types
Lecture 3 - Characteristics of a Signal
Lecture 4 - Digitization of Signal
Lecture 5 - Digitization of Signal (Continued...)
Lecture 6 - Concept of Frequency in Continuous-time and Discrete-time Signal
Lecture 7 - Tutorial 1
Lecture 8 - Discrete Time Signal
Lecture 9 - Discrete Time System
Lecture 10 - D.T.S (L.T.I System)
Lecture 11 - Linear Time-Invariant Systems (Continued...)
Lecture 12 - Correlation
Lecture 13 - Tutorial 02
Lecture 14 - Z-Transform
Lecture 15 - Z-Transform Properties
Lecture 16 - Pole and Zero in Z-Transform
Lecture 17 - Inverse Z-Transform
Lecture 18 - Frequency-Domain Representation of Discrete Signals and L.T.I Systems
Lecture 19 - Discrete Fourier Transform (DFT)
Lecture 20 - Discrete Fourier Transform Linear Transform View
Lecture 21 - Discrete Fourier Transform Linear Transform View (Continued...)
Lecture 22 - Properties of Discrete Fourier Transform
Lecture 23 - Properties of Discrete Fourier Transform (Continued...)
Lecture 24 - Properties of Discrete Fourier Transform (Continued...)
Lecture 25 - Properties of Discrete Fourier Transform (Continued...)
Lecture 26 - Linear Filtering
Lecture 27 - Tutorial 5
Lecture 28 - Two Dimensional Discrete Fourier Transform
Lecture 29 - Discrete Cosine Transform

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Lecture 30 - Frequency analysis of long signal using DFT
Lecture 31 - Short-Time Fourier Transform (STFT)
Lecture 32 - STFT Synthesis
Lecture 33 - Fast Fourier Transform (FFT) Algorithms
Lecture 34 - Fast Fourier Transform (FFT) Algorithms (Continued...)
Lecture 35 - Radix-2 FFT Algorithms
Lecture 36 - Radix-2 FFT Algorithms (Continued...)
Lecture 37 - Spectrum and spectrogram
Lecture 38 - Digital Filter
Lecture 39 - FIR Filter
Lecture 40 - Linear Symmetric and Anti-symmetric filter
Lecture 41 - FIR Filter Design
Lecture 42 - Frequency Sampling Method
Lecture 43 - Design Optimum equiripple Linear-Phase FIR Filters (optimization methods)
Lecture 44 - Infinite Impulse Response (IIR) Filters
Lecture 45 - Traditional Analog Filter Design
Lecture 46 - Chebyshev filter Design Method
Lecture 47 - Analogue filter to digital filter transformation
Lecture 48 - Linear Prediction and Optimum Linear Filters
Lecture 49 - Autocorrelation Method for Linear Prediction
Lecture 50 - Covariance Method for Linear Prediction
Lecture 51 - Lattice Formulations of Linear Prediction
Lecture 52 - Lattice Formulations of Linear Prediction (Continued....)
Lecture 53 - Introduction to Multirate Signal Processing
Lecture 54 - Analysis of Decimation and Interpolation
Lecture 55 - Fractional Rate Conversion
Lecture 56 - Implementations of Decimator and Interpolator
Lecture 57 - Sample Rate Conversion by Stages
Lecture 58 - Power Spectrum Estimation
Lecture 59 - Power Spectrum Estimation (Continued...)
Lecture 60 - Tutorial 6: Tutorial for Final Examination
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NPTEL Video Course - Electronics and Communication Engineering - Analog IC Design

Subject Co-ordinator - Dr. Nagendra Krishnapura

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Course introduction; Negative feedback control
Lecture 2 - Negative feedback amplifier
Lecture 3 - Step response, sinusoidal steady state response
Lecture 4 - Loop gain and unity loop gain frequency; Opamp
Lecture 5 - Opamp realization using controlled sources; Delay in the loop
Lecture 6 - Negative feedback amplifier with ideal delay-small delays
Lecture 7 - Negative feedback amplifier with ideal delay-large delays
Lecture 8 - Negative feedback amplifier with parasitic poles and zeros
Lecture 9 - Negative feedback amplifier with parasitic poles and zeros; Nyquist criterion
Lecture 10 - Nyquist criterion; Phase margin
Lecture 11 - Phase margin
Lecture 12 - Single stage opamp realization
Lecture 13 - Two stage miller compensated opamp
Lecture 14 - Two stage miller compensated opamp
Lecture 15 - Two and three stage miller compensated opamps; Feedforward compensated opamp
Lecture 16 - Feedforward compensated opamp
Lecture 17 - Feedforward compensated opamp
Lecture 18 - Feedforward compensated opamp; typical opamp data sheet
Lecture 19 - Opamp offset and CMRR; Transimpedance amplifier using an opamp
Lecture 20 - Components available in a CMOS process
Lecture 21 - MOS transistors-basics
Lecture 22 - MOS transistors-parasitics, mismatch
Lecture 23 - MOS transistors-mismatch, speed
Lecture 24 - Noise in resistors
Lecture 25 - Noise in MOS transistors; Input and output referred noise
Lecture 26 - Noise scaling; Basic amplifier stages-Common source, common gate
Lecture 27 - Basic amplifier stages-Common drain; Frequency response of amplifiers
Lecture 28 - Common source amplifier frequency response; Differential amplifier
Lecture 29 - Differential and common mode half circuits; Differential pair with active load

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Lecture 30 - Differential pair with current mirror load
Lecture 31 - Single stage opamp characteristics
Lecture 32 - Opamp with single and dual supplies; Single stage opamp tradeoffs
Lecture 33 - Telescopic cascode opamp
Lecture 34 - Telescopic cascode opamp; Folded cascode opamp
Lecture 35 - Folded cascode opamp
Lecture 36 - Two stage opamp
Lecture 37 - Two stage opamp; Three stage and triple cascode opamps
Lecture 38 - Common mode rejection ratio; Example
Lecture 39 - Fully differential circuits
Lecture 40 - Fully differential single stage opamp
Lecture 41 - Common mode feedback
Lecture 42 - Fully differential single stage opamp
Lecture 43 - Fully differential two stage opamp; Fully differential versus pseudo-differential
Lecture 44 - Circuit simulators and analyses
Lecture 45 - Phase locked loop as frequency multiplier
Lecture 46 - Phase domain model
Lecture 47 - Type I PLL transfer function and reference feedthrough
Lecture 48 - Type II PLL
Lecture 49 - Type II PLL transfer functions; Implementation
Lecture 50 - Type II PLL-extra poles; Random noise in a PLL
Lecture 51 - Oscillator phase noise
Lecture 52 - PLL phase noise; LC and ring Oscillators
Lecture 53 - Generating PTAT and constant MOS gm bias currents
Lecture 54 - Reducing supply sensitivity; Bandgap voltage reference
Lecture 55 - Fractional bandgap reference; Low dropout regulator
Lecture 56 - Low dropout regulators; Continuous-time active filters
Lecture 57 - Continuous-time active filters
Lecture 58 - Continuous-time active filters
Lecture 59 - Discrete-time active filters
Lecture 60 - Transistor sizing in practice; Course summary
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NPTEL Video Course - Electronics and Communication Engineering - Coding Theory

Subject Co-ordinator - Dr. Andrew Thangaraj

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Linear Block Codes
Lecture 2 - Properties of Linear Block Codes
Lecture 3 - Dual of Linear Block Codes
Lecture 4 - Minimum Distance of Codes
Lecture 5 - Operations on Codes
Lecture 6 - Bounds on Code Parameters
Lecture 7 - Optimal Decoders
Lecture 8 - Syndrome Decoder, Basics of Finite Fields
Lecture 9 - Constructions of Finite Fields
Lecture 10 - Computations in Finite Fields
Lecture 11 - Codes over Finite Fields, Minimal Polynomials
Lecture 12 - BCH Codes
Lecture 13 - BCH and RS Codes I
Lecture 14 - BCH and RS Codes II
Lecture 15 - Decoding BCH Codes
Lecture 16 - Decoding RS Codes
Lecture 17 - Coded Modulation and Soft Decision Decoding
Lecture 18 - Optimal Decoders for BPSK and AWGN
Lecture 19 - Bitwise Map Decoder for BPSK over AWGN
Lecture 20 - Bitwise Map Decoder from the Dual Code
Lecture 21 - Simulating Coded Modulation
Lecture 22 - Union Bound, Introduction to LDPC Codes
Lecture 23 - LDPC Codes
Lecture 24 - Message Passing, Density Evolution Analysis
Lecture 25 - Thresholds of LDPC Codes
Lecture 26 - Irregular LDPC Codes
Lecture 27 - Optimized Irregular LDPC Codes, Soft Message Passing Decoders
Lecture 28 - Density Evolution for Soft Message Passing Decoding of LDPC Codes
Lecture 29 - LDPC Codes in Practice

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Lecture 30 - Introduction to Convolutional Codes
Lecture 31 - Viterbi Decoding of Convolutional Codes
Lecture 32 - Union Bound, Recursive Convolutional Encoders
Lecture 33 - Convolutional Codes in Practice
Lecture 34 - BCJR Decoder
Lecture 35 - BCJR & Max-Log-MAP Decoder, Introduction to Turbo Codes
Lecture 36 - Turbo Decoder
Lecture 37 - Turbo Codes in Practice
Lecture 38 - Modern Codes
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NPTEL Video Course - Electronics and Communication Engineering - Semiconductor Device Modeling

Subject Co-ordinator - Prof. S. Karmalkar

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1
Lecture 2
Lecture 3
Lecture 4
Lecture 5
Lecture 6
Lecture 7
Lecture 8
Lecture 9
Lecture 10
Lecture 11
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Lecture 46
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NPTEL Video Course - Electronics and Communication Engineering - VLSI Data Conversion Circuits

Subject Co-ordinator - Dr. Shanthi Pavan

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable │ MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Data Conversion
Lecture 2 - Sampling-1
Lecture 3 - Sampling-2
Lecture 4 - Nonidealities in Samples
Lecture 5 - Noise due to Sampling
Lecture 6 - Distortion in a Sampling Switch
Lecture 7 - Gate Boosted Switches-1
Lecture 8 - Gate Boosted Switches-2
Lecture 9 - Charge Injection
Lecture 10 - S/H Characterization-1
Lecture 11 - S/H Characterization-2
Lecture 12 - FFTs and Leakage
Lecture 13 - Spectral Windows-1
Lecture 14 - Spectral Windows-2
Lecture 15 - ADC/DAC Definition
Lecture 16 - Quantization Noise-1
Lecture 17 - Quantization Noise-2
Lecture 18 - Over Sampling and Noise Shaping
Lecture 19 - Delta-Sigma Modulation-1
Lecture 20 - Delta-Sigma Modulation-2
Lecture 21 - Linearized Analysis
Lecture 22 - Stability of Delta Sigma Modulators
Lecture 23 - High Order DSMs
Lecture 24 - NTF Design and Tradeoffs
Lecture 25 - Single bit Modulators
Lecture 26 - Loop Filter Architectures
Lecture 27 - Continous-time Delta Sigma Modulation
Lecture 28 - Implicit Antialiasing
Lecture 29 - Modulators with NRZ and Impulsive DACs

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Lecture 30 - High Order CTDSMs
Lecture 31 - CTDM Design
Lecture 32 - Excess Loop Delay (ELD)
Lecture 33 - ELD Compensation
Lecture 34 - Effect of Clock Jitter on CTDSMs-1
Lecture 35 - Effect of Clock Jitter on CTDSMs-2
Lecture 36 - Dynamic Range Scaling
Lecture 37 - Simulation of CTDSMs
Lecture 38 - Integrator Design-1
Lecture 39 - Integrator Design-2
Lecture 40 - Flash ADC Design
Lecture 41 - Latches and Metastability
Lecture 42 - Offset in a Latch-1
Lecture 43 - Offset in a Latch-2 Auto Zeroing
Lecture 44 - Auto Zeroing-2
Lecture 45 - Auto Zeroing-3
Lecture 46 - Auto Zeroing in flash ADCs
Lecture 47 - Flash ADCs Case Study
Lecture 48 - Flash ADC Case Study
Lecture 49 - Flash ADC in a Delta Sigma Loop
Lecture 50 - DAC Basics
Lecture 51 - Binary and Themometer DACs
Lecture 52 - Segmented DACs
Lecture 53 - Optimal DAC Segmentation
Lecture 54 - DAC Nonlinearities
Lecture 55 - Current Steering DACs-1
Lecture 56 - Current Steering DACs-2
Lecture 57 - DAC Mismatches in DSMs
Lecture 58 - Calibration and Randomization
Lecture 59 - Dynamic Element Matching-1
Lecture 60 - Dynamic Element Matching-2
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NPTEL Video Course - Electronics and Communication Engineering - Digital Circuits and Systems

Subject Co-ordinator - Prof. S. Srinivasan

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction To Digital Circuits
Lecture 2 - Introduction To Digital Circuits
Lecture 3 - Combinational Logic Basics
Lecture 4 - Combinational Circuits
Lecture 5 - Logic Simplification
Lecture 6 - Karnaugh Maps And Implicants
Lecture 7 - Logic Minimization Using Karnaugh Maps
Lecture 8 - Karnaugh Map Minimization Using Maxterms
Lecture 9 - Code Converters
Lecture 10 - Parity Generators And Display Decoder
Lecture 11 - Arithmetic Circuits
Lecture 12 - Carry Look Ahead Adders
Lecture 13 - Subtractors
Lecture 14 - 2?'S Complement Subtractor and BCD Adder
Lecture 15 - Array Multiplier
Lecture 16 - Introduction to Sequential Circuits
Lecture 17 - S-R, J-K and D Flip Flops
Lecture 18 - J-K and T Flip Flops
Lecture 19 - Triggering Mechanisms of Flip Flops and Counters
Lecture 20 - Up/Down Counters
Lecture 21 - Shift Registers
Lecture 22 - Application of shift Registers
Lecture 23 - State Machines
Lecture 24 - Design of Synchronous Sequential Circuits
Lecture 25 - Design using J-K Flip Flop
Lecture 26 - Mealy and Moore Circuits
Lecture 27 - Pattern Detector
Lecture 28 - MSI and LSI Based Design
Lecture 29 - Multiplexer Based Design

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Lecture 30 - Encoders and Decoders
Lecture 31 - Programmable Logic Devices
Lecture 32 - Design using Programmable Logic Devices
Lecture 33 - Design using Programmable Logic Devices (Continued)
Lecture 34 - MSI and LSI based Implementation of Sequential Circuits
Lecture 35 - MSI and LSI based Implementation of Sequential Circuits (Continued)
Lecture 36 - Design of circuits using MSI sequential blocks
Lecture 37 - System Design Example
Lecture 38 - System Design Example (Continued)
Lecture 39 - System Design using the concept of controllers
Lecture 40 - System Design using the concept of controllers (Continued)
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NPTEL Video Course - Electronics and Communication Engineering - Electronics for Analog Signal Processing - I

Subject Co-ordinator - Prof. K. Radhakrishna Rao

Co-ordinating Institute - IIT - Madras | Texas Instruments - India

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Diode
Lecture 3 - Diode characteristics
Lecture 4 - Rectifier
Lecture 5 - Voltage Multiplier
Lecture 6 - Full Wave Rectifier and Peak Detector
Lecture 7 - Diode as a GATE
Lecture 8 - Analog GATE
Lecture 9 - Small Signal Analysis of Diode Circuit
Lecture 10 - Zener Regulator and Voltage Regulator
Lecture 11 - Varactor Diode
Lecture 12 - Amplifiers
Lecture 13 - Cascading of Amplifiers
Lecture 14 - Cascading of Amplifiers
Lecture 15 - h and g Parameters
Lecture 16 - Two Port Analysis
Lecture 17 - Amplifier Applications
Lecture 18 - Frequency Limitations Of An Amplifier
Lecture 19 - Distortion In Amplifiers
Lecture 20 - Bipolar Junction Transistor
Lecture 21 - Transistor (BJT) Inverter
Lecture 22 - Transistor Biasing
Lecture 23 - Stable Way of Biasing
Lecture 24 - Common Emitter Amplifiers
Lecture 25 - Transistor Biasing Using Single Supply
Lecture 26 - Metal Oxide Semiconductor
Lecture 27 - Construction of a MOSFET
Lecture 28 - Varieties of MOSFETS and JFETS
Lecture 29 - Characteristics of MOSFET

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Lecture 30 - Cascading Amplifiers
Lecture 31 - Cascading (Direct Coupling)
Lecture 32 - The Differential Amplifiers
Lecture 33 - BJT Differential Amplifiers
Lecture 34 - MOSFET Differential Amplifiers
Lecture 35 - Cascading Differential Amplifiers
Lecture 36 - Current Source and Current Sink
Lecture 37 - NMOS Inverters and CMOS Inverters
Lecture 38 - Active Components used in Electronics
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NPTEL Video Course - Electronics and Communication Engineering - Electronics for Analog Signal Processing - I

Subject Co-ordinator - Prof. K. Radhakrishna Rao

Co-ordinating Institute - IIT - Madras | Texas Instruments - India

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Feedback Theory
Lecture 2 - Negative Feedback
Lecture 3 - Negative Feedback
Lecture 4 - Y-Feedback
Lecture 5 - h and g Negative Feedback
Lecture 6 - g Feedback with Mosfet
Lecture 7 - Operational Amplifier in Negative Feedback
Lecture 8 - Operational Amplifier in Negative Feedback
Lecture 9 - Positive Feedback (Regenerative)
Lecture 10 - Experimental Demonstration
Lecture 11 - Instrumentation Amplifiers
Lecture 12 - Active Filters
Lecture 13 - Simulation of Harmonic Oscillators
Lecture 14 - Oscillators
Lecture 15 - Oscillators
Lecture 16 - Frequency Compensation in Negative Feedback
Lecture 17 - Frequency Compensation
Lecture 18 - Wideband (video) Amplifiers
Lecture 19 - Wideband Amplifiers
Lecture 20 - ICs For Video And Tuned Amplifier Applications
Lecture 21 - Power Amplifier
Lecture 22 - Power Amplifier
Lecture 23 - Class B and C Power Amplifiers
Lecture 24 - Class-B Power Amplifier Load and Drive
Lecture 25 - Control Circuits
Lecture 26 - Voltage Regulators
Lecture 27 - Voltage Regulators
Lecture 28 - Voltage Regulators
Lecture 29 - Convertors

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Lecture 30 - Analog Multipliers (Modems & Mixers)
Lecture 31 - Log-Antilog Multipliers
Lecture 32 - Multipliers
Lecture 33 - Multipliers
Lecture 34 - AGC/AVC
Lecture 35 - AGC/AVC
Lecture 36 - Experimental Demonstration
Lecture 37 - PLL (Phase Locked Loop)
Lecture 38 - PLL (Phase Locked Loop)
Lecture 39 - Lock Range Capture Range and FSK and FM
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NPTEL Video Course - Electronics and Communication Engineering - High Speed Devices and Circuits

Subject Co-ordinator - Prof. K.N. Bhat

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Basic concepts
Lecture 2 - Requirements for high speed circuits, devices and materials
Lecture 3 - Classification and properties of semiconductor devices
Lecture 4 - Ternary compound semiconductors and their applications
Lecture 5 - Ternary compound semiconductors and their applications (Continued.)
Lecture 6 - Crystal structures in GaAs
Lecture 7 - Dopants and impurities in GaAs and InP
Lecture 8 - Brief Overview of GaAs Technology for High Speed Devices
Lecture 9 - Epitaxial Techniques for GaAs and high speed devices
Lecture 10 - MBE and LPE for GaAs Epitoxy
Lecture 11 - GaAs and InP devices for Microelectronics
Lecture 12 - Metal Semiconductor contacts for MESFET
Lecture 13 - Metal Semiconductor contacts for MESFET (Continued.)
Lecture 14 - Metal Semiconductor contacts for MESFET (Continued.)
Lecture 15 - Ohmic contacts on semiconductors
Lecture 16 - Fermi level pinning, I V characteristics of Schottky Barrier Diodes
Lecture 17 - Schottky Barrier Diodes I V characteristics of Non idealities -1
Lecture 18 - Schottky Barrier Diodes I V characteristics of Non idealities -1
Lecture 19 - Causes of Non idealities in the Schottky Barrier Diodes (I V characteristics)
Lecture 20 - MESFET operations and I V characteristics
Lecture 21 - MESFET I V characteristics Shockley's Model
Lecture 22 - MESFET Shockley's Model and velocity saturation effect
Lecture 23 - MESFET velocity saturation effect on drain current saturation
Lecture 24 - MESFET
Lecture 25 - MESFET
Lecture 26 - MESFET
Lecture 27 - MESFET
Lecture 28 - MESFET
Lecture 29 - Self Aligned MESFET SAINT Threshold Voltage and Sub Threshold current

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Lecture 30 - Hetero junctions
Lecture 31 - Hetero junctions and high electron Mobility Transistor (HEMT)
Lecture 32 - Hetero junctions and high electron Mobility Transistor (HEMT) (Continued.)
Lecture 33 - High Electron Mobility Transistor
Lecture 34 - HEMT off voltage, I-V characteristics and trans conductance
Lecture 35 - I-V characteristics and trans conductance and optimization
Lecture 36 - Indium phosphide based HEMT
Lecture 37 - Pseudomorphic HEMT and Hetrojunction Bipolar Transistors
Lecture 38 - Hetero junction Bipolar Transistors (HBT)
Lecture 39 - Hetero junction Bipolar Transistors (HBT) (Continued.)
Lecture 40 - Hetero junction Bipolar Transistors (HBT) (Continued.)
Lecture 41 - Hetero junction Bipolar Transistors (HBT) (Continued.)
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NPTEL Video Course - Electronics and Communication Engineering - Solid State Devices

Subject Co-ordinator - Prof. S. Karmalkar

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable


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Lecture 1 - Introduction on Solid State Devices
Lecture 2 - Evolution and Uniqueness of Semiconductor
Lecture 3 - Equilibrium Carrier Concentration
Lecture 4 - Equilibrium Carrier Concentration
Lecture 5 - Equilibrium Carrier Concentration
Lecture 6 - Equilibrium Carrier Concentration
Lecture 7 - Equilibrium Carrier Concentration
Lecture 8 - Equilibrium Carrier Concentration
Lecture 9 - Equilibrium Carrier Concentration
Lecture 10 - Equilibrium Carrier Concentration
Lecture 11 - Equilibrium Carrier Concentration
Lecture 12 - Carrier Transport
Lecture 13 - Carrier Transport (Continued.)
Lecture 14 - Carrier Transport (Continued.)
Lecture 15 - Excess Carriers
Lecture 16 - Excess Carriers (Continued.)
Lecture 17 - Procedure for Device Analysis
Lecture 18 - Procedure for Device Analysis (Continued.)
Lecture 19 - PN Junction
Lecture 20 - PN Junction (Continued.)
Lecture 21 - PN Junction (Continued.)
Lecture 22 - PN Junction (Continued.)
Lecture 23 - PN Junction (Continued.)
Lecture 24 - PN Junction (Continued.)
Lecture 25 - PN Junction (Continued.)
Lecture 26 - Bipolar Junction Transistor
Lecture 27 - Bipolar Junction Transistor (Continued.)
Lecture 28 - Bipolar Junction Transistor (Continued.)
Lecture 29 - Bipolar Junction Transistor (Continued.)
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Lecture 30 - Bipolar Junction Transistor (Continued.)
Lecture 31 - Bipolar Junction Transistor (Continued.)
Lecture 32 - Bipolar Junction Transistor (Continued.)
Lecture 33 - Metal-Oxide-Semiconductor (MOS) Junction
Lecture 34 - Metal-Oxide-Semiconductor (MOS) Junction (Continued.)
Lecture 35 - Metal-Oxide-Semiconductor (MOS) Junction (Continued.)
Lecture 36 - Metal-Oxide-Semiconductor (MOS) Junction (Continued.)
Lecture 37 - Metal-Oxide-Semiconductor (MOS) Junction (Continued.)
Lecture 38 - MOS Field Effect Transistor
Lecture 39 - MOS Field Effect Transistor (Continued.)
Lecture 40 - MOS Field Effect Transistor (Continued.)
Lecture 41 - MOS Field Effect Transistor (Continued.)
Lecture 42 - The Final Lecture - Conclusion
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NPTEL Video Course - Electronics and Communication Engineering - VLSI Circuits

Subject Co-ordinator - Prof. S. Srinivasan

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to VLSI Design
Lecture 2 - Combinational Circuit Design
Lecture 3 - Programmable Logic Devices
Lecture 4 - Programmable Array Logic
Lecture 5 - Review of Flip-Flops
Lecture 6 - Sequential Circuits
Lecture 7 - Sequential Circuit Design
Lecture 8 - MSI Implementation of Sequential Circuits
Lecture 9 - Design of Sequential Circuits using One Hot Controller
Lecture 10 - Verilog Modeling of Combinational Circuits
Lecture 11 - Modeling of Verilog Sequential Circuits - Core Statements
Lecture 12 - Modeling of Verilog Sequential Circuits - Core Statements(Continued.)
Lecture 13 - RTL Coding Guidelines
Lecture 14 - Coding Organization - Complete Realization
Lecture 15 - Coding Organization - Complete Realization (Continued.)
Lecture 16 - Writing a Test Bench
Lecture 17 - System Design using ASM Chart
Lecture 18 - Example of System Design using ASM Chart
Lecture 19 - Examples of System Design using Sequential Circuits
Lecture 20 - Examples of System Design using Sequential Circuits (Continued.)
Lecture 21 - Microprogrammed Design
Lecture 22 - Microprogrammed Design (Continued.)
Lecture 23 - Design Flow of VLSI Circuits
Lecture 24 - Simulation of Combinational Circuits
Lecture 25 - Simulation of Combinational and Sequential Circuits
Lecture 26 - Analysis of Waveforms using Modelsim
Lecture 27 - Analysis of Waveforms using Modelsim (Continued.)
Lecture 28 - ModelSim Simulation Tool
Lecture 29 - Synthesis Tool

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Lecture 30 - Synthesis Tool (Continued.)
Lecture 31 - Synplify Tool - Schematic Circuit Diagram View
Lecture 32 - Technology View using Synplify Tool
Lecture 33 - Synopsys Full and Parallel Cases
Lecture 34 - Xilinx Place & Route Tool
Lecture 35 - Xilinx Place & Route Tool (Continued.)
Lecture 36 - PCI Arbiter Design using ASM Chart
Lecture 37 - Design of Memories - ROM
Lecture 38 - Design of Memories- RAM
Lecture 39 - Design of External RAM
Lecture 40 - Design of Arithmetic Circuits
Lecture 41 - Design of Arithmetic Circuits (Continued.)
Lecture 42 - Design of Arithmetic Circuits (Continued.)
Lecture 43 - System Design Examples
Lecture 44 - System Design Examples (Continued.)
Lecture 45 - System Design Examples (Continued.)
Lecture 46 - System Design Examples (Continued.)
Lecture 47 - System Design Examples (Continued.)
Lecture 48 - System Design Examples using FPGA Board
Lecture 49 - System Design Examples using FPGA Board (Continued.)
Lecture 50 - Advanced Features of Xilinx Project Navigator
Lecture 51 - System Design Examples using FPGA Board (Continued.)
Lecture 52 - System Design Examples using FPGA Board (Continued.)
Lecture 53 - System Design Examples using FPGA Board (Continued.)
Lecture 54 - System Design Examples using FPGA Board (Continued.)
Lecture 55 - Project Design Suggested for FPGA/ASIC Implementations
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NPTEL Video Course - Electronics and Communication Engineering - VLSI Technology

Subject Co-ordinator - Dr. Nandita Dasgupta

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction on VLSI Design
Lecture 2 - Bipolar Junction Transistor Fabrication
Lecture 3 - MOSFET Fabrication for IC
Lecture 4 - Crystal Structure of Si
Lecture 5 - Crystal Structure (Continued.)
Lecture 6 - Defects in Crystal + Crystal growth
Lecture 7 - Crystal growth Contd + Epitaxy I
Lecture 8 - Epitaxy II - Vapour phase Epitaxy
Lecture 9 - Epitaxy III - Doping during Epitaxy
Lecture 10 - Molecular beam Epitaxy
Lecture 11 - Oxidation I - Kinetics of Oxidation
Lecture 12 - Oxidation II - Oxidation rate constants
Lecture 13 - Oxidation III - Dopant Redistribution
Lecture 14 - Oxidation IV - Oxide Charges
Lecture 15 - Diffusion I - Theory of Diffusion
Lecture 16 - Diffusion II - Infinite Source
Lecture 17 - Diffusion III - Actual Doping Profiles
Lecture 18 - Diffusion IV - Diffusion Systems
Lecture 19 - Ion - Implantation Process
Lecture 20 - Ion - Implantation Process
Lecture 21 - Annealing of Damages
Lecture 22 - Masking during Implantation
Lecture 23 - Lithography - I
Lecture 24 - Lithography - II
Lecture 25 - Wet Chemical Etching
Lecture 26 - Dry Etching
Lecture 27 - Plasma Etching Systems
Lecture 28 - Etching of Si,Sio2,SiN and other materials
Lecture 29 - Plasma Deposition Process

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Lecture 30 - Metallization - I
Lecture 31 - Problems in Aluminium Metal contacts
Lecture 32 - IC BJT - From junction isolation to LOCOS
Lecture 33 - Problems in LOCOS + Trench isolation
Lecture 34 - More about BJT Fabrication and Realization
Lecture 35 - Circuits + Transistors in ECL Circuits
Lecture 36 - MOSFET I - Metal gate vs. Self-aligned Poly-gate
Lecture 37 - MOSFET II Tailoring of Device Parameters
Lecture 38 - CMOS Technology
Lecture 39 - Latch - up in CMOS
Lecture 40 - BICMOS Technology
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NPTEL Video Course - Electronics and Communication Engineering - Basic Electrical Circuits

Subject Co-ordinator - Dr. Nagendra Krishnapura

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to the course;Current and Voltage;Kirchhoff's Current and Voltage laws
Lecture 2 - Electrical circuit elements
Lecture 3 - Elements in series and parallel; Superposition in linear circuits
Lecture 4 - Controlled sources; Determining the characteristics of a two terminal element; Realizing a resist
Lecture 5 - Nodal analysis of a network with conductances and current sources; Setting up the equations; Cond
Lecture 6 - Circuit analysis; Number of KCL and KVL equations in a circuit; Nodal analysis of a network with
Lecture 7 - Nodal analysis with voltage sources and controlled sources; Brief introduction to modified nodal
Lecture 8 - Mesh analysis of a circuit with resistors and voltage sources; Comparison with nodal analysis; Me
Lecture 9 - Choice of nodal versus mesh analysis; Circuit theorems
Lecture 10 - Thevenin and Norton (theorem and) equivalent circuits; Power conservation in a circuit
Lecture 11 - Tellegen's theorem; Reciprocity theorem
Lecture 12 - Compensation Theorem; Two ports
Lecture 13 - Two port parameters-y parameters
Lecture 14 - Two port parameters(z, h, and g); Reciprocal two ports
Lecture 15 - Opamp, ideal opamp circuits, non-inverting and inverting amplifiers; Ensuring that the opamp has
Lecture 16 - RC circuit natural response; First order differential equation
Lecture 17 - RC (first-order) circuit, complete response with step inputs; Transient(natural) and steady stat
Lecture 18 - Step response of RC circuit with loops of voltage sources and capacitors; RL circuits; RLC circu
Lecture 19 - Second order(RLC circuit) natural response; Series and prallel RLC circuits; Differential equati
Lecture 20 - General formulation of second order(RLC circuit) natural response; Natural frequency and damping
Lecture 21 - Sinusoidal steady state response of RC and RLC circuits

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NPTEL Video Course - Electronics and Communication Engineering - NOC:Basic Electrical Circuits

Subject Co-ordinator - Dr. Nagendra Krishnapura

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Preliminaries
Lecture 2 - Current
Lecture 3 - Voltage
Lecture 4 - Electrical elements and circuits
Lecture 5 - Kirchhoff's current law (KCL)
Lecture 6 - Kirchhoff's Voltage law (KVL)
Lecture 7 - Voltage Source
Lecture 8 - Current Source
Lecture 9 - Resistor
Lecture 10 - Capacitor
Lecture 11 - Inductor
Lecture 12 - Mutual Inductor
Lecture 13 - Linearity of Elements
Lecture 14 - Solutions to the assignment on units 1 and 2
Lecture 15 - Series connection-Voltage sources in series
Lecture 16 - Series connection of R, L, C, current source
Lecture 17 - Elements in parallel
Lecture 18 - Current source in series with an element; Voltage source in parallel with an element
Lecture 19 - Extreme cases
Lecture 20 - Summary
Lecture 21 - Voltage controlled voltage source (VCVS)
Lecture 22 - Voltage controlled current source (VCCS)
Lecture 23 - Current controlled voltage source (CCVS)
Lecture 24 - Current controlled current source (CCCS)
Lecture 25 - Realizing a resistance using a VCCS or CCCS
Lecture 26 - Scaling an element's value using controlled sources
Lecture 27 - Example calculation
Lecture 28 - Solution to the assignment on units 3 and 4
Lecture 29 - Power and energy absorbed by electrical elements

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Lecture 30 - Power and energy in a resistor
Lecture 31 - Power and energy in a capacitor
Lecture 32 - Power and energy in an inductor
Lecture 33 - Power and energy in a voltage source
Lecture 34 - Power and energy in a current source
Lecture 35 - Goals of circuit analysis
Lecture 36 - Number of independent KCL equations
Lecture 37 - Number of independent KVL equations and branch relationships
Lecture 38 - Analysis of circuits with a single independent source
Lecture 39 - Analysis of circuits with multiple independent sources using superposition
Lecture 40 - Superposition
Lecture 41 - Solution to the assignment on units 5 and 6
Lecture 42 - What is nodal analysis
Lecture 43 - Setting up nodal analysis equations
Lecture 44 - Structure of the conductance matrix
Lecture 45 - How elements appear in the nodal analysis formulation
Lecture 46 - Completely solving the circuit starting from nodal analysis
Lecture 47 - Nodal analysis example
Lecture 48 - Matrix inversion basics
Lecture 49 - Nodal analysis with independent voltage sources
Lecture 50 - Supernode for nodal analysis with independent voltage sources
Lecture 51 - Nodal analysis with VCCS
Lecture 52 - Nodal analysis with VCVS
Lecture 53 - Nodal analysis with CCVS
Lecture 54 - Nodal analysis with CCCS
Lecture 55 - Nodal analysis summary
Lecture 56 - Solution to the assignment on units 7 and 8
Lecture 57 - Planar circuits
Lecture 58 - Mesh currents and their relationship to branch currents
Lecture 59 - Mesh analysis
Lecture 60 - Mesh analysis with independent current sources-Supermesh
Lecture 61 - Mesh analysis with current controlled voltage sources
Lecture 62 - Mesh analysis with current controlled current sources
Lecture 63 - Mesh analysis using voltage controlled sources
Lecture 64 - Nodal analysis versus Mesh analysis
Lecture 65 - Superposition theorem
Lecture 66 - Pushing a voltage source through a node
Lecture 67 - Splitting a current source
Lecture 68 - Substitution theorem
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Lecture 69 - Substitution theorem
Lecture 70 - Substituting a voltage or current source with a resistor
Lecture 71 - Solutions
Lecture 72 - Extensions to Superposition and Substitution theorem
Lecture 73 - Thevenin's theorem
Lecture 74 - Worked out example
Lecture 75 - Norton's theorem
Lecture 76 - Worked out example
Lecture 77 - Maximum power transfer theorem
Lecture 78 - Preliminaries.
Lecture 79 - Two port parameters
Lecture 80 - y parameters
Lecture 81 - y parameters
Lecture 82 - Solutions.
Lecture 83 - z parameters
Lecture 84 - z parameters
Lecture 85 - h parameters
Lecture 86 - h parameters
Lecture 87 - g parameters
Lecture 88 - g parameters
Lecture 89 - Calculations with a two-port element
Lecture 90 - Calculations with a two-port element.
Lecture 91 - Degenerate cases
Lecture 92 - Relationships between different two-port parameters
Lecture 93 - Equivalent circuit representation for two ports
Lecture 94 - Reciprocity
Lecture 95 - Proof of reciprocity of resistive two-ports
Lecture 96 - Proof for 4-terminal two-ports
Lecture 97 - Reciprocity in terms of different two-port parameters
Lecture 98 - Reciprocity in circuits containing controlled sources
Lecture 99 - Examples
Lecture 100 - Solutions..
Lecture 101 - Feedback amplifier using an opamp
Lecture 102 - Ideal opamp
Lecture 103 - Negative feedback around the opamp
Lecture 104 - Finding opamp signs for negative feedback
Lecture 105 - Example
Lecture 106 - Analysis of circuits with opamps
Lecture 107 - Inverting amplifier
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Lecture 108 - Summing amplifier
Lecture 109 - Instrumentation amplifier
Lecture 110 - Negative resistance and Miller effect
Lecture 111 - Finding opamp signs for negative feedback-circuits with multiple opamps
Lecture 112 - Opamp supply voltages and saturation
Lecture 113 - KCL with an opamp and supply currents
Lecture 114 - Solutions...
Lecture 115 - Circuits with storage elements (capacitors and inductors)
Lecture 116 - First order circuit with zero input-natural response
Lecture 117 - First order RC circuit with zero input-Example
Lecture 118 - First order circuit with a constant input
Lecture 119 - General form of the first order circuit response
Lecture 120 - First order RC circuit with a constant input-Example
Lecture 121 - First order circuit with piecewise constant input
Lecture 122 - First order circuit with piecewise constant input-Example
Lecture 123 - First order circuit-Response of arbitrary circuit variables
Lecture 124 - Summary
Lecture 125 - Does a capacitor block DC?
Lecture 126 - Finding the order of a circuit
Lecture 127 - First order RC circuits with discontinuous capacitor voltages
Lecture 128 - Summary
Lecture 129 - First order RL circuits
Lecture 130 - First order RL circuit with discontinuous inductor current-Example
Lecture 131 - First order RC circuit with an exponential input
Lecture 132 - First order RC response to its own natural response
Lecture 133 - First order RC response to a sinusoidal input
Lecture 134 - First order RC response to a sinusoidal input-via the complex exponential
Lecture 135 - Summary
Lecture 136 - Three methods of calculating the sinusoidal steady state response
Lecture 137 - Calculating the total response including initial conditions
Lecture 138 - Why are sinusoids used in measurement?
Lecture 139 - Second order system natural response
Lecture 140 - Second order system as a cascade of two first order systems
Lecture 141 - Second order system natural response-critically damped and underdamped
Lecture 142 - Generalized form of a second order system
Lecture 143 - Numerical example
Lecture 144 - Series and parallel RLC circuits
Lecture 145 - Forced response of a second order system
Lecture 146 - Steady state response calculation and Phasors
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Lecture 147 - Phasors (Continued...)
Lecture 148 - Magnitude and Phase plots
Lecture 149 - Magnitude and phase plotes of a second order system
Lecture 150 - Maximum power transfer and Conjugate matching

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NPTEL Video Course - Electronics and Communication Engineering - Advanced Logic Synthesis

Subject Co-ordinator - Mr. Dhiraj Taneja

Co-ordinating Institute - Broadcom - Hyderabad

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - MOS Transistor
Lecture 2 - MOS Transistor - Detailed Study
Lecture 3 - Combinational Circuits and layout
Lecture 4 - Delay
Lecture 5 - Sequential Circuits
Lecture 6 - Logical Effort
Lecture 7 - Circuit Families
Lecture 8 - Lab-01
Lecture 9 - Lab-02
Lecture 10 - Lab-03
Lecture 11 - Lab-04
Lecture 12 - Introduction to Synthesis
Lecture 13 - Libraries
Lecture 14 - RTL Coding for Synthesis
Lecture 15 - Reading Design in DC
Lecture 16 - Design Environment
Lecture 17 - Design Constraints
Lecture 18 - Compile Flow and stratergies
Lecture 19 - Analysis and Reporting
Lecture 20 - Lab-05
Lecture 21 - Advanced Synthesis Techniques
Lecture 22 - Datapath Extraction Guidelines
Lecture 23 - Power - Methodology and Analysis
Lecture 24 - Lab-06
Lecture 25 - Lab-07
Lecture 26 - Lab-08
Lecture 27 - Lab-09
Lecture 28 - Static Timing Analysis - Concepts and Flow
Lecture 29 - Interconnects and Delay calculation

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NPTEL Video Course - Electronics and Communication Engineering - ARM Based Development

Subject Co-ordinator - Mr. S. Chandramouleeswaran

Co-ordinating Institute - Independent Embedded SW Trainer

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Types of computer Architectures, ISA's and ARM History
Lecture 2 - Embedded System Software and Hardware, stack implementation in ARM, Endianness, condition codes
Lecture 3 - Processor core VS CPU core, ARM7TDMI Interface signals, Memory Interface, Bus Cycle types, Regist
Lecture 4 - Instruction Format, ARM Core Data Flow Model, ARM 3 stage Pipeline, ARM family attribute comparis
Lecture 5 - ARM 5 stage Pipeline, Pipeline Hazards, Data forwarding - a hardware solution
Lecture 6 - ARM ISA and Processor Variants, Different Types of Instructions, ARM Instruction set, data proces
Lecture 7 - Shift Operations, shift Operations using RS lower byte, Immediate value encoding
Lecture 8 - Dataprocessing Instructions
Lecture 9 - Addressing Mode-1, Addressing Mode-2
Lecture 10 - Addressing Mode-2, LDR/STR, Addressing mode-3 with examples
Lecture 11 - Instruction Timing, Addressing Mode-4 with Examples
Lecture 12 - Swap Instructions, Swap Register related Instructions, Loading Constants
Lecture 13 - Program Control Flow, Control Flow Instructions, B & BL instructions, BX instruction
Lecture 14 - Interrupts and Exceptions, Exception Handlers, Reset Handling
Lecture 15 - Aborts, software Interrupt Instruction, undefined instruction exception
Lecture 16 - Interrupt Latency, Multiply Instructions, Instruction set examples
Lecture 17 - Thumb state, Thumb Programmers model, Thumb Implementation, Thumb Applications
Lecture 18 - Thumb Instructions, Interrupt processing
Lecture 19 - Interrupt Handelling schemes, Examples of Interrupt Handlers
Lecture 20 - Coprocessors
Lecture 21 - Coprocessor Instructions, data Processing Instruction, data transfers, register transfers
Lecture 22 - Number representations, floating point representation
Lecture 23 - Flynn's Taxonomy, SIMD and Vector Processors, Vector Floating Point Processor (VFP), VFP and ARM
Lecture 24 - Memory Technologies, Need for memory Hierarchy, Hierarchical Memory Organization, Virtual Memory
Lecture 25 - Cache Memory, Mapping Functions
Lecture 26 - Cache Design, Unified or split cache, multiple level of caches, ARM cache features, coprocessor
Lecture 27 - Processes, Memory Map, Protected Systems, ARM systems with MPU, memory Protection Unit (MPU)
Lecture 28 - Physical Vs Virtual Memory, Paging, Segmentation
Lecture 29 - MMU Advantage, virtual memory translation, Multitasking with MMU, MMU organization, Tightly coup

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Lecture 30 - ARM Development Environment, Arm Procedure Call Standard (APCS),
Lecture 31 - Example C program
Lecture 32 - Embedded software Development, Image structure, linker inputs and outputs, memory map, applicati
Lecture 33 - AMBA Overview, Typical AMAB Based Microcontroller, AHB bus features, AHB Bus transfers, APB bus
Lecture 34 - DMA, Peripherals, Programming Peripherals in ARM
Lecture 35 - DMA
Lecture 36 - Protocols (I2c, SPI), UART, GPIO
Lecture 37 - ARM ISAs, ARMv5, ARMv6, ARM v7, big.little technology, ARMv8
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NPTEL Video Course - Electronics and Communication Engineering - Embedded Software Testing

Subject Co-ordinator - Mr. Madhukeshwara H.M

Co-ordinating Institute - HCL

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Embedded Systems Basics Session 1
Lecture 2 - Embedded Systems Basics Session 1 (Continued...)
Lecture 3 - Prerequistics for Embedded Systems Testing
Lecture 4 - Test Case Designa and procedures
Lecture 5 - Test Standards
Lecture 6 - Depicting Levels of Testing
Lecture 7 - Depicting Levels of Testing (Continued...)
Lecture 8 - Software Life Cycle
Lecture 9 - Embedded V-Model Life Cycle
Lecture 10 - Embedded V-Model Life Cycle (Continued...)
Lecture 11 - Master Test Planning
Lecture 12 - Black Box Testing (Continued...)
Lecture 13 - Black Box Testing (Continued...)
Lecture 14 - Dynamic Testing
Lecture 15 - Black Box Testing
Lecture 16 - (Lecture Missing)
Lecture 17 - Black Box Testing (Continued...)
Lecture 18 - Model Based Design Intro.
Lecture 19 - Dynamic Testing (Continued...)
Lecture 20 - White Box Testing
Lecture 21 - White Box Testing (Continued...)
Lecture 22 - Grey-box testing
Lecture 23 - Static Testing
Lecture 24 - Static Analysis
Lecture 25 - Static Analysis (Continued...)
Lecture 26 - Static Analysis (Continued...)
Lecture 27 - Test Metrics
Lecture 28 - Software Testing Metrics
Lecture 29 - Integration Test Strategy

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Lecture 30 - Integration Tests Environment
Lecture 31 - Use Case Diagram
Lecture 32 - Depicting Levels of Testing (Continued...)
Lecture 33 - Configure Management Elements
Lecture 34 - SCM Activities
Lecture 35 - Test Management Tool
Lecture 36 - SCM Activities (Continued...)
Lecture 37 - Overview Lecture 1
Lecture 38 - Unit Testing
Lecture 39 - Unit Testing (Continued...)
Lecture 40 - Understading C++
Lecture 41 - Unit Testing (Continued...)
Lecture 42 - Level Testing
Lecture 43 - Identify Test Cases
Lecture 44 - Test Link Work Flow
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NPTEL Video Course - Electronics and Communication Engineering - Linux Programming and Scripting

Subject Co-ordinator - Mr. Anand Iyer

Co-ordinating Institute - Calypto Design Systems

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable


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Lecture 1 - Linux Basics - I
Lecture 2 - Linux Basics - II
Lecture 3 - Linux Basics - III
Lecture 4 - Linux Basics - IV
Lecture 5 - Linux Networking - I
Lecture 6 - Linux Networking - II
Lecture 7 - File Transfer Protocol
Lecture 8 - Domain Name System
Lecture 9 - DNS (Continued...)
Lecture 10 - DFS
Lecture 11 - AFS and NIS
Lecture 12 - PERL 1
Lecture 13 - PERL 2
Lecture 14 - PERL 3
Lecture 15 - PERL 4
Lecture 16 - PERL 5
Lecture 17 - PERL 6
Lecture 18 - PERL 7
Lecture 19 - PERL 8
Lecture 20 - PERL 9
Lecture 21 - Using sort
Lecture 22 - PERL 10
Lecture 23 - Programming Using Tcl/Tk - I
Lecture 24 - Programming Using Tcl/Tk - II
Lecture 25 - Programming Using Tcl/Tk - III
Lecture 26 - More about Procedures
Lecture 27 - TCP, Ports and Sockets
Lecture 28 - I/O and Processes
Lecture 29 - Bindings
```

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Lecture 30 - Programming Using Tcl/Tk - IV
Lecture 31 - Furniture Arranger
Lecture 32 - Bindtags
Lecture 33 - Tcl in Synopsys Tools
Lecture 34 - Python Programming
Lecture 35 - Scope
Lecture 36 - Iteration
Lecture 37 - More about Regexps
Lecture 38 - Advanced Functions
Lecture 39 - Exception Handling
Lecture 40 - Examples of file Parsing
Lecture 41 - Program on If Statement
Lecture 42 - Program on Lists
Lecture 43 - Makefiles
```

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NPTEL Video Course - Electronics and Communication Engineering - NOC:Digital Circuits and Systems

Subject Co-ordinator - Prof. Shankar Balachandran

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable │ MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Basic Boolean Logic
Lecture 3 - Boolean Theorems
Lecture 4 - Definitions, SoP and Pos
Lecture 5 - Algebraic Minimization Examples
Lecture 6 - Introduction to Verilog
Lecture 7 - Universality, Rearranging Truth Tables
Lecture 8 - Karnaugh Maps
Lecture 9 - K-Map Minimization
Lecture 10 - K-Map with Don't cares
Lecture 11 - Multiple Output Functions
Lecture 12 - Number Systems
Lecture 13 - Encoders and Decoders
Lecture 14 - Multiplexers
Lecture 15 - Multiplexer based Circuit Design
Lecture 16 - Verilog
Lecture 17 - Compiling and Running Verilog - A Demonstration
Lecture 18 - Sequential Elements
Lecture 19 - Gated Latches
Lecture 20 - Flipflops
Lecture 21 - Verilog - Assign Statement and Instantiation
Lecture 22 - Sequential Circuits
Lecture 23 - CMOS+Electrical Properties
Lecture 24 - Delays
Lecture 25 - Sequential Element Delays
Lecture 26 - More Sequential Circuits
Lecture 27 - Introduction to State Machines
Lecture 28 - Always Statement in Verilog
Lecture 29 - Sequential Logic Synthesis

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Lecture 30 - FSM Design Problems
Lecture 31 - State Minimization
Lecture 32 - State Assignment
Lecture 33 - Timing Sequential Circuits
Lecture 34 - Verilog Styles + Sequential Elements
Lecture 35 - GCD Algorithm
Lecture 36 - GCD Machines Datapath
Lecture 37 - GCD State Machine
Lecture 38 - GCD Top Level Module
Lecture 39 - Datapath in Verilog
Lecture 40 - Datapath Elements in Verilog
Lecture 41 - FSM in Verilog
Lecture 42 - Putting it all together
Lecture 43 - Pipelining
Lecture 44 - K-stage Pipeline
Lecture 45 - Interleaving and Parallelism
Lecture 46 - Blocking and Non-blocking Statements
Lecture 47 - Modeling Circuits with Pipelining
Lecture 48 - Signed Number Representation
Lecture 49 - Signed Number Addition
Lecture 50 - Adder/Subtracter
Lecture 51 - Fast Adders
Lecture 52 - Multiplication
Lecture 53 - Closing
```

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NPTEL Video Course - Electronics and Communication Engineering - NOC:Networks and Systems

Subject Co-ordinator - Prof. V.G.K. Murti, Mr. C. S. Ramalingam, Dr. Andrew Thangaraj

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Functions in circuits - constant and sinusoidal functions
Lecture 2 - Functions in circuits - Exponential function
Lecture 3 - Complex numbers and other topics
Lecture 4 - Systems, Signals, Networks
Lecture 5 - Representation and Classification of Systems
Lecture 6 - Linear systems
Lecture 7 - Time-invariance and causality
Lecture 8 - Signals, Elementary continuous signals
Lecture 9 - Complex frequencies of signals
Lecture 10 - Discontinuous signals - step, ramp
Lecture 11 - Unit impulse or delta function
Lecture 12 - Basic discrete-time signals
Lecture 13 - Examples of Signals
Lecture 14 - Introduction to Systems, Complementary Functions, Initial Conditions
Lecture 15 - Special initial conditions
Lecture 16 - Characterization of a linear system
Lecture 17 - Impulse Response
Lecture 18 - Evaluating the Convolution Integral
Lecture 19 - Worked-out Problems
Lecture 20 - Introduction and Motivation
Lecture 21 - Evaluating Fourier series coefficients
Lecture 22 - Symmetry conditions
Lecture 23 - Symmetry Condition Examples
Lecture 24 - Application to Network Analysis
Lecture 25 - Exponential Fourier Series
Lecture 26 - Frequency Spectrum
Lecture 27 - Examples
Lecture 28 - Signal Power and Related Ideas
Lecture 29 - Convergence of Fourier Series

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Lecture 30 - Week 1 Solutions
Lecture 31 - Hints for Assignment 2
Lecture 32 - Hints for Assignment 3
Lecture 33 - Additional Properties of Fourier Series
Lecture 34 - Exercises on Fourier Series
Lecture 35 - Lab Demo
Lecture 36 - From Fourier Series to Fourier Transform
Lecture 37 - Continuous Time Fourier Transform
Lecture 38 - Fourier Transform Examples
Lecture 39 - Examples and Some Properties of Fourier Transform
Lecture 40 - Properties of Fourier Transform (contd.)
Lecture 41 - More Fourier Transform Properties
Lecture 42 - Energy Considerations
Lecture 43 - Energy Considerations II
Lecture 44 - Helpful Relationships for Inverse Fourier Transform
Lecture 45 - Fourier transform of signals that are not absolutely integrable
Lecture 46 - Fourier Transform of Periodic Signals, Unit Step and Signum Function
Lecture 47 - Truncated Sine wave and Convolution properties
Lecture 48 - Integration in Time domain
Lecture 49 - Application of continuous-time Fourier transform to system analysis
Lecture 50 - Comments about transient analysis
Lecture 51 - Sampling Theorem and Exercises on Fourier Transforms
Lecture 52 - Introduction to Laplace Transform
Lecture 53 - Laplace transforms of important functions
Lecture 54 - Recap, Poles / Zeros and Laplace Transform Notation
Lecture 55 - Properties
Lecture 56 - Application and properties of Laplace transform
Lecture 57 - More properties of Laplace transform
Lecture 58 - More properties of Laplace transform
Lecture 59 - Properties
Lecture 60 - Properties
Lecture 61 - Complex convolution and periodic functions
Lecture 62 - Examples of Laplace transform
Lecture 63 - Laplace transform examples
Lecture 64 - Inverse Laplace transform
Lecture 65 - Partial fractions
Lecture 66 - Inverse Laplace Transform and Contour Integration
Lecture 67 - Relating Fourier and Laplace Transform
Lecture 68 - Exercises
```

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Lecture 69 - Applications of Laplace transform to network transients
Lecture 70 - Laplace transform for resistor and system analysis
Lecture 71 - Laplace transform method for mutual inductance
Lecture 72 - Mutual Inductance Continued
Lecture 73 - Examples and Advantages of L-transform
Lecture 74 - General LTI systems and more about H(s)
Lecture 75 - Many facets of the system function (contd)
Lecture 76 - Frequency response and stability
Lecture 77 - Full circuit example
Lecture 78 - Exercises

NPTEL Video Course - Electronics and Communication Engineering - NOC:Circuit Analysis for Analog Designers

Subject Co-ordinator - Prof. Shanthi Pavan

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Course Introduction and Motivation
Lecture 2 - Kirchoff's Current and Voltage Laws, and the Incidence Matrix
Lecture 3 - Power Conservation and Tellegen's Theorem
Lecture 4 - Intuition behind Tellegen's Theorem
Lecture 5 - Tellegen's Theorem and reciprocity in linear resistive networks
Lecture 6 - Why is reciprocity useful in practice?
Lecture 7 - Inter-reciprocity in linear time-invariant networks
Lecture 8 - Inter-reciprocity in linear time-invariant networks (Continued...)
Lecture 9 - Inter-reciprocity in networks with ideal operational amplifiers
Lecture 10 - Review of Modified Nodal Analysis (MNA) of linear networks
Lecture 11 - MNA stamps of controlled sources - the VCCS and VCVS
Lecture 12 - MNA stamps of controlled sources - the CCCS and CCVS
Lecture 13 - Inter-reciprocity in linear networks - using the MNA stamp approach
Lecture 14 - The Adjoint Network
Lecture 15 - MNA stamp of an ideal opamp
Lecture 16 - Properties of circuits with multiple ideal opamps
Lecture 17 - Introduction to Analog Active Filters
Lecture 18 - Magnitude approximation principles
Lecture 19 - The maximally flat (Butterworth) approximation
Lecture 20 - The Butterworth Approximation (Continued...)
Lecture 21 - Connection between magnitude response and pole locations in an all-pole filter
Lecture 22 - Cascade-of-biquads, realization of stray-insensitive first-order section
Lecture 23 - Opamp-RC biquadratic sections
Lecture 24 - Active-RC biquads and Impedance scaling
Lecture 25 - Opamp-RC biquadratic sections (Continued...)
Lecture 26 - High-order filters using cascade of biquads, Dynamic range scaling in opamp-RC filters
Lecture 27 - The finite gain-bandwidth model of nonideal opamps
Lecture 28 - Effect of finite opamp bandwidth on an active-RC integrator
Lecture 29 - Effect of finite opamp bandwidth on an active-RC biquad

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Lecture 30 - Visualization and mitigation of the effect of Q-enhancement
Lecture 31 - Transconductance-Capacitance integrators
Lecture 32 - Introduction to noise in electrical networks
Lecture 33 - Noise processed by a linear time-invariant system
Lecture 34 - kT/C noise in a sample-and-hold circuit
Lecture 35 - Noise in RLC networks
Lecture 36 - Total integrated noise in RLC Networks
Lecture 37 - Bode's Noise Theorem - Frequency domain
Lecture 38 - Input referred noise in electrical networks - Part 1
Lecture 39 - Input referred noise in electrical networks - Part 2
Lecture 40 - Input referred noise and the noise factor
Lecture 41 - Noise Factor Examples
Lecture 42 - Introduction to distributed networks, the ideal transmission line
Lecture 43 - Solving the wave equation in an ideal transmission line
Lecture 44 - Transmisson line circuit analysis : The short circuited and open circuited line
Lecture 45 - Transmission line circuit analysis, the reflection coefficient, open and short-circuited lines
Lecture 46 - Transmission line driven by a source, power in a transmission line
Lecture 47 - The Smith chart
Lecture 48 - The need for scattering parameters
Lecture 49 - Scattering Parameters: Introduction
Lecture 50 - Example scattering matrix calculations
Lecture 51 - Scattering matrices properties
Lecture 52 - Measuring the S-parameters of a one-port
Lecture 53 - The one-port vector network analyzer
Lecture 54 - The two-port vector network analyzer
Lecture 55 - Weak nonlinearity in electronic circuits, second-order harmonic distortion, HD2 and IM2
Lecture 56 - Weak nonlinearity in electronic circuits, second-order intermodulation distortion
Lecture 57 - Gain compression and third-order harmonic distortion
Lecture 58 - Third-order intermodulation distortion
Lecture 59 - Weak nonlinearities in circuits: Intuition behind the method of current injection
Lecture 60 - Weak nonlinearities in circuits: Calculating nonlinear components
Lecture 61 - Current-injection analysis of distortion in a negative feedback system
Lecture 62 - Current-injection analysis of distortion in a negative feedback system (Continued...)
Lecture 63 - Course summary and recap
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NPTEL Video Course - Electronics and Communication Engineering - NOC:Design and Analysis of VLSI Subsystems

Subject Co-ordinator - Prof. Madhav Rao

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Understanding Silicon
Lecture 2 - Introduction to NMOS
Lecture 3 - NMOS Transistor Working
Lecture 4 - PMOS Transistor
Lecture 5 - MOS Capacitances
Lecture 6 - Non Ideal MOS model
Lecture 7 - Short channel current model
Lecture 8 - Short channel current model analysis
Lecture 9 - Channel Length modulation index
Lecture 10 - DC characteristics of Inverter
Lecture 11 - Transfer characteristics of Inverter
Lecture 12 - Skewed Inverter
Lecture 13 - Skewed Inverter and threshold voltage
Lecture 14 - Equivalent of transistors in series
Lecture 15 - Transmission Gate
Lecture 16 - Bad CMOS Buffer - Part 1
Lecture 17 - Bad CMOS Buffer - Part 2
Lecture 18 - Noise margin characteristics of inverter
Lecture 19 - Noise margin parameters
Lecture 20 - Introduction to Delay in CMOS
Lecture 21 - Transient analysis of CMOS Inverter
Lecture 22 - RC approximated delay
Lecture 23 - Switching Resistance
Lecture 24 - CMOS Inverter approximated to RC Circuit
Lecture 25 - Elmore delay
Lecture 26 - Delay of FO4 inverter
Lecture 27 - Extracting capacitances of 3-Nand gate for delay estimation
Lecture 28 - Characterizing Delay of NOR gate
Lecture 29 - Linear Delay model

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Lecture 30 - Logical effort and Parasitic delay
Lecture 31 - Logical effort and Parasitic delay for different gates
Lecture 32 - Logical effort for short-channel current model
Lecture 33 - Ring Oscillator design
Lecture 34 - Optimizing Gate Size
Lecture 35 - Optimizing Gate Sizes Example
Lecture 36 - Optimizing the Stages for an inverter path
Lecture 37 - Optimizing the Stages for a General Circuit
Lecture 38 - Decoder Design
Lecture 39 - Introduction to Combinational Circuit and assymetric gates
Lecture 40 - Assymetric Gates analysis
Lecture 41 - Assymetric Gates analysis using short-channel current model
Lecture 42 - Introduction to Skewed gates
Lecture 43 - Skewed gates and best P/N ratio
Lecture 44 - vIntroduction to Pseudo NMOS
Lecture 45 - Psudeo NMOS gates
Lecture 46 - Other Logic Family
Lecture 47 - Dynamic Logic and Domino logic
Lecture 48 - Domino gates
Lecture 49 - Introduction to Stick Diagram
Lecture 50 - Stick Diagram for different gates
Lecture 51 - Applying Eulers path for stick diagram representations
Lecture 52 - Multiplexer design and layout
Lecture 53 - Introduction to Interconnects
Lecture 54 - Interconnects - RC delay, and Energy
Lecture 55 - Introduction to crosstalks in interconnects
Lecture 56 - Transient analysis in Crosstalk
Lecture 57 - Introduction to Repeaters in Interconnect Engineering
Lecture 58 - Repeater Design
Lecture 59 - Energy and delay analysis for interconnectwith repeaters
Lecture 60
Lecture 61 - Introduction to Power
Lecture 62 - Switching Power and Energy Estimation
Lecture 63 - Activity factor and estimating dynamic power for a combinational circuit design
Lecture 64 - Analyzing Dynamic Power
Lecture 65 - Energy estimation through driving factor
Lecture 66 - Energy expression in terms of delay
Lecture 67 - Voltage Scaling
Lecture 68 - DVFS
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Lecture 69 - Introduction to subthreshold leakage current model
Lecture 70 - Subthreshold leakage current and Gate leakage current
Lecture 71 - Estimating Static Power
Lecture 72 - Introduction to CMOS Latch design
Lecture 73 - CMOS Latch Design
Lecture 74 - CMOS Latch and flipflop design
Lecture 75 - Static Timing Analysis
Lecture 76 - Static Timing Analysis (Continued...)
Lecture 77 - Static Timing Analysis - Part 2
Lecture 78 - Static Timing Analysis - Part 2.1
Lecture 79 - Static Timing Analysis - Part 3
Lecture 80 - TPDQ and TPCQ
Lecture 81 - Static Timing Analysis - Part 4
Lecture 82 - Static Timing Analysis - Part 5
Lecture 83 - Static Timing Analysis - Part 6
Lecture 84 - SET and CLEAR enabled Latch and Flipflop Design
Lecture 85 - 1-bit Adder design
Lecture 86 - Adder-Part2
Lecture 87 - PG architecture - Part 1
Lecture 88 - PG architecture - Part 2
Lecture 89 - Carry Skip Adder
Lecture 90 - Carry Look Ahead and Carry Increment Adder
Lecture 91 - Other Adder Subsystems
Lecture 92 - Approximate Multipliers - Part 1
Lecture 93 - Approximate Multipliers - Part 2
Lecture 94 - Approximate Adder
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NPTEL Video Course - Electronics and Communication Engineering - NOC:Nonlinear Dynamical Systems and Control

Subject Co-ordinator - Prof. Sanjay Bhat, Prof. Vijaysekhar Chellaboina

Co-ordinating Institute - IIT - Madras

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction - Part 1
Lecture 2 - Introduction - Part 2
Lecture 3 - Ordinary Differential Equations - Part 1
Lecture 4 - Ordinary Differential Equations - Part 2
Lecture 5 - ODE Solutions via Examples
Lecture 6 - Solutions to ODEs
Lecture 7 - Existence and Uniqueness Theorems
Lecture 8 - Asymptotic Behaviour of Dynamical Systems - Part 1
Lecture 9 - Asymptotic Behaviour of Dynamical Systems - Part 2
Lecture 10 - Asymptotic Behaviour of Dynamical Systems - Part 3
Lecture 11 - Stability Theory: Definitions - Part 1
Lecture 12 - Stability Theory: Definitions - Part 2
Lecture 13 - Stability Theory: Lyapunov Methods - Part 1
Lecture 14 - Stability Theory: Lyapunov Methods - Part 2
Lecture 15 - Lyapunov Function Examples
Lecture 16 - LaSalle's Invariance Theorem
Lecture 17 - Stability Theory: Converse Lyapunov and Instability Theorems
Lecture 18 - Solved Problems - Part 1
Lecture 19 - Solved Problems - Part 2
Lecture 20 - Linear Systems - Part 1
Lecture 21 - Linear Systems - Part 2
Lecture 22 - Linearization of Nonlinear Systems
Lecture 23 - Linear Systems and Linearization: Solved Problems - Part 1
Lecture 24 - Linear Systems and Linearization: Solved Problems - Part 2
Lecture 25 - Nonlinear Analysis: Key Concepts and Results - Part 1
Lecture 26 - Nonlinear Analysis: Key Concepts and Results - Part 2
Lecture 27 - Construction of Lyapunov Functions - Part 1
Lecture 28 - Construction of Lyapunov Functions - Part 2
Lecture 29 - Futher Topics - Part 1

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Lecture 30 - Futher Topics - Part 2
Lecture 31 - Introduction to Robust Stability
Lecture 32 - Robust Stability for Structured Uncertainty - Part 1
Lecture 33 - Robust Stability for Structured Uncertainty - Part 2
Lecture 34 - Robust Stability for Structured Uncertainty - Part 3
Lecture 35 - The Absolute Stability (Lure) Problem
Lecture 36 - Robust Stability: A Solved Problem
Lecture 37 - Dissipativity Theory - Part 1
Lecture 38 - Dissipativity Theory - Part 2
Lecture 39 - Dissipativity: Solved Problems
Lecture 40 - Feedback Interconnection of Dissipative Systems - Part 1
Lecture 41 - Feedback Interconnection of Dissipative Systems - Part 2
Lecture 42 - Stable Adaptive Control - Part 1
Lecture 43 - Stable Adaptive Control - Part 2
Lecture 44 - Examples and Generalizations - Part 1
Lecture 45 - Examples and Generalizations - Part 2
Lecture 46 - Optimization - Part 1
Lecture 47 - Optimization - Part 2
Lecture 48 - Functional Optimization - Part 1
Lecture 49 - Functional Optimization - Part 2
Lecture 50 - Optimal Control - Part 1
Lecture 51 - Optimal Control - Part 2
Lecture 52 - Optimal Control - Part 3
Lecture 53 - Stability Margins of Feedback Controllers
Lecture 54 - Control Lyapunov Functions
Lecture 55 - Disturbance Rejection - Part 1
Lecture 56 - Disturbance Rejection - Part 2
Lecture 57 - Revisition through Solved Problems - I
Lecture 58 - Revisition through Solved Problems - I (Continued...)
Lecture 59 - Revision through Solved Problems II
Lecture 60 - Revision through Solved Problems III - Part 1
Lecture 61 - Revision through Solved Problems III - Part 2
Lecture 62 - Assorted Topics: Highlights - Part 1
Lecture 63 - Assorted Topics: Highlights - Part 2
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NPTEL Video Course - Electronics and Communication Engineering - NOC:Digital Protection of Power System

Subject Co-ordinator - Prof. Bhaveshkumar R. Bhalja

Co-ordinating Institute - IIT - Roorkee

Sub-Titles - Available / Unavailable │ MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Digital Relays - I
Lecture 2 - Introduction to Digital Relays - II
Lecture 3 - Components of Digital Relays
Lecture 4 - Fundamentals of Digital Relays
Lecture 5 - Phasor Estimation Algorithm - I
Lecture 6 - Phasor Estimation Algorithm - II
Lecture 7 - Phasor Estimation Algorithm - III
Lecture 8 - Phasor Estimation Algorithm - IV
Lecture 9 - Phasor Estimation Algorithm - V
Lecture 10 - Frequency Estimation Algorithm
Lecture 11 - Digital Protection of Transformer - I
Lecture 12 - Digital Protection of Transformer - II
Lecture 13 - Digital Protection of Transformer - III
Lecture 14 - Digital Protection of Transformer - IV
Lecture 15 - Digital Protection of Transformer - V
Lecture 16 - Digital Protection of Induction Motors - I
Lecture 17 - Digital Protection of Induction Motors - II
Lecture 18 - Digital Protection of Induction Motors - III
Lecture 19 - Digital Protection of Generators - I
Lecture 20 - Digital Protection OF Generators - II
Lecture 21 - Coordination of Overcurrent Relays for Distribution Network - I
Lecture 22 - Coordination of Overcurrent Relays for Distribution Network - II
Lecture 23 - Coordination of Overcurrent Relays for Distribution Network - III
Lecture 24 - Coordination of Overcurrent Relays for Distribution Network - IV
Lecture 25 - Coordination of Overcurrent Relays for Distribution Network - V
Lecture 26 - Coordination of Overcurrent Relays for Distribution Network - VI
Lecture 27 - Load Shedding and Frequency Relaying - I
Lecture 28 - Load Shedding and Frequency Relaying - II
Lecture 29 - Islanding Detection

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Lecture 30 - Digital Distance Relaying Scheme for transmission Line - I
Lecture 31 - Digital Distance Relaying Scheme for transmission Line - II
Lecture 32 - Introduction to Phasor Measurement Unit - I
Lecture 33 - Introduction to Phasor Measurement Unit - II
Lecture 34 - Introduction to Phasor Measurement Unit - III
Lecture 35 - Introduction to IEC 61850 - I
Lecture 36 - Introduction to IEC 61850 - II
Lecture 37 - Application of Big-Data Analytics in Power System Protection
Lecture 38 - Cyber Security Issues in Power System Network
Lecture 39 - Protection of Hybride AC/DC Microgrid: Issues and Challenges
Lecture 40 - Application of AI-Based Techniques in Digital Protection
```

NPTEL Video Course - Electronics and Communication Engineering - NOC:Physics of Nanoscale Devices

Subject Co-ordinator - Prof. Vishvendra Singh Poonia

Co-ordinating Institute - IIT - Roorkee

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction
Lecture 2 - Introduction and Course Overview
Lecture 3 - Basics of Quantum Mechanics
Lecture 4 - Electron in a Potential Well
Lecture 5 - Electrons in Solids
Lecture 6 - KP Model
Lecture 7 - KP Model, Effective Mass
Lecture 8 - Bands, Effective Mass, DOS
Lecture 9 - Effective Mass, DOS
Lecture 10 - Density of States
Lecture 11 - Density of States
Lecture 12 - Density of States - 3D, 2D
Lecture 13 - Density of States - 2D, 1D, 0D
Lecture 14 - DOS, Fermi Function
Lecture 15 - Fermi- Dirac Distribution
Lecture 16 - Fermi Function, General Model of Transport
Lecture 17 - General Model of Transport - I
Lecture 18 - General Model of Transport - II
Lecture 19 - General Model of Transport - III
Lecture 20 - General Model of Transport, Modes
Lecture 21 - Modes - I
Lecture 22 - Modes - II
Lecture 23 - Modes, Diffusive Transport
Lecture 24 - Diffusive Transport
Lecture 25 - Diffusive Transport, Conductance
Lecture 26 - Conductance, Bulk Transport - I
Lecture 27 - Conductance, Bulk Transport - II
Lecture 28 - Resistance: Ballistic and Diffusive Cases - I
Lecture 29 - Resistance: Ballistic and Diffusive Cases - II

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Lecture 30 - Resistance: Ballistic and Diffusive Cases - III
Lecture 31 - Resistance: Diffusive Case
Lecture 32 - The Idea of Mobility
Lecture 33 - Voltage Drop in Ballistic Conductor
Lecture 34 - 1D and 2D Realistic Conductors
Lecture 35 - Introduction to MOSFET - I
Lecture 36 - Introduction to MOSFET - II
Lecture 37 - MOSFET: A Barrier Controlled Device
Lecture 38 - MOSFET Electrical Characteristics
Lecture 39 - MOSFET IV Characteristics - I
Lecture 40 - MOSFET IV Characteristics - II
Lecture 41 - MOSFET IV Characteristics - III
Lecture 42 - MOSFET IV Characteristics - Traditional Approach
Lecture 43 - MOSFET: Transport - I
Lecture 44 - MOSFET: Transport - II
Lecture 45 - MOSFET: Landauer Transport
Lecture 46 - Landauer Transport and Ballistic MOSFET
Lecture 47 - Ballistic MOSFET
Lecture 48 - Ballistic Injection Velocity
Lecture 49 - Velocity Saturation in Ballistic MOSFET and Electrostatics
Lecture 50 - MOS Electrostatics
Lecture 51 - MOS Electrostatics
Lecture 52 - MOSFET: Electrostatics, Threshold Voltage
Lecture 53 - MOSFET: 2D Electrostatics
Lecture 54 - MOSFET: 2D Electrostatics and Quantum Confinement
Lecture 55 - ETSOI MOSFETs, Quantum Confinement, Strain Engineering
Lecture 56 - Strain Engineering, Thermoelectric Effects
Lecture 57 - Thermoelectric Effects
Lecture 58 - Thermoelectric Effects, Quantum Dot Devices
Lecture 59 - Quantum Dot Devices
Lecture 60 - Quantum Dot Devices - IV Characteristics, DFT, Course Summary
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NPTEL Video Course - Electronics and Communication Engineering - NOC:Low Voltage CMOS Circuit Operation

Subject Co-ordinator - Prof. Anand Bulusu

Co-ordinating Institute - IIT - Roorkee

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction and Motivation
Lecture 2 - Review of MOSFET operation - I
Lecture 3 - Review of MOSFET operation - II
Lecture 4 - Basic charge model - I
Lecture 5 - Basic charge model - II
Lecture 6 - Basic charge model - III
Lecture 7 - Basic charge model - IV
Lecture 8 - Basic charge model - V
Lecture 9 - Basic charge model - VI
Lecture 10 - Basic charge model - VII
Lecture 11 - Basic charge model - VIII
Lecture 12 - Basic charge model - IX
Lecture 13 - Basic charge model - X
Lecture 14 - Minimum energy point - I
Lecture 15 - Minimum energy point - II
Lecture 16 - Minimum energy point - III
Lecture 17 - Transistor sizing for combinational circuit - I
Lecture 18 - Transistor sizing for combinational circuit - II
Lecture 19 - Transistor sizing for asymmetric combinational circuits
Lecture 20 - Charging and discharging mechanism in NTV combinational gates
Lecture 21 - Effective current for NTV inverter
Lecture 22 - Effective current for NTV combinational gates - I
Lecture 23 - Effective current for NTV combinational gates - II
Lecture 24 - Effective current for NTV combinational gates - III
Lecture 25 - Combinational circuit design considering variations - I
Lecture 26 - Combinational circuit design considering variations - II
Lecture 27 - Buffer design considering INWE
Lecture 28 - Decoder design considering INWE
Lecture 29 - Flip-flop operation

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Lecture 30 - Warning flip-flops design and operation
Lecture 31 - Single phase flip-flops design and operation
Lecture 32 - Consideration of radiation effects in NTV
Lecture 33 - Radiation-hardened NTV sequential circuit elements
Lecture 34 - Level shifters for multi-Vdd domains
Lecture 35 - Introduction to 6T SRAM
Lecture 36 - Stability and Reliability Issues in 6T SRAM
Lecture 37 - Read and Write-Assist Circuits in 6T SRAM
Lecture 38 - Physical Insights into Channel Charge Distribution
Lecture 39 - FinFET based Standard Cell Design
Lecture 40 - Example problems

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NPTEL Video Course - Electronics and Communication Engineering - Circuits for Analog System Design

Subject Co-ordinator - Prof. M.K. Gunasekaran

Co-ordinating Institute - IISc - Bangalore

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Transistor Amplifier
Lecture 2 - Transistor Op-amp and Transistor Based Voltage Regulator
Lecture 3 - Some applications of transistor - I
Lecture 4 - Some applications of transistor - II
Lecture 5 - Transformer design & Heat sink design
Lecture 6 - Op-amp Based Linear Voltage Regulator
Lecture 7 - Short circuit protection for linear power supply
Lecture 8 - Temperature indicator design using Op-amp
Lecture 9 - On & off Temperature controller design
Lecture 10 - Proportional Temperature Controller Design
Lecture 11 - PID - Temperature Controller Design
Lecture 12 - Heater Drive for Various Temperature Controllers
Lecture 13 - Short Circuit Protection of Power MOSFET
Lecture 14 - Error budgeting for temperature Indicator
Lecture 15 - PID Temperature Controllers with Error Budgeting
Lecture 16 - Error Budgeting for Constant Current Sources
Lecture 17 - Error Budgeting for Thermo Couple Amplifier
Lecture 18 - Error Budgeting for Op amp Circuits
Lecture 19 - Gain Error Calculation in Op amp Circuits
Lecture 20 - Input Resistance Calculations for Op amp
Lecture 21 - Output Resistance Calculations for Op amp
Lecture 22 - Error Budgeting for Different Circuits
Lecture 23 - 4-20 mA current Transmitter design
Lecture 24 - Error budgeting for 4-20mA Current Transmitters
Lecture 25 - LVDT Based Current Transmitters
Lecture 26 - Constant Current Source Design
Lecture 27 - 4-20 MA Based Temperature Transmitter
Lecture 28 - 3-Wire Current Transmitter
Lecture 29 - Various Resistance Measurement Techniques

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Lecture 30 - Ratio Transformer Technique to Measure Resistance and capacitance
Lecture 31 - Capacitive Sensor Circuit Design Examples
Lecture 32 - Capacitive Sensor Circuit With High Impedance Amplifier
Lecture 33 - AC- applications of the Op-Amp and Lock in Amplifier Design
Lecture 34 - Design of lock in Amplifier Circuit with example
Lecture 35 - Dual Slopes ADC â   Design Examples
Lecture 36 - Dual Slope ADC and Successor approximation ADC
Lecture 37 - MC based ADC
Lecture 38 - Digital to analog Converter design and working, Flash ADC
Lecture 39 - Flash ADC and ADC Converter errors
Lecture 40 - Sigma delta ADC working Principle
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NPTEL Video Course - Electronics and Communication Engineering - Digital System design with PLDs and FPGAs

Subject Co-ordinator - Prof. Kuruvilla Varghese

Co-ordinating Institute - IISc - Bangalore

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Course Contents, Objective
Lecture 2 - Revision of Prerequisite
Lecture 3 - Design of Synchronous Sequential Circuits
Lecture 4 - Analysis of Synchronous Sequential Circuits
Lecture 5 - Top-down Design
Lecture 6 - Controller Design
Lecture 7 - Control algorithm and State diagram
Lecture 8 - Case study 1
Lecture 9 - FSM issues 1
Lecture 10 - FSM Issues 2
Lecture 11 - FSM Issues 3
Lecture 12 - FSM Issues 4
Lecture 13 - FSM Issues 5
Lecture 14 - Synchronization 1
Lecture 15 - Synchronization 2
Lecture 16 - Case study 2
Lecture 17 - Case study on FPGA Board
Lecture 18 - Entity, Architecture and Operators
Lecture 19 - Concurrency, Data flow and Behavioural models
Lecture 20 - Structural Model, Simulation
Lecture 21 - Simulating Concurrency
Lecture 22 - Classes and Data types
Lecture 23 - Concurrent statements and Sequential statements
Lecture 24 - Sequential statements and Loops
Lecture 25 - Modelling flip-flops, Registers
Lecture 26 - Synthesis of Sequential circuits
Lecture 27 - Libraries and Packages
Lecture 28 - Operators, Delay modelling
Lecture 29 - Delay modelling

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Lecture 30 - VHDL Examples
Lecture 31 - VHDL coding of FSM
Lecture 32 - VHDL Test bench
Lecture 33 - VHDL Examples, FSM Clock
Lecture 34 - Evolution of PLDs
Lecture 35 - Simple PLDs
Lecture 36 - Simple PLDs
Lecture 37 - Complex PLDs
Lecture 38 - FPGA Introduction
Lecture 39 - FPGA Interconnection, Design Methodology
Lecture 40 - Xilinx Virtex FPGAâ s CLB
Lecture 41 - Xilinx Virtex Resource Mapping, IO Block
Lecture 42 - Xilinx Virtex Clock Tree
Lecture 43 - FPGA Configuration
Lecture 44 - Altera and Actel FPGAs
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NPTEL Video Course - Electronics and Communication Engineering - Error Correcting Codes

Subject Co-ordinator - Prof. P. Vijay Kumar

Co-ordinating Institute - IISc - Bangalore

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Course Overview & Basics
Lecture 2 - Example Codes and their Parameters
Lecture 3 - Mathematical Preliminaries
Lecture 4 - Subgroups and Equivalence Relations
Lecture 5 - Cosets, Rings & Fields
Lecture 6 - Vector Spaces, Linear Independence and Basis
Lecture 7 - Linear Codes, & Linear independence
Lecture 8 - Spanning & Basis
Lecture 9 - The Dual Code
Lecture 10 - Systematic Generator Matrix
Lecture 11 - Minimum Distance of a Linear Code
Lecture 12 - Bounds on the size of a Code
Lecture 13 - Asymptotic Bounds
Lecture 14 - Standard Array Decoding
Lecture 15 - Performance Analysis of the SAD
Lecture 16 - State and Trellis
Lecture 17 - The Viterbi Decoder
Lecture 18 - Catastrophic Error Propagation
Lecture 19 - Path Enumeration
Lecture 20 - Viterbi Decoder over the AWGN Channel
Lecture 21 - Generalized Distributive Law
Lecture 22 - The MPF Problem
Lecture 23 - Further Examples of the MPF Problem
Lecture 24 - Junction Trees
Lecture 25 - Example of Junction Tree Construction
Lecture 26 - Message passing on the Junction tree
Lecture 27 - GDL Approach to Decoding Convolutional Codes
Lecture 28 - ML Code-Symbol Decoding of the Convolutional Code
Lecture 29 - LDPC Codes

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Lecture 30 - LDPC Code Terminology
Lecture 31 - Gallager Decoding Algorithm A
Lecture 32 - BP Decoding of LDPC Codes
Lecture 33 - BP Decoding (Continued)
Lecture 34 - Density Evolution under BP decoding
Lecture 35 - Convergence & Concentration Theorem - LDPC Codes
Lecture 36 - A Construction for Finite Fields
Lecture 37 - Finite Fields
Lecture 38 - Deductive Approach to Finite Fields
Lecture 39 - Subfields of a Finite field
Lecture 40 - Transform Approach to Cyclic Codes
Lecture 41 - Estimating the Parameters of a Cyclic Code
Lecture 42 - Decoding Cyclic Codes
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NPTEL Video Course - Electronics and Communication Engineering - Nanoelectronics: Devices and Materials

Subject Co-ordinator - Dr. Navakanta Bhat, Prof. K.N. Bhat, Dr. S.A. Shivashankar

Co-ordinating Institute - IISc - Bangalore

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Nanoelectronics
Lecture 2 - CMOS Scaling Theory
Lecture 3 - Short Channel Effects
Lecture 4 - Subthreshold Conduction
Lecture 5 - Drain Induced Barrier Lowering
Lecture 6 - Channel and Source / Drain Engineering
Lecture 7 - CMOS Process Flow
Lecture 8 - Gate oxide scaling and reliability
Lecture 9 - High-k gate dielectrics
Lecture 10 - Metal gate transistor
Lecture 11 - Industrial CMOS Technology
Lecture 12 - Ideal MOS C-V Characteristics
Lecture 13 - Effect of non idealities on C-V
Lecture 14 - MOS Parameter Extraction from C-V Characteristics
Lecture 15 - MOS Parameter Extraction from I-V Characteristics
Lecture 16 - MOSFET Analysis, sub-threshold swing Â SÂ
Lecture 17 - Interface state density effects on Â SÂ . Short Channel Effects (SCE) and Drain Induced Barrier
Lecture 18 - Velocity Saturation, Ballistic transport, and Velocity Overshoot Effects and Injection Velocity
Lecture 19 - SOI Technology and comparisons with Bulk Silicon CMOS technology
Lecture 20 - SOI MOSFET structures, Partially Depleted (PD)and Fully Depleted (FD) SOIMOSFETs
Lecture 21 - FD SOI MOSFET
Lecture 22 - Sub-threshold Slope & SCE suppression in FD SOI MOSFET, Volume Inversion and Ultra thin (UTFD) S
Lecture 23 - Need for MS contact Source/Drain Junction in Nano scale MOSFETs
Lecture 24 - Rectifying and Ohmic contacts and challenges in MS unction source drain MOSFET Technology
Lecture 25 - Effect of Interface states and Fermi level pinning on MS contacts on Si and passivation techniqu
Lecture 26 - Germanium as an alternate to silicon for high performance MOSFETs and the challenges in Germani
Lecture 27 - Germanium MOSFT technology and recent results on surface passivated Ge MOSFETS
Lecture 28 - Compound semiconductors and hetero junction FETsfor high performance
Lecture 29 - GaAs MESFETs

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Lecture 30 - Hetero-junctions and High Electron Mobility Transistors (HEMT)
Lecture 31 - Introduction to Nanomaterials
Lecture 32 - Basic Principles of Quantum Mechanics
Lecture 33 - Basic Principles of Quantum Mechanics (Continued...)
Lecture 34 - Energy bands in crystalline solids
Lecture 35 - Quantum structures and devices
Lecture 36 - Crystal growth and nanocrystals
Lecture 37 - Nanocrystals and nanostructured thin films
Lecture 38 - Nanowires and other nanostructures
Lecture 39 - Carbon Nanostructures and CVD
Lecture 40 - Atomic layer deposition (ALD)
Lecture 41 - Characterisation of nanomaterials
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NPTEL Video Course - Electronics and Communication Engineering - Pattern Recognition

Subject Co-ordinator - Prof. P.S. Sastry

Co-ordinating Institute - IISc - Bangalore

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Statistical Pattern Recognition
Lecture 2 - Overview of Pattern Classifiers
Lecture 3 - The Bayes Classifier for minimizing Risk
Lecture 4 - Estimating Bayes Error; Minimax and Neymann-Pearson classifiers
Lecture 5 - Implementing Bayes Classifier; Estimation of Class Conditional Densities
Lecture 6 - Maximum Likelihood estimation of different densities
Lecture 7 - Bayesian estimation of parameters of density functions, MAP estimates
Lecture 8 - Bayesian Estimation examples; the exponential family of densities and ML estimates
Lecture 9 - Sufficient Statistics; Recursive formulation of ML and Bayesian estimates
Lecture 10 - Mixture Densities, ML estimation and EM algorithm
Lecture 11 - Convergence of EM algorithm; overview of Nonparametric density estimation
Lecture 12 - Convergence of EM algorithm, Overview of Nonparametric density estimation
Lecture 13 - Nonparametric estimation, Parzen Windows, nearest neighbour methods
Lecture 14 - Linear Discriminant Functions; Perceptron -- Learning Algorithm and convergence proof
Lecture 15 - Linear Least Squares Regression; LMS algorithm
Lecture 16 - AdaLinE and LMS algorithm; General nonliner least-squares regression
Lecture 17 - Logistic Regression; Statistics of least squares method; Regularized Least Squares
Lecture 18 - Fisher Linear Discriminant
Lecture 19 - Linear Discriminant functions for multi-class case; multi-class logistic regression
Lecture 20 - Learning and Generalization; PAC learning framework
Lecture 21 - Overview of Statistical Learning Theory; Empirical Risk Minimization
Lecture 22 - Consistency of Empirical Risk Minimization
Lecture 23 - Consistency of Empirical Risk Minimization; VC-Dimension
Lecture 24 - Complexity of Learning problems and VC-Dimension
Lecture 25 - VC-Dimension Examples; VC-Dimension of hyperplanes
Lecture 26 - Overview of Artificial Neural Networks
Lecture 27 - Multilayer Feedforward Neural networks with Sigmoidal activation functions;
Lecture 28 - Backpropagation Algorithm; Representational abilities of feedforward networks
Lecture 29 - Feedforward networks for Classification and Regression; Backpropagation in Practice

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Lecture 30 - Radial Basis Function Networks; Gaussian RBF networks
Lecture 31 - Learning Weights in RBF networks; K-means clustering algorithm
Lecture 32 - Support Vector Machines -- Introduction, obtaining the optimal hyperplane
Lecture 33 - SVM formulation with slack variables; nonlinear SVM classifiers
Lecture 34 - Kernel Functions for nonlinear SVMs; Mercer and positive definite Kernels
Lecture 35 - Support Vector Regression and ?-insensitive Loss function, examples of SVM learning
Lecture 36 - Overview of SMO and other algorithms for SVM; ?-SVM and ?-SVR; SVM as a risk minimizer
Lecture 37 - Positive Definite Kernels; RKHS; Representer Theorem
Lecture 38 - Feature Selection and Dimensionality Reduction; Principal Component Analysis
Lecture 39 - No Free Lunch Theorem; Model selection and model estimation; Bias-variance trade-off
Lecture 40 - Assessing Learnt classifiers; Cross Validation;
Lecture 41 - Bootstrap, Bagging and Boosting; Classifier Ensembles; AdaBoost
Lecture 42 - Risk minimization view of AdaBoost
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NPTEL Video Course - Electronics and Communication Engineering - Analog Circuits and Systems 1

Subject Co-ordinator - Prof. K. Radhakrishna Rao

Co-ordinating Institute - IISc - Bangalore

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Sensors, Signals and Systems
Lecture 2 - Role of Analog Signal Processing in Electronic Products - Part I
Lecture 3 - Role of Analog Signal Processing in Electronic Products - Part II
Lecture 4 - Analog Signal Processing using One Port Networks
Lecture 5 - Analog Signal Processing using One Port Networks, Passive Two Ports and Ideal amplifiers
Lecture 6 - Synthesis of Amplifiers using Nullators and Norators
Lecture 7 - Passive Electronic Devices for Analog Signal Processing
Lecture 8 - Active Devices for Analog Signal Processing Systems
Lecture 9 - Electronic Devices for Analog Circuits - Part I
Lecture 10 - Electronic Devices for Analog Circuits - Part II
Lecture 11 - Feedback in Systems
Lecture 12 - Static Charecteristic of Feedback Systems
Lecture 13 - Dynamic Behaviour of Feedback Systems - Part I
Lecture 14 - Dynamic Behavior of Feedback Systems - Part II
Lecture 15 - Design of Feedback Amplifiers - Part I
Lecture 16 - Design of Feedback Amplifiers - Part II
Lecture 17 - Design of Feedback Amplifiers and Instrumentation Amplifiers
Lecture 18 - Instrumentation Amplifiers, Integrators and Differentiators
Lecture 19 - Non-linear Analog Signal Processing
Lecture 20 - DC Voltage Regulators
Lecture 21 - Filters - Approximations to ideal filter functions
Lecture 22 - Passive Filters - Part I
Lecture 23 - Passive Filters - Part II
Lecture 24 - Active Filters - Part I
Lecture 25 - Active Filters - Part II
Lecture 26 - Active Filters
Lecture 27 - State Space Filters
Lecture 28 - Universal Active Filter - Effect of Active Device GB
Lecture 29 - State-Space Filters (Tuning of Filters)

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Lecture 30 - Automatic Tuning of Filters (PLL) and Review of Filter Design
Lecture 31 - Waveform Generation
Lecture 32 - LC Oscillator - Effect of Non-idealities
Lecture 33 - Transconductor based Oscillator
Lecture 34 - Regenerative Comparators and Non-Sinusoidal Oscillators
Lecture 35 - Non-Sinusoidal Oscillators and VCO (FM & FSK Generators)
Lecture 36 - Phase and Frequency Followers
Lecture 37 - Frequency Locked Loop (Popularly known as PLL)
Lecture 38 - Design of PLL and FLL
Lecture 39 - Analog System Design
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NPTEL Video Course - Electronics and Communication Engineering - NOC:Design and Simulation of DC-DC converter

Subject Co-ordinator - Prof. L. Umanand

Co-ordinating Institute - IISc - Bangalore

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - System Overview
Lecture 2 - Understanding Rectifier with C-filter
Lecture 3 - Setting up gEDA, ngSpice and Octave
Lecture 4 - Simulation walk-through
Lecture 5 - Designing the rectifier capacitor filter circuit
Lecture 6 - Startup surge limiting
Lecture 7 - DC-DC converter concepts
Lecture 8 - Buck, Boost and Buck-Boost Converters
Lecture 9 - Simulation Example of Buck Converter
Lecture 10 - Understanding Buck Converter
Lecture 11 - Understanding Boost and Buck-Boost
Lecture 12 - Forward Converter Topology
Lecture 13 - Waveforms and Design
Lecture 14 - Simulation of Forward Converter
Lecture 15 - Forward Converter with Lossless Core Reset
Lecture 16 - Transformer Design
Lecture 17 - Inductor Design
Lecture 18 - Flyback Converter Topology
Lecture 19 - Pushpull Converter
Lecture 20 - Half and Full Bridge Converters
Lecture 21 - Close Loop Operation of Converters
Lecture 22 - Simulation examples
Lecture 23 - Multi-Output Converters
Lecture 24 - Concluding Remarks

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NPTEL Video Course - Electronics and Communication Engineering - NOC:Enclosure Design of Electronics Equipmer

Subject Co-ordinator - Prof. N. V Chalapathi Rao

Co-ordinating Institute - IISc - Bangalore

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Enclosure design for Electronics Equipment Introduction
Lecture 2 - Aspects and features that are non electrical and are essential to Electronic Product Realisation
Lecture 3 - Enclosure Design in electronic equipment
Lecture 4 - Design as applied to small electronics products and projects
Lecture 5 - Sketching in design for communication
Lecture 6 - Sketching as a tool with example and exercise
Lecture 7 - Sketching Part 2
Lecture 8 - Enclosures to Product design
Lecture 9 - Examples of product enclosures ID_PD
Lecture 10 - Enclosures with detailing
Lecture 11 - Alternate Designs in an everyday item
Lecture 12 - Sheet metal in small equipment (PSU)
Lecture 13 - Layouts and Materials of small equipment
Lecture 14 - Materials used for construction
Lecture 15 - Materials choice
Lecture 16 - Aluminium for common equipment
Lecture 17 - Use of Aluminium extrusions
Lecture 18 - Application of Sheet metal
Lecture 19 - Sheet Metal bending
Lecture 20 - Development of enclosures for bending
Lecture 21 - Video of Fabrication
Lecture 22 - What can be done in the lab Bending
Lecture 23 - Issues in bending and folding
Lecture 24 - Making a quick model
Lecture 25 - Detailing in plastic
Lecture 26 - Fabricating with flat plastic
Lecture 27 - Video in ID Lab
Lecture 28 - Off the shelf enclosures
Lecture 29 - Ready made enclosures

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Lecture 30 - Application documentation and Selection
Lecture 31 - Index of protection, Safety
Lecture 32 - NEMA and related
Lecture 33 - Testing for IP class
Lecture 34 - Sealed Enclosures Video
Lecture 35 - Public utility boxes
Lecture 36 - EMI Sealing
Lecture 37 - Sealed Enclosures 2
Lecture 38 - Gasketing practice
Lecture 39 - Gasketing Basics
Lecture 40 - Off the shelf Aluminum enclosures
Lecture 41 - Understanding
Lecture 42 - Heat sink enclosures
Lecture 43 - Detailing of Built in Heat sink boxes
Lecture 44 - Connector basics
Lecture 45 - Connectors - Part 2
Lecture 46 - Common connectors
Lecture 47 - Connectors (multi way) and CoAx
Lecture 48 - MIL C connectors
Lecture 49 - CAD in Layout Drawing
Lecture 50 - Types of CAD
Lecture 51 - CAD for enclosure Design
Lecture 52 - Egpt layout with CAD
Lecture 53 - CAD sample Example
Lecture 54 - CAD Layout
Lecture 55 - Detailing with CAD
Lecture 56 - Integrating Products with CAD
Lecture 57 - Product Detailing
Lecture 58 - Components CAD Physical Models
Lecture 59 - Sheet Metal and Plastic common details
Lecture 60 - Sample of Simple Organic Shapes
Lecture 61 - Conclusion
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NPTEL Video Course - Electronics and Communication Engineering - NOC:Design of Photovoltaic Systems

Subject Co-ordinator - Prof. L. Umanand

Co-ordinating Institute - IISc - Bangalore

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - A historical perspective
Lecture 2 - PV cell characteristics and equivalent circuit
Lecture 3 - Model of PV cell
Lecture 4 - Short Circuit, Open Circuit and peak power parameters
Lecture 5 - Datasheet study
Lecture 6 - Cell efficiency
Lecture 7 - Effect of temperature
Lecture 8 - Temperature effect calculation example
Lecture 9 - Fill factor
Lecture 10 - PV cell simulation
Lecture 11 - Identical cells in series
Lecture 12 - Load line
Lecture 13 - Non-identical cells in series
Lecture 14 - Protecting cells in series
Lecture 15 - Interconnecting modules in series
Lecture 16 - Simulation of cells in series
Lecture 17 - Identical cells in parallel
Lecture 18 - Non-identical cells in parallel
Lecture 19 - Protecting cells in parallel
Lecture 20 - Interconnecting modules
Lecture 21 - Simulation of cells in parallel
Lecture 22 - Practicals - Measuring i-v characteristics
Lecture 23 - Practicals - PV source emulation
Lecture 24 - Introduction
Lecture 25 - Insolation and irradiance
Lecture 26 - Insolation variation with time of day
Lecture 27 - Earth centric viewpoint and declination
Lecture 28 - Solar geometry
Lecture 29 - Insolation on a horizontal flat plate

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Lecture 30 - Energy on a horizontal flat plate
Lecture 31 - Sunrise and sunset hour angles
Lecture 32 - Examples
Lecture 33 - Energy on a tilted flat plate
Lecture 34 - Energy plots in octave
Lecture 35 - Atmospheric effects
Lecture 36 - Airmass
Lecture 37 - Energy with atmospheric effects
Lecture 38 - Clearness index
Lecture 39 - Clearness index and energy scripts in Octave
Lecture 40 - Sizing PV for applications without batteries
Lecture 41 - Sizing PV Examples
Lecture 42 - Batteries - intro
Lecture 43 - Batteries - Capacity
Lecture 44 - Batteries - C-rate
Lecture 45 - Batteries - Efficiency
Lecture 46 - Batteries - Energy and power densities
Lecture 47 - Batteries - Comparison
Lecture 48 - Battery selection
Lecture 49 - Other energy storage methods
Lecture 50 - PV system design - Load profile
Lecture 51 - PV system design - Days of autonomy and recharge
Lecture 52 - PV system design - Battery size
Lecture 53 - PV system design - PV array size
Lecture 54 - Design toolbox in octave
Lecture 55 - MPPT concept>
Lecture 56 - Input impedance of DC-DC converters - Boost converter
Lecture 57 - Input impedance of DC-DC converters - Buck converter
Lecture 58 - Input impedance of DC-DC converters - Buck-Boost converter
Lecture 59 - Input impedance of DC-DC converters - PV module in SPICE
Lecture 60 - Input impedance of DC-DC converters -Simulation - PV and DC-DC interface
Lecture 61 - Impedance control methods
Lecture 62 - Impedance control methods- Reference cell - voltage scaling
Lecture 63 - Impedance control methods- Reference cell - current scaling
Lecture 64 - Impedance control methods- Reference cell - Sampling method
Lecture 65 - Impedance control methods- Reference cell - Power slope method 1
Lecture 66 - Impedance control methods- Reference cell - Power slope method 2
Lecture 67 - Impedance control methods- Reference cell - Hill climbing method
Lecture 68 - Practical points - Housekeeping power supply
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Lecture 69 - Practical points - Gate driver
Lecture 70 - Practical points - MPPT for non-resistive loads
Lecture 71 - Simulation - MPPT
Lecture 72 - Direct PV-battery connection
Lecture 73 - Charge controller
Lecture 74 - Battery charger - Understanding current control
Lecture 75 - Battery charger - slope compensation
Lecture 76 - Battery charger - simulation of current control
Lecture 77 - Batteries in series - charge equalisation
Lecture 78 - Batteries in parallel
Lecture 79 - Peltier device - principle
Lecture 80 - Peltier element - datasheet
Lecture 81 - Peltier cooling
Lecture 82 - Thermal aspects
Lecture 83 - Thermal aspects - Conduction
Lecture 84 - Thermal aspects - Convection
Lecture 85 - Thermal aspects - A peltier refrigeration example
Lecture 86 - Thermal aspects - Radiation and mass transport
Lecture 87 - Demo of Peltier cooling
Lecture 88 - Water pumping principle
Lecture 89 - Hydraulic energy and power
Lecture 90 - Total dynamic head
Lecture 91 - Numerical solution - Colebrook formula
Lecture 92 - Octave script for head calculation
Lecture 93 - PV and Water Pumping Examples
Lecture 94 - Octave script for hydraulic power
Lecture 95 - Centrifugal pump
Lecture 96 - Reciprocating pump
Lecture 97 - PV power
Lecture 98 - Pumped hydro application
Lecture 99 - Grid connection principle
Lecture 100 - PV to grid topologies Part-I
Lecture 101 - PV to grid topologies Part-II
Lecture 102 - PV to grid topologies Part-III
Lecture 103 - 3ph d-q controlled grid connection intro
Lecture 104 - 3ph d-q controlled grid connection dq-axis theory
Lecture 105 - 3ph d-q controlled grid connection  AC to DC transformations
Lecture 106 - 3ph d-q controlled grid connection DC to AC transformations
Lecture 107 - 3ph d-q controlled grid connection Complete 3ph grid connection
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Lecture 108 - 1ph d-q controlled grid connection
Lecture 109 - 3ph PV-Grid interface example
Lecture 110 - SVPWM - discrete implementation
Lecture 111 - SVPWM - analog implementation
Lecture 112 - Application of integrated magnetics
Lecture 113 - Life cycle Costing Growth models
Lecture 114 - Life cycle Costing Growth model examples
Lecture 115 - Life cycle Costing Annual payment and present worth factor
Lecture 116 - Life cycle Costing LCC with example - 1
Lecture 117 - Life cycle Costing LCC example - 2
Lecture 118 - Life cycle Costing LCC example - 3
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NPTEL Video Course - Electronics and Communication Engineering - NOC:Photonic Integrated Circuits

Subject Co-ordinator - Dr. Srinivas Talabatulla

Co-ordinating Institute - IISc - Bangalore

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Photonic Integrated Circuits
Lecture 2 - Optical Waveguide Theory - Symmetric Waveguides
Lecture 3 - Optical Waveguide Theory - Asymmetric Waveguides
Lecture 4 - Vector Modes
Lecture 5 - Channel Waveguide
Lecture 6 - Directional Coupler and Coupled Mode Theory
Lecture 7 - Passive Devices and Beam Propagation Method
Lecture 8 - Dynamic Devices
Lecture 9 - Integrated optical Systems and Applications
Lecture 10 - Fabrication and Characterisation
Lecture 11 - MOEMS
Lecture 12 - Ring Resonators
Lecture 13 - Photonic Band Gap Devices
Lecture 14 - Lecture Summary

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NPTEL Video Course - Electronics and Communication Engineering - NOC:Neural Science for Engineers

Subject Co-ordinator - Prof. Vikas V

Co-ordinating Institute - IISc - Bangalore

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Course Outline and Scope
Lecture 2 - Biological Information Systems
Lecture 3 - Analogy between Living Systems with Semiconductor Structures
Lecture 4 - Action Potential - I
Lecture 5 - Action Potential - II
Lecture 6 - Synaptic Potential
Lecture 7 - Threshold and Action Potential Propogation
Lecture 8 - Anatomy of a Neuron
Lecture 9 - Neuro Muscular Junction
Lecture 10 - Spatial and Temporal Summation of neuronal electrical activities
Lecture 11 - Brain Anatomy Introduction
Lecture 12 - Architecture of the Nervous System
Lecture 13 - Architecture of the Nervous System (Continued...)
Lecture 14 - Analog and Digital Processing in the Neuron - I
Lecture 15 - Analog and Digital Processing in the Neuron - II
Lecture 16 - Energy Sources of Neuronal Systems
Lecture 17 - Skull Demonstration
Lecture 18 - Brain Anatomy: Skull
Lecture 19 - Brain Anatomty 3D - I
Lecture 20 - Brain Anatomty 3D - II
Lecture 21 - Brain Anatomty 3D - III
Lecture 22 - Basics of Brain Imaging Techniques
Lecture 23 - Brain anatomy using MR images - I
Lecture 24 - Brain anatomy using MR images - II
Lecture 25 - Spinal Cord Anatomy
Lecture 26 - Reflexes: Introduction
Lecture 27 - Monosynaptic Reflexes
Lecture 28 - Polysynaptic Reflexes
Lecture 29 - Criteria for electrode material

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Lecture 30 - Introduction to brain stimulation
Lecture 31 - Brain Stimulation: Device fabrication - Illustration
Lecture 32 - Brain Stimulation: Electronic Systems (Current Mirrors)
Lecture 33 - Brain regions and associated functions
Lecture 34 - Human vision system - II
Lecture 35 - Network analysis during visual processing
Lecture 36 - Control of eye movements
Lecture 37 - COMSOL Multiphysics for Medical Devices
Lecture 38 - COMSOL Brain Electrical Stimulation Demo
Lecture 39 - Human vision system - III
Lecture 40 - Human auditory system - I
Lecture 41 - Human auditory system - II
Lecture 42 - Human auditory system - III
Lecture 43 - The human balance system
Lecture 44 - Movement: Introduction
Lecture 45 - Movement: Synchronization
Lecture 46 - Movement: Role of Spinall Cord
Lecture 47 - Movement: Role of Cerebellum
Lecture 48 - Memory and Learning - I
Lecture 49 - Memory and Learning - II
Lecture 50 - Microengineering devices for Neural Signal Acquisiton
Lecture 51 - Microfabrication Process for Multi Electrode Array
Lecture 52 - Introduction and Applications of Event Related Potentials
Lecture 53 - ERP Extraction Demonstration
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NPTEL Video Course - Electronics and Communication Engineering - NOC:Analog Circuits and Systems

Subject Co-ordinator - Prof. K Radhakrishna Rao

Co-ordinating Institute - IIT - Madras, Texas Instruments, Freelancer

Sub-Titles - Available / Unavailable | MP3 Audio Lectures - Available / Unavailable

Lecture 1 - Introduction to Sensors, Signals and Systems
Lecture 2 - Role of Analog Signal Processing in Electronic Products - Part 1
Lecture 3 - Role of Analog Signal Processing in Electronic Products - Part 2
Lecture 4 - Analog Signal Processing using One Port Networks
Lecture 5 - Analog Signal Processing using One Port Networks, Passive Two Ports and Ideal amplifiers
Lecture 6 - Synthesis of Amplifiers using Nullators and Norators
Lecture 7 - Passive Electronic Devices for Analog Signal Processing
Lecture 8 - Active Devices for Analog Signal Processing Systems
Lecture 9 - Electronic Devices for Analog Circuits
Lecture 10 - Electronic Devices for Analog Circuits
Lecture 11 - Feedback in Systems
Lecture 12 - Static Charecteristic of Feedback Systems
Lecture 13 - Dynamic Behavior of Feedback Systems - Part I
Lecture 14 - Dynamic Behavior of Feedback Systems - Part II
Lecture 15 - Design of Feedback Amplifiers
Lecture 16 - Design of Feedback Amplifiers
Lecture 17 - Design of Feedback Amplifiers and Instrumentation Amplifiers
Lecture 18 - Instrumentation Amplifiers, Integrators and Differentiators
Lecture 19 - Non-linear Analog Signal Processing
Lecture 20 - DC Voltage Regulators
Lecture 21 - Filters - Approximations to ideal filter functions
Lecture 22 - Passive Filters - Part 1
Lecture 23 - Passive Filters - Part 2
Lecture 24 - Active Filters - Part 1
Lecture 25 - Active Filters - Part 2
Lecture 26 - Active Filters: Q-enhancement
Lecture 27 - State Space Filters
Lecture 28 - Universal Active Filter - Effect of Active Device GB
Lecture 29 - State-Space Filters (Tuning of Filters)

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Lecture 30 - Automatic Tuning of Filters (PLL) and Review of Filter Design
Lecture 31 - Waveform Generation
Lecture 32 - LC Oscillator - Effect of Non-idealities
Lecture 33 - Transconductor based Oscillator
Lecture 34 - Regenerative Comparators and Non-Sinusoidal Oscillators
Lecture 35 - Non-Sinusoidal Oscillators and VCO (FM and FSK Generators)
Lecture 36 - Phase and Frequency Followers
Lecture 37 - Frequency Locked Loop (Popularly known as PLL)
Lecture 38 - Design of PLL and FLL
Lecture 39 - Analog System Design
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