

NPTEL Video Lecture Topic List - Created by LinuXpert Systems, Chennai

NPTEL Video Course - Electrical Engineering - NOC:Mathematical Methods and Techniques in Signal Processing

Subject Co-ordinator - Prof. Shayan Srinivasa Garani

Co-ordinating Institute - IISc - Bangalore

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

- Lecture 1 - Introduction to signal processing
- Lecture 2 - Basics of signals and systems
- Lecture 3 - Linear time-invariant systems
- Lecture 4 - Modes in a linear system
- Lecture 5 - Introduction to state space representation
- Lecture 6 - State space representation
- Lecture 7 - Non-uniqueness of state space representation
- Lecture 8 - Introduction to vector space
- Lecture 9 - Linear independence and spanning set
- Lecture 10 - Unique representation theorem
- Lecture 11 - Basis and cardinality of basis
- Lecture 12 - Norms and inner product spaces
- Lecture 13 - Inner products and induced norm
- Lecture 14 - Cauchy Schwartz inequality
- Lecture 15 - Orthonormality
- Lecture 16 - Problem on sum of subspaces
- Lecture 17 - Linear independence of orthogonal vectors
- Lecture 18 - Hilbert space and linear transformation
- Lecture 19 - Gram Schmidt orthonormalization
- Lecture 20 - Linear approximation of signal space
- Lecture 21 - Gram Schmidt orthogonalization of signals
- Lecture 22 - Problem on orthogonal complement
- Lecture 23 - Problem on signal geometry (4-QAM)
- Lecture 24 - Basics of probability and random variables
- Lecture 25 - Mean and variance of a random variable
- Lecture 26 - Introduction to random process
- Lecture 27 - Statistical specification of random processes
- Lecture 28 - Stationarity of random processes
- Lecture 29 - Problem on mean and variance

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- Lecture 30 - Problem on MAP Detection
- Lecture 31 - Fourier transform of dirac comb sequence
- Lecture 32 - Sampling theorem
- Lecture 33 - Basics of multirate systems
- Lecture 34 - Frequency representation of expanders and decimators
- Lecture 35 - Decimation and interpolation filters
- Lecture 36 - Fractional sampling rate alterations
- Lecture 37 - Digital filter banks
- Lecture 38 - DFT as filter bank
- Lecture 39 - Noble Identities
- Lecture 40 - Polyphase representation
- Lecture 41 - Efficient architectures for interpolation and decimation filters
- Lecture 42 - Problems on simplifying multirate systems using noble identities
- Lecture 43 - Problem on designing synthesis bank filters
- Lecture 44 - Efficient architecture for fractional decimator
- Lecture 45 - Multistage filter design
- Lecture 46 - Two-channel filter banks
- Lecture 47 - Amplitude and phase distortion in signals
- Lecture 48 - Polyphase representation of 2-channel filter banks, signal flow graphs and perfect reconstruction
- Lecture 49 - M-channel filter banks
- Lecture 50 - Polyphase representation of M-channel filter bank
- Lecture 51 - Perfect reconstruction of signals
- Lecture 52 - Nyquist and half band filters
- Lecture 53 - Special filter banks for perfect reconstruction
- Lecture 54 - Introduction to wavelets
- Lecture 55 - Multiresolution analysis and properties
- Lecture 56 - The Haar wavelet
- Lecture 57 - Structure of subspaces in MRA
- Lecture 58 - Haar decomposition - 1
- Lecture 59 - Haar decomposition - 2
- Lecture 60 - Wavelet Reconstruction
- Lecture 61 - Haar wavelet and link to filter banks
- Lecture 62 - Demo on wavelet decomposition
- Lecture 63 - Problem on circular convolution
- Lecture 64 - Time frequency localization
- Lecture 65 - Basic analysis
- Lecture 66 - Basic Analysis
- Lecture 67 - Fourier series and notions of convergence
- Lecture 68 - Convergence of Fourier series at a point of continuity

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- Lecture 69 - Convergence of Fourier series for piecewise differentiable periodic functions
- Lecture 70 - Uniform convergence of Fourier series of piecewise smooth periodic function
- Lecture 71 - Convergence in norm of Fourier series
- Lecture 72 - Convergence of Fourier series for all square integrable periodic functions
- Lecture 73 - Problem on limits of integration of periodic functions
- Lecture 74 - Matrix Calculus
- Lecture 75 - KL transform
- Lecture 76 - Applications of KL transform
- Lecture 77 - Demo on KL Transform
- Lecture 78 - Live Session
- Lecture 79 - Live Session 2